

## **General Analysis of the Distributor's Rate Structures**

### **Rates**



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## 1 INTRODUCTION

1 Hydro-Quebec Distribution (hereafter, the Distributor) presents to the Régie  
2 de l'Énergie (hereafter, the Régie) the general framework of analysis for the  
3 structure of its rates, arising from the 2005-2006 rate hearing.

4 The present request follows upon decision D-2004-64 of the Régie which  
5 accommodated the request of the Distributor to defer two subjects of Phase 3  
6 from case R-3492-2002, these subjects being the rate structures and the  
7 cost of administrative services, related to the 2005-2006 rate hearing.

8 In this same decision, the Régie required the holding of technical meetings  
9 with the interveners on these same subjects<sup>1</sup>. Three meetings were held  
10 in May and June 2004. At the first session, the Distributor presented  
11 the generally recognized principles in regards to rate structures and their  
12 possible implications on its current rates in the form of base rate scenarios.  
13 In the second meeting, the interveners formulated various options  
14 with a view to compare and contrast the base rate scenarios.  
15 In the third meeting, the Distributor presented an analysis  
16 of these options, an analysis which is integrated in the present request.

17 The Distributor presents in this request a framework of analysis and different  
18 scenarios relating to the development of the structures for each of the basic rates.  
19 It should be noted that the modifications to the tariff structures analyzed do not  
20 affect the cross-subsidization between the applicable rates of the various  
21 consumer categories.

22 In addition, this document presents the general framework of analysis of  
23 the rate structure of the Distributor. Firstly, General Principles  
24 referring to the development of rate components are introduced.

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<sup>1</sup> Within the framework of Phase 2 of the R-3492-2002 proceedings, four technical meetings have also been held from November 2002 to April 2003.

1 Secondly, the methodology used to analyze  
2 the rate components is explained.

## **2 RATE MAKING PRINCIPLES**

3 The Distributor can recover the revenue authorized by the Régie via an endless  
4 number of rate structures going from a flat rate for all customers  
5 (authorized revenue/sale in kWh) to a multitude of unique rates  
6 comprising every fixed and variable component. The choice as to  
7 the number of rates, the type of rate structure and the level of each rate  
8 component is made according to the principles which follow.

### **2.1 REFLECTING THE COST OF SERVICE STRUCTURE**

9 The rates constitute a price signal which allows the customer to be aware of the  
10 costs associated with its electricity demand. The design of the various rates  
11 consists of reflecting the costs of service between fixed and variable components  
12 in order to attribute the particular cost of the services by rate category. It  
13 also allows the equal treatment of customers who share  
14 similar patterns of consumption.

15 From a rate perspective, the costs of service are expressed in terms of  
16 capacity, energy and connection costs.

17 The invoicing of capacity normally makes it possible to recover the costs of  
18 the equipments necessary to respond to peak demand.  
19 Even in the absence of any energy consumption in kilowatt-hours, these  
20 equipments and services must be maintained and consequently invoiced. Thus,  
21 the costs of transmission and of the distribution network associated with each rate  
22 category are fixed costs since they are related to peak requirements. They would  
23 thus need to be recovered via the capacity component of the rates.

1 Certain expenses depend on the quantity of energy delivered. They represent  
2 variable charges which are normally recovered in the energy component  
3 of the rates. Consequently, the cost to supply energy for each rate category is  
4 expressed in ¢/kWh. It should be noted, however, that even if this cost is included  
5 in the energy component of the rate, it still nevertheless reflects  
6 peak capacity needs for each rate category since the allocation of this cost is  
7 notably calculated using the ratio of utilization.

8 Other expenses are based on the number of customers served  
9 independent of their level of consumption. These expenses, such as the cost of  
10 metering, reading and billing, are normally recovered in  
11 the form of a subscription charge when they are significant.

## **2.2 PRICE SIGNALS FOR ENERGY EFFICIENCY**

12 In order to guarantee the optimal use of resources, economic theory  
13 suggests that the price of a good is fixed according to the long term marginal cost,  
14 i.e. the cost associated with the production of an additional unit of this good.  
15 However, in Quebec like elsewhere, average costs are used to  
16 establish the level of base electricity rates.

17 In the absence of marginal cost rate making, it is still possible to induce  
18 good economic and energy consumption choices while reflecting, in the rate  
19 structures, the price signals provided by marginal costs. It is not the intention  
20 here to fix the rates according to marginal costs but rather to use the marginal  
21 costs and their intrinsic structure — that is to say, the costs of energy and capacity  
22 — as indicators of the changes that are to be embedded in the rate  
23 structures for the long term planning horizon.

24 The price signal from the long term marginal cost will have a greater effect on  
25 the behavior of customers if it is applied to the most elastic components

1 of the rate structures <sup>2</sup>. Rate making can thus encourage consumers  
2 to make rational use of electricity by informing them of the impact of their  
3 behavior on the costs of the Distributor.

4 *"the principle of economic efficiency (....) implies a reflection*  
5 *on each customer of the total costs that they impose on the*  
6 *electric system based on their electricity use. As a*  
7 *function of this cost, reflected in the rate, each customer decides*  
8 *independently if it maintains its demand or if it modifies it.*  
9 *Economic efficiency is thus assured (...) <sup>3</sup>. "*

10 *"The customer makes his choices on the basis of his own interest (...). It is*  
11 *therefore the company's responsibility to inform him of the economic*  
12 *consequences of its decisions on society (....) The objective of*  
13 *marginal cost rate making, as practiced by Electricité de France,*  
14 *is defined as follows: by means of a price signal, to incite*  
15 *consumers to use the electric system in the best way possible*  
16 *for the general interest <sup>4</sup>. "*

17 The use of marginal costs in rate design is typically imposed on  
18 regulated monopolies.

19 *« Since electric utilities generally do not operate in competitive*  
20 *markets that would impose cost discipline upon them, regulation*  
21 *must fulfill that function. This objective is promoted by setting rates*  
22 *that reflect, to the greatest extent possible, the long-run marginal*  
23 *costs of production <sup>5</sup>.»*

24 The British Columbia Utilities Commission also has as a mandate to support  
25 energy efficiency via a rate which reflects the signals given by marginal costs.  
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27 *« In designing B.C. Hydro electricity rates, the Commission shall*  
28 *ensure that those rates contribute to conservation and efficient*

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<sup>2</sup> Ways in which the customers can act in reaction to a signal of price.

<sup>3</sup> Electricity of France, *Electricity Rate Making in France: principles and construction of schedules*, DEPS Rate Making, Book 30, June 1995, page 3.

<sup>4</sup> Electricity of France, *Electricity Rate Making in France: principles and construction of schedules*, DEPS Rate Making, Book 30, June 1995, page 5.

<sup>5</sup> Weston, Frederick, « Charging for distribution utility services : Issues in rate design», The Regulatory Assistance Project, décembre 2000, pages 22-23.

1 *electricity use by reflecting the total cost of new sources of electricity*  
2 *supply (...) <sup>6</sup>. "*

3 The Ontario Energy Board adopts the same principle with regard to the costs of  
4 distribution:

5 *« The basis of the volumetric charge is the incremental distribution*  
6 *cost (...). Conceptually it represents the cost of providing the next*  
7 *kWh and includes incremental operating and maintenance expenses*  
8 *incremental capital investment, and incremental financing charges<sup>7</sup>. »*

9 The marginal costs used in the present rate hearing are the same ones as  
10 those presented in the R-3519-2003 proceeding to seek  
11 budgetary approval for the Global energy efficiency plan.

### **2.3 SIMPLICITY, EQUITY, RATE CONTINUITY, AND STABILITY**

12 The principle of simplicity must generally guide the design of the rates.  
13 Simplicity means on the one hand to avoid having too many rates or building  
14 custom rates for all the customers, and also to conceive rates that are  
15 easy to understand and apply. It is also for reasons of  
16 simplicity that the Distributor does not invoice capacity to the domestic customers  
17 with a load of less than 50 kW and of small capacity customers with a  
18 load of less than 40 kW.

19 Rate simplicity must be achieved while respecting the tariff making principle of  
20 equity<sup>8</sup>, whether between rate categories or between the customers of a same rate  
21 category. Indeed, although the customers within a rate category present  
22 great similarities as to their consumption profile, their position on the distribution

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<sup>6</sup> The Government of British Columbia, "Special Directive No. 8 to the British Columbia Utilities Commission ", March 2000.

<sup>7</sup> Ontario Energy Board, "Electricity Distribution Rate Handbook", chapter 3, page 3-3, November 2000.

<sup>8</sup> This principle is also adopted by the Ontario Energy Board: "The volumetric charge is intended to reflect, to some degree, differences in customers' use of the distribution system and, as such, addresses equity between customers within a customer class.» (Electricity Distribution Rate Handbook, Chapitre 3, page 3-3, November 2000).

1 network as well as the services used, they nevertheless generate  
2 a large diversity of costs. Since all customers of a  
3 rate category are invoiced following the same rate, some among them will pay  
4 more than their share of costs whereas others will pay less. Equity within one  
5 rate category is guaranteed when, for the sub-groups of customers who  
6 form the rate category, the difference between the costs and the revenues  
7 generated is reasonable<sup>9</sup>.

8 Taking into account the cross subsidization within a rate category, a modification  
9 to the rate structure, although realized with constant revenues, implies  
10 theoretically that certain customers will see an increase in costs while others will  
11 see a decrease. Concretely, the adjustments to rate structures are undertaken  
12 within the framework of requests for increased rates. The "increase" associated  
13 with the modification in structure would thus be added to the regular rate increase  
14 and certain customers could experience increases higher than the average. This  
15 cumulative effect must be taken into account to determine the period necessary to  
16 reach the desired rate structure.

17 Continuity between the rates makes it possible to ensure equity between  
18 rate categories. In respecting this principle, rate structures  
19 encourage customers to naturally choose the rate which corresponds to their  
20 level of consumption and with the utilization period of their maximum capacity  
21 demand.

22 The defined rate structures should eventually ensure the stability of the rates.  
23 The Adjustments to the rate structures should be made in a progressive way and it  
24 would be preferable to use rate options as opposed to  
25 a complete restructuring of base rates so as to respect the freedom of choice of  
26 the consumers and to take into account their capacity to modify their  
27 load profiles.

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<sup>9</sup> It is what is called the measurement of cross subsidization. A variation of 10 % is considered reasonable.

### **3 METHODOLOGICAL FRAMEWORK**

1 In order to better analyze the evolution of the rate components, it is necessary  
2 to present the steps taken by the Distributor to establish the basic structures of  
3 each tariff. The principal parameters used are the required revenues  
4 and the reference revenues. The steps in determining the “sub-rate”  
5 classes (tarifs satellites) is treated separately in section 3.3.

#### **3.1 REQUIRED REVENUES**

6 The required revenues represent the totals costs of generation,  
7 transmission, distribution and customer service, including a return on capital,  
8 required by the Distributor to offer the service to its customers.  
9 Given the maintenance of cross subsidization, revenues required from each  
10 consumer category does not represent the total revenues to be generated from the  
11 rates and cannot thus be the objective to be reached. Instead, they represent a  
12 pure signal for the cost of service, exempt from the distortion related to  
13 cross subsidization. The required revenues are thus useful not to fix the  
14 level of the rates suggested for each category of consumers but rather  
15 to gauge the components of each of the rate structures of the Distributor.

#### **3.2 REFERENCE REVENUES**

16 The reference revenues correspond to the simulated revenues arising from the  
17 rates as of April 1<sup>st</sup> 2004 and of the most recent revenue data arising from each  
18 customer having at least one year of history. Thus rate simulations  
19 are carried out including almost all the subscription base from each rate category.  
20 In the framework of this hearing, the reference historical data  
21 cover the period from September 1<sup>st</sup>, 2002 to August 30<sup>th</sup>, 2003.  
22 This period constitutes the most recent year of consumption available at  
23 the time of the establishment of the basic rate structures. It also allows

1 the inclusion of one complete winter and minimizes the rejections, inter alia,  
2 associated with moves.

3 In addition, the choice of another period would not influence the results since  
4 the consumption data is only used to illustrate the impact, with consumption  
5 held constant, of the modifications to the rate structures studied. The comparison,  
6 for each customer, of the revenues arising from a new rate structure with the  
7 reference revenues makes it possible to measure the impact and the dispersion of  
8 the revenue variations for each rate category. This result being obtained from  
9 the same consumption data, variations of revenues observed are  
10 directly attributable to the modifications of the rate structures and exclude  
11 any volume effect.

12 These impacts are however purely illustrative. In fact, since  
13 restructuring could be undertaken gradually at the time  
14 of the next rate increase, no customer would be invoiced from the  
15 basic price structures. They illustrate only one possible tendency  
16 in the evolution of the rate components and thus allow to rule on  
17 which components of the rates the next rate increase could  
18 target.

### **3.3 SUB-RATE CLASSES (tarifs satellites)**

19 In decision D-2003-93, the Régie has accepted categories of  
20 consumers proposed by the Distributor: domestic customers (rates  
21 D, DM, DH and DT), of small capacity (tariffs G, G-9, street lighting and fixed cost),  
22 medium capacity (tariff M) and large capacity (tariffs L and H).  
23 These regroupings are explained by fact that rate classes are  
24 determined starting from a basic rate; for example, the tariffs DM, DH and DT are  
25 dependent on tariff D. to maintain this balance between the rates of the same

- 1 category of consumers, the Distributor would have to account for
- 2 the repercussions from a modification of a basic rate over the sub-rate classes.