INDICATORS AND BENCHMARKING PLAN RELATED TO THE DISTRIBUTOR'S EFFICIENCY

TABLE OF CONTENT

1 INTRODUCTION

This document responds to the expectations of the Régie in the matters indicated and in the objective relative to the efficiency of the Distributor.

More precisely, the Régie, in its Decision D-2003-93 (pages 110-111) indicates that it:

- notes that the Distributor gave itself the global objective to absorb the natural growth of its activities by maintaining the current level of manpower around 7 400 employees;
- notice that the Distributor provided little benchmarking;
- inform the Distributor that the provision of benchmarking data would make its evidence more convincing;
- request the Distributor to produce a benchmarking plan accompanied by a timetable for implementation and a progress report presenting a statement of progress as well as the results available to date;
- request from the Distributor a demonstration of the concrete measures taken and results obtained by the Distributor to improve its productivity and its efficiency.

Vis-à-vis these expectations and observations as well as the evolution in the Distributor's work plan, the latter suggests to cover the efficiency aspects in three aspects: 1) the overall indicators covering all the activities of the Distributor, 2) the indicators and analyses related to performance as well as the efficiency of its main processes, and 3) a benchmarking plan. Each one of these aspects is pertinent in bringing to light the efficiency of the Distributor, but the right measurement of the gains realized or attained must be based on a total and simultaneous analysis of the three aspects.

These three aspects are respectively the subject of the sections which follow.

2 OVERALL EFFICIENCY OF THE DISTRIBUTOR

2.1 Choice of indicators

The principal criteria which guided the Distributor in the choice of its overall indicators of efficiency are as follows:

- limit the number of indicators, thus avoiding the overload of information;
- representation of the collective activities of the Distributor in line with its basic mission;
- representation of the costs on which the Distributor has good control;
- representation of financial reality;
- reliability and availability of the data;
- facility of historical comparison with other companies (the benchmarking).

The efficiency indicators must illustrate the efforts implemented to reach the results obtained; it is a relationship between the inputs and the outputs. For the inputs, three concepts of cost expressed in dollars were retained: cost of distribution and service to the customers, net operating costs and net fixed operating assets. The normalized sales and subscription numbers constitute the outputs. The sales represent the volume of business to which the Distributor must respond and make it possible to establish a direct link with the unit prices. Normalization of temperature has the affect of refining the volume of the annual sales variation due to variations in the climatic conditions and which do not have any impact on efficiency. As for the subscriptions, they are directly associated with the Distributor’s obligation to serve. In fact, the subscription represents the principal inductor of costs for the Distributor.

The Distributor retained the four following indicators:

- Cost of distribution and service to the customers/kWh normalized
- Net operating charges/subscription.
- Net operating charges/kWh normalized.
- Net fixed operating assets/subscription.

The indicators were selected for their complementarity. They provide a good overall representation of efficiency at a given moment. The Distributor thus hopes to be able to establish the link with the cost of service used for the establishment of the required revenues. Their follow-up over several years[1] permits the identification and better understanding of the factors contributing to their growth. In addition, it will allow it to conduct benchmarking with other companies and to communicate in a simple manner with the various interested parties (its personnel, the Régie, its customers, its partners, etc). These indicators will also be used as benchmarks by the Distributor in order to measure the improvement of overall efficiency.

2.2 Efficiency and quality of service

Before detailing each one of these indicators, it seems opportune to put in perspective the links that exist between the efficiency of the Distributor, the level of service offered and the customer satisfaction.

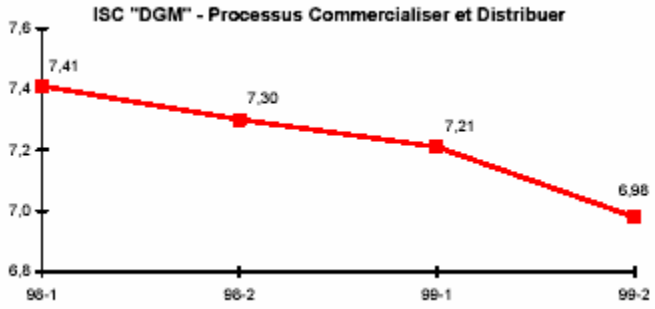
A brief return in the growth of the quality of the service, during the last few years, will make it possible to emphasize these links.

After having known significant improvements at the beginning of the 1990's, the service was hit hard by the continuation of the ice storm crisis, a lengthy labour dispute in 1999 and the breakdowns affecting the distribution network this same

[1] It should be noted that the growth of these indicators must relate to several years in order to smooth them specific and nonrecurring events which will inevitably affect the results.

summer. The graph which follows illustrates the growth of the customer satisfaction during a six-month period in the years 1998 and 1999.

SIC (Continuity of Service Index) "DGM" Commercial Processes of the Distributor



Given the service and the customer for the central to the Strategic Plan 2000-2004 in the theme of "to better serve our customers", the Distributor was given as objective to respond to the expectations of its customers and this, in a context of a rate freeze.

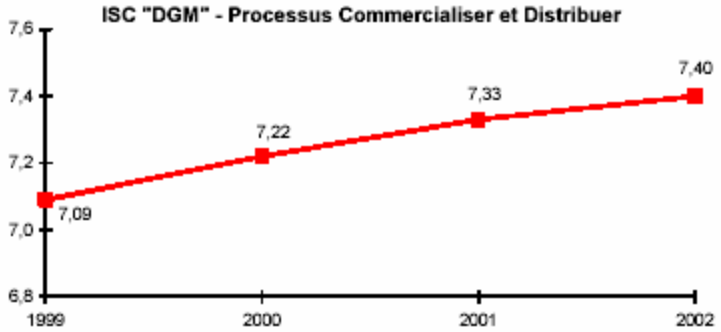
Several aspects of the service were brought to more acceptable levels: improvement of the continuity of service index (number of hours of interruption of service per year per customer) and in the delay in telephone responses but also responses to the priority expectations like the availability and the exactness of information at the time of the breakdowns, the advanced notices of planned outages, a greater respect for the delay in re-connecting the customers to the network, etc. Major projects like the implementation of the call centre were carried out and service offerings was expanded (ex: interactive services on the Web), with a view to enhancing the customers relationship.

In order to better serve the business customers, of which the level of satisfaction was inadequate, a particular effort was made to differentiate the service: appointed representative, visits, assessment, account managements and installation of automated meters allowing the offer of added value services (choice of date of reading, regrouping of invoices, Visilec).

Parallel to this readdressing, a reflection on the desired collective growth of the business processes that were utilized and that led to the SIC project which was approved in December 2002 by the Régie.

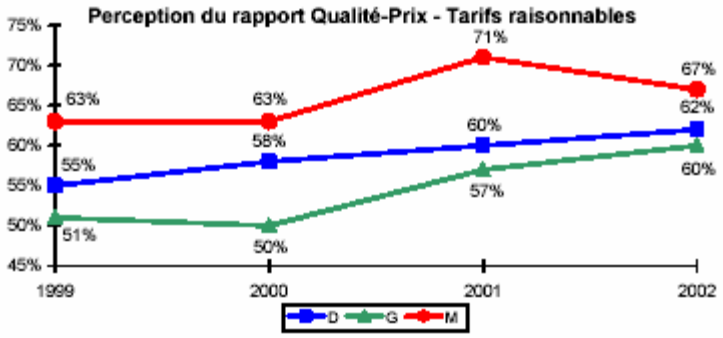
These significant efforts bore fruit as testified by the growth in satisfaction from 1999 to 2002.

SIC (Continuity of Service Index) "DGM" Commercial Processes of the Distributor



In a context of the rate freeze since 1998, one can affirm that the quality/price ratio clearly improved. The customers themselves are conscious of it as illustrated by the graph attached.

Perception of Quality/Price Received - Reasonable Rates



Question: *"When you think of the quality of the service of Hydro-Quebec, would you say that its tariffs are reasonable, too high or relatively low?"*

The Distributor favors actions which permit it to obtain good quality of customer service while maintaining or even improving its efficiency. Therefore, obtaining better quality of service should not be done at the price of a reduction in efficiency.

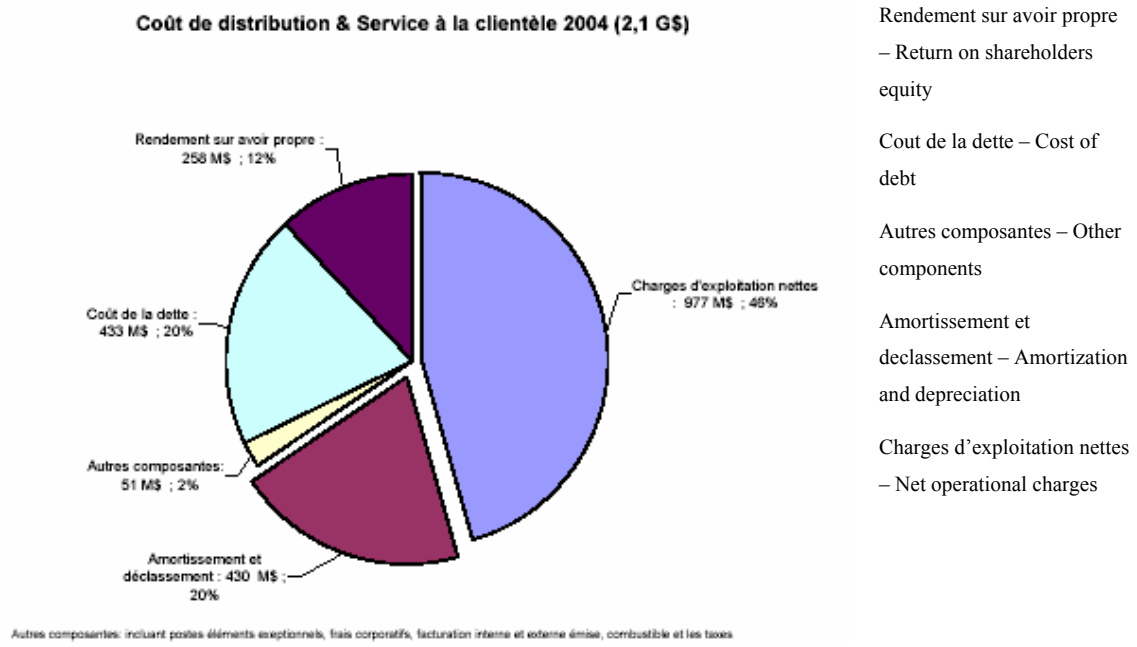
As to the links between the level of efficiency and the quality of the service established, the following sections presents the results of 2001 to 2004 for the selected indicators. Appendix 1 contains, in the form of cards, the detailed characteristics of the indicators proposed. Lastly, appendix 2 contains all the definitions used.

2.3 Distribution and service cost to the customers per normalized kWh

The distribution and service cost to the customers represents all the expenditure necessary for the realization of the activities specific to the Distributor. It excludes the expenditure on which the Distributor does not exert direct control such as cost of supplying electricity and the cost of transmission services.

The figure below presents the principal distribution and service cost components for the customers with their values for 2004, as presented in other parts of this evidence

2004 Distribution and Service Costs for the Customers ($2.1 B)



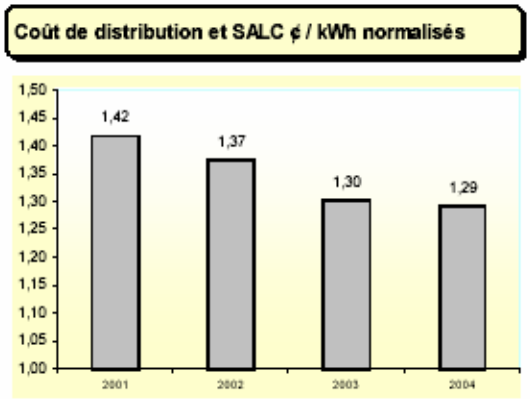
Other components include the exceptional entries, corporate expenses, internal and external submitted invoices, fuel and taxes

The net operating charges account for 46% of the whole. The amortization, arising from the depreciation of the investments realized by the Distributor, represents 20%. The cost of the capital, including the cost of debt (20%) and the return (12%), account for 32% of the whole cost of distribution and service to the customers. Finally, the $51 M or 2% remaining is composed of $178 M of taxes, corporate expenses and purchases of fuel to which are added $127 M of credits associated with the internal and external invoicing and with the exceptional elements.

The indicator *distribution and service cost to the customers per kWh normalized* measures the overall unit cost of the activities suitable for the distribution and service to the customers. It covers as much as the overall operational costs as

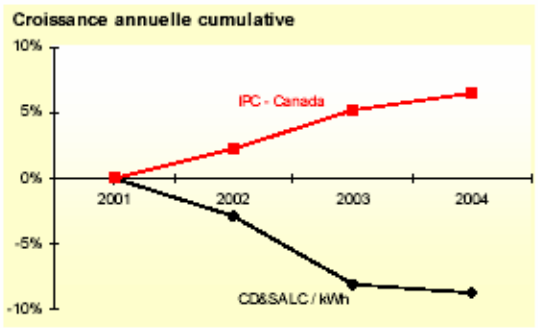
they do of the costs more directly connected to these activities. This indicator can also similarly be a tariff of Distribution and Service to the customers in a universe where the tariffs of electricity would be unbundled.

Cost of Distribution at SALC ¢/kWh Normalized



Croissance annuelle 2001-2004 : -3,0 %

Annual Cumulative Growth



Annual growth 2001-2004: -3.0%

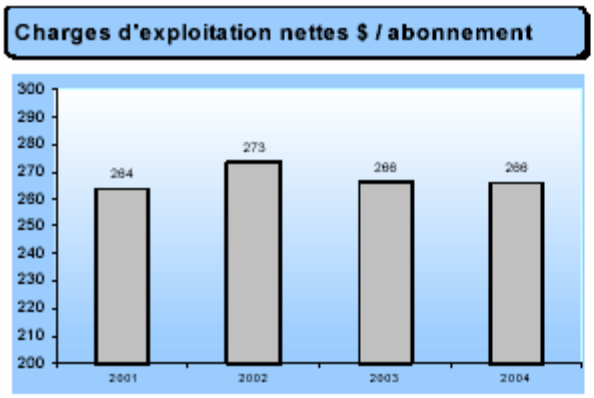
In the entire period, the indicator decreases, going from 1.42 ¢/kWh to 1.29 ¢/kWh over the period 2001-2004, which indicates an improvement of the total efficiency of the Distributor, thus reflecting the actions taken to control the costs and prioritize the investments projects. The results are all the more interesting when one considers that, during this period, significant financial efforts were agreed to so as to improve the quality of service offered to the customers. The positive growth of the indicator was also supported by keeping financial charges in check and the growth of the sales. The result planned for 2004 indicates stability compared to 2003, the small increase of the net operating costs being compensated by a more significant increase of the sales of electricity.

2.4 Net operating charges per subscription

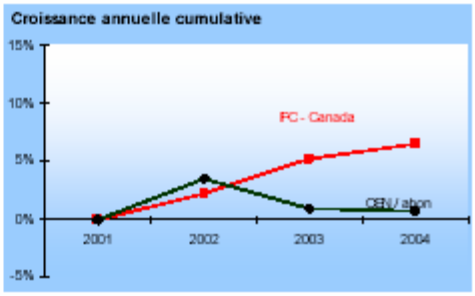
This indicator measures the level of the costs directly associated to the current management of the Distributor and which are necessary to provide the electric service to each subscriber.

The net operating charges are composed mainly of the expenditure relating to labor, the internal invoicing of the services provided by the other units of business (e.g. Center for Shared Services) and other direct charges (e.g. external services, bad credits…) from which is deducted the expenditure necessary for the realization of the investments, and who are subject to capitalization.

Net Operational Charges $/subscription



Annual Cumulative Growth



Annual growth 2001-2004: 0.2 %

The net operating charges per subscription are stable around $266 over the period of analysis, for an average annual growth of 0.2%. This rate compares very advantageously with the growth of the consumer price index which constitutes a relevant index of reference pertinent in the measure of the growth of the net operating charges which is largely conditioned by the trends in total wages.

The results obtained translate the importance of the business base of the Distributor which serves more than three million and half of subscribers for the whole of Quebec. The network and the business processes in place allow the treatment of significant volumes of activities so that the new subscribers can be integrated without creating significant shocks on the operating costs.

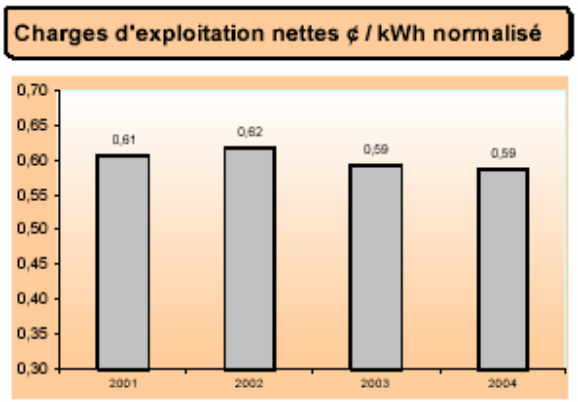
That said, in 2002, the net operating charges per subscription increase by 3.5% followed by a decrease of 2.5% in 2003. These annual variations argue in favor of an interpretation for more than one year of the indicator. The good result of the growth of the indicator over the period of analysis requires very large management efforts by the Distributor considering the increases in wages (about 3% per year) and the operational expenditures necessary for the realization of several projects essential to the improvement of services, for example cost cutting, the SIC project and the deployment of the network of graphic geo-references information system (Dcartes).

2.5 Net operating charges per kWh normalized

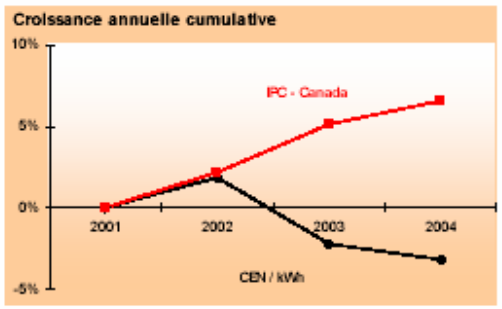
This indicator makes it possible to measure the operational expenses of the Distributor necessary to meet its volume of sales. From 2001 to 2004, the indicator sees a small decrease which conveys the constant efforts of the Distributor, as much as possible, to absorb the growth of the volume of business the same as the existing resources.

1

Net Operational Charges ¢/kWh Normalized



Annual Cumulative Growth



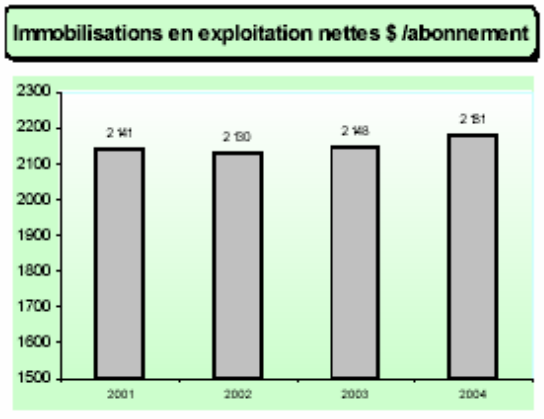
Annual growth 2001-2004:-1.1 %

2

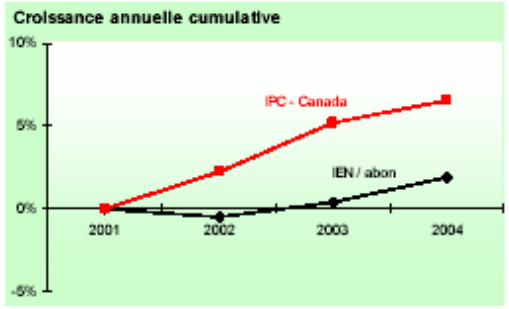
2.6 Net fixed assets in use by subscriber

3 This indicator represents the value, by subscription, of the equipment and
4 infrastructures necessary to distribute electricity and to provide the services
5 required by the customers. In accounting terms, the indicator represents the net
6 value (the deduction made from cumulative amortization) of the credits of the
7 Distributor. The indicator grows as a function of the amortization and of the
8 startup of the projects arising from the strategy of investment of the Distributor.

Net Fixed Assets In Use $/Subscriber



Annual Cumulative Growth



Annual growth 2001-2004: 0,6 %

9

The indicator presents very stable results from one year to the other and for the whole period. Given the significant volume of the fixed assets in use, only major variations can indeed affect the indicator appreciably. The net fixed assets will go from $7.6 billion in 2001 to nearly $8 billion in 2004, which results primarily from the demand growth and the load sold to new subscribers. The amortization is practically of the same level each year, which is approximately $420 M.

The strategy of the Distributor consists in reconciling two objectives: to implement investment projects so as to continue offering quality service but to limit investments that do not generate additional incomes in order to control the growth of its fixed assets in use and thus, its rate base. Also, in spite of an increase in new service accounts, the indicator shows only an average annual increase of 0.6% over the period 2001-2004.

3 EFFICIENCY AND PERFORMANCE OF CERTAIN PROCESSES

In addition to the follow-up of the overall indicators, the Distributor analyzes, compares and questions each process and activity for a good understanding of its growth in order to improve itself. Between others, a constant vigil is implemented so as to know the best practices of the industry. This vigil includes notably a review of the literature, the participation in conferences and specialized associations and visits to other companies. In this framework and for several years, an evaluation of certain processes has been implemented.

This exercise emphasizes that the Distributor, compared to other companies in the market, possesses characteristics which are unique to it and which influence its efficiency, by the costs engendered to deliver the levels of services required by its customers.

3.1 Particular characteristics of the Distributor

These characteristics are three:

- **The role of electricity in heating:** The strong presence of electric heating has several impacts. On the one hand, the energy invoice of customers varies as a function of temperature but, as is particular to the customers of the Distributor, it is not distributed between several suppliers in the majority of the cases (for example, gas and electricity or fuel oil and electricity). This situation is somewhat unique in North America. It results in decisions taking this factor into account. Thus, the customers of the Distributor, more so than in other jurisdictions, expect to receive invoices based on accurate statements of consumption. To respond to this expectation, the Distributor has the objective, now for over 10 years, of maximizing the number of statements based on real consumption. By way of consequence, the Distributor issues less estimates of consumption than elsewhere and measures the actual consumption and issues statements every two months for the residential customers. In addition, the amount invoiced also has an impact on the activities of credit and collection. In order to control to the maximum bad credit expenditures and to facilitate the relationship with customers, the Distributor has favored for the last ten years the use of the MVE (equal payment plan) and the negotiation of payment agreements which take into account the capacity of customers to pay. Despite everything, the importance and the fluctuations of the amount of the invoices make it so that a great number of customers communicate with the call centre and the recovery service. On the other hand, the Distributor must rely on telephone calls to avoid the delay in payment.

- **Statute of a public company:** the statute of a public company of the Distributor implies precise social responsibilities. Three examples: at the time of conceiving a call center, the maintenance of regional employees

had an impact on the number of sites retained; the social role of the Distributor is also exerted towards more financially strapped customers having difficulties of payment, since all the customers are connected when winter begins.

- **The organization of work:** Following the example of several service companies and collaboration with its trade-union partners, efforts carried out towards an organization of work more centered on the needs and behaviors of the customers, for example implementation of more flexible service hours were agreed to. The collective agreement signed in spring 2003 participates in this benchmark, implementing significant modifications in the organization of work. These modifications will gradually impact on the efficiency of the Distributor.

The last few years, the Distributor has chosen to devote much effort to improve quality of its service and it succeeded as these performance indicators and the satisfaction of the customers testify. These efforts were also made with the constant concern to maintain improved efficiency of the processes. In this regard, the analyses carried out on four of its more significant processes are presented in detail in the pages which follow: – Receipt and treatment of customer requests, Meter exchange, Invoicing and Collections, Credit and Recovery.

Although it is interesting to analyze each process separately, it should be well remembered that to deliver customer service implies a chain of action between many processes. An improvement in one process, on the service or the costs, should not be done to the detriment of another process.

3.2 Receipt and treatment of customer requests

Description of processes

- Reception of the requests for information and service of customers (information on the invoice, mode of payment, MVE, etc), excludes the calls associated with maximum coverage and the reception of the requests from Large Corporate customers.
- Identification and routing (data-processing) with good internal intervening for treatment; relief, measurement, network, etc.
- Offline treatment of customer requests, daily update of files, correction and adjustment of the customer invoices, reception and treatment of the complaints, etc.
- Retroactive invoicing (practices, processes and rules for the correction of invoices).
- Complete response from call center for:
    - modes of payment and agreements (minimal coverage),
    - installation – removal,
    - invoicing,
    - explanation of invoices,
    - general information,
    - service and emergencies.
- Organization of receipt and treatment of customer requests:
    - 4 residential sites,
    - 2 commercial sites,
    - 1 centralized site (treatment of the licenses, outgoing calls for coverage, reception of service calls),
    - 5 business sites in territory,
    - 5 sites in area distinct from the call centres,
    - approximately 1000 employees including 150 executives and specialists,
    - 24 hours/365 days for service calls,
    - 8h-18h for other activities (Exception for outgoing calls: 8h00-20h30)

1

1

Description of processes (continuation)

2002 Volumes

	Regular customers and small CII [1]	Businesses	**Total**
Received calls	4 224 483	20 612	**4 245 095**
Treated calls	4 066 322	19 720	**4 086 042**
Rate of answer	96.25%	95.67%	**96.25%**
Outgoing calls	629 015		**629 015**
Mail	613 579		
E-mails	60 000		

2 [1] CII – Commercial, Institutional and Industrial

The Service Indicators

Levels of telephone service 1999-2002

		1999	2000	2001	2002
CST [1]	**%**	ND	82	90	92
Rate of answer (%)		79	91	94	96
Average time of answer (seconds)		132	87	49	43

[1] Coefficient of telephony service in 180 seconds

Overall satisfaction with regard to contacts with customer services

	1999	2000	2001	2002
Residential customers	8.1	8.0	8.1	8.2
Commercial customers	7.7	7.7	7.8	7.9

Rate of payment in 1 call (%)

	1999	2000	2001	2002
Residential customers	74	76	78	81
Commercial customers	65	64	65	65

1

Indicator of efficiency

Net operating charges per subscription of the Receipt and Treatment of requests process

	2000	2001	2002	2003	2004
$/subscription	33.24	33.09	36.07	34.76	35.68

It is noticed that the average annual growth of the net operating charges per subscription over the period 2000-2004 accounts for 1.8%, that is to say on a level lower than that of the inflation which was 2.2% over this period. The indicator undergoes an increase in 2004, for two principal reasons. On the one hand, the activity of receipt and treatment of customers requests is intensive in labor. The increase of the wage bill (related to the wage increases) has a direct impact on the net operating charges of this activity. In addition, the operating expenses for the realization of the SIC project will be increased by approximately $14 M in 2004, which is in large part inherent in the Receipt and Treatment of requests.

2

Evolution of the processes

- Before 1998, activities were carried out in 25 autonomous sectors that were not reliant on each other.
- Since 1998, reorganization was made to provincial virtual call centres. The virtuality consists of responding to a customer or treating their requests using well qualified resources without regard to their location.

3

1

Growth of processes (continuation)

- Regrouping the majority of the personnel and the activities in 5 physical places (Montreal, Quebec, St-Antoine, St-Hyacinthe and Hull).
- Maintenance of the distinct Customer Services of the Call Center (Rouyn, Chicoutimi, Sept-Îles, Rimouski, Île-de-la-Madeleine) within autonomous sites that treat all the customer services.
- Technology allowing the virtuality of the principal activities is in place since 2001.
- Virtual telephony response since spring 2001 and virtual office work function work since the end of 2002
- Virtuality brings robustness, operational constancy and uniformity in the quality of the service to the customers and improves the effectiveness.
- Virtuality requires a standardization of the processes and working tools, imposes upon the internal partners (relief, measurement, network etc.) a uniform and constant treatment of requests, requests co-responsibility and confidence in the responsibilities of the interveners treating the customer requests.
- Put in place call centres by Business Territory– 5 sites.
- Put in place an employees coaching approach.

1

Growth 2004-2008
• Stabilization of the organization by a reduction in the number of temporary employees, a concentration of jobs with knowledge of English. • Increased flexibility to answer customer requirements by the introduction of jobs with reduced and flexible hours. • Major transformation of the process via the SIC project forecast for 2007 for the large load customers offering more flexibility and a customer focus rather than subscription.

2

Tendencies of the industry		
Hydro-Quebec	**Market or other similar companies**	**Comments**
5 sites for the call centre Maintenance of the autonomous sites and creation of call centres by Business Territory.	Regrouping in only one or two sites.	Desire to maintain employment in regions.
Promotion by seniority. Criteria of recruiting: Sec.V not specialized. Individual remuneration not related to the return or quality. Flexibility of the limited hours.	Employment according to a profile of competences and aptitudes. Hours fixed advantageously as a function of needs/habits of the customers (flexibility and part time). Constant evaluation of quality and of the individual (monitoring).	Renewal of collective Conventions in spring 2003 will allow modifying in a sensible way the current characteristics of the organization of work.
Interactive vocal response (RVI) little used (< 5% of calls)	RVI strongly privileged for a wide range of customer services	The customers prefer to communicate with an employee rather than with a boxed voice

1

Tendencies of the industry (continuation)		
Hydro-Quebec	**Market or other similar companies**	**Comments**
Predominance of electricity for residential heating	Not very widespread elsewhere in North America	Significantly increases the requests/needs of customers and increases the time of call treatment: • Explanations of invoice related to seasonal fluctuations • Variations in equal payments • Difficulties paying winter invoices • A number of customers in difficulty of paying or understanding • Recognition of the essential service of electricity

3.3 Meter exchange

Description of processes

- To ensure the meter exchange in order to provide data for invoicing, offer of service, management of consumption and analysis.
- The responsibility for meter exchange is shared between a management staff and the five territories.

Measurage – Installation = Measure – installation
Relève = Exchange
Physique = Physical
Lien telephonique = Telephone line
(RVI ou automatique) = (RVI or automatic)
Carte auto-relève = Auto-exchange card
Internet = Internet

Transmission of consumption data for invoicing, profiles of consumption and rate analyses. Moreover the regular exchange, the exchange function:

- carry out special and final exchange,
- carry out detection of anomalies,
- participate in the daily customer file updates,
- provides signals to certain business customers whose meter is communicating.

Volume of activities (2002)

- 590 people years including nearly 475 reliefs.
- 2.8 million customers.
- 3.5 million meters to read.
- 22 million exchanges.
- 8 billion dollars in invoicing.

1

Indicators of service

- **Rate of exchange:** 96% (stable since 2000).
- **Satisfaction**

According to the *Table of tables 2002,* principal expectation of customers in line with meter exchange is:

"To obtain an invoice based exactly on actual consumption".

Customers expectation:	To obtain an invoice based exactly on actual consumption Annual results 2002	
Tariff	**Importance ranked out of 10**	**Satisfaction out of 10**
D	8.91 (16e/45)	7.7
G	8.93 (6e/32)	8.3
M	9.38 (4e/33)	8.1

In addition, with the question *"What is your degree of satisfaction for your electricity meter exchange?"* the residential and commercial customers scored it 8/10 in 2002.

1

Indicator of efficiency

Net operating charges of processes of Exchanging per subscription

	2000	2001	2002	2003	2004
$/subscription	15.70	15.60	16.41	16.57	16.64

The average annual growth of the net operating charges per subscription over the period 2000-2004 is in the order of 1.5%, that is to say 0.7% less than inflation. The increase in expenses for the wage bill is the principal factor which explains the increase in the indicator over the period.

2

Growth of the process

For several years, significant improvements have been carried out in notably with the re-engineering of the meter exchange function between 1997 and 1999. The performance improved, the costs were reduced in spite of the growth of the number of customers, as indicated in the following statistics over the period 1994 to 2001:

- progression from 94% to 96% of the rate of exchange,
- increase of approximately 6% of a number of customers,
- reduction of the direct cost by exchange of 21%,
- reduction of the number of work accidents of 46%.

In 1999, establishment of the remote reading by telephone line, making so that in 2003, approximately 15 500 meters of the business customers are read daily in this manner just as 45 000 residential meters which are read every two months.

1

Growth 2004-2008

The direction is initially centered on efficiency, the work health/security and the mobilization of the employees as such making it possible to absorb the annual growth with the same manpower. The growth of the tools and systems is also required in order to obtain a dynamic management of the activities. All the opportunities to establish the tele-exchange will be seized. Here, between others, the aspects which will be approached:

- modernization of the apparatuses of the exchange of meters (MARC) and of the infrastructure – to ensure more effective transmission and the reliability of the exchange and to allow a greater flexibility for the radio frequency and cellular readings,
- to evaluate various reading and transmission of measured data technologies within the framework of pilot projects,
- to pursue the modernization of tools of acquisition and management of the data coming from the measuring apparatuses,
- within the framework of the SIC project:
    - to examine the feasibility of a dynamic system of management by way of exchange for obtaining greater flexibility in the adjustment and the workload,
    - to integrate the exchange data in a data base "Exchange" for better targeting and following the efficiency and for optimizing processes.
- to verify the added value of an offer of service to differentiate the reading frequency by segment of customers,
- to continue the installation of the remote reading among business customers.

1

Tendencies of industry

Participation in specialized conferences and visits of public companies and enterprises to be up to date on the growth of technologies in tele-exchange.

Reports:

In a general way, one observes in the energy companies, three factors having a significant impact on the cost of the activity:

- the more frequent estimation of consumption for the exchange being more costly to obtain (customers in distant regions, meters difficult to access). In Hydro-Quebec Distribution, given the importance of electric heating, the historical direction has been to minimize the estimates of consumption and to use them by exception.
- a double reading for a single placement (electricity – gas, electricity – water),
- the geographical dispersion of meters: the readings in urban environment being concentrated, they are on average less expensive to obtain.

<u>In Canada</u>

- Maintenance of the monthly exchange for business customers and of the two-monthly exchanges for the residential customers
- Use of the technology of radio frequency for the meters difficult to access

1

Tendencies of industry (continuation)

In the United States

- Increasingly significant deployment of the tele-exchange.
- Upward trend of the frequency of reading which goes from 6 to 12 exchanges per year with the aid of tele-exchange.

3.4 Invoicing and collection

Description of processes

- Invoicing (calculation and production of invoice data) monthly or bimonthly for all customers (residential, commercial, business) with the exception of the large companies.
- Manual treatment of the consolidated and grouped invoices.
- Printing of the invoice.
- Control and follow-up of the invoicing.
- Printing of delay notices, various correspondences, confirmations of subscription.
- Placing in envelope, including insertion of HydroContact, various inserts, return-envelope etc.
- Sent by mail, postal sorting, organization of the mailings according to the rules of Canada Post for a maximum reduction of the postal expenses.
- Invoicing by Internet.
- Cashing by cheque (including post-dated), automatic teller machine, bank account, pre-authorized payment.

Volumes of activities (2002):

Number of invoices sent	21 881 280
No. of customers receiving an internet invoice (on 31 déc. 2002)	50 000
Send by mail	31 880 732
Number of payments made by cheque	5 121 487 (19%)
Number of payments made via the banks	22 165 008 (81%)

1

Indicators of service – 2002

% of invoices sent based on real measures	95%
% sent by mail in 24 hours or less	99.6%
% of customers using MVE (Equal Payments Mode)	35.6%
% of customers who pay by automatic payment	17%

Indicator of efficiency

Net operating charges per subscription of the invoicing and collection processes

	2000	2001	2002	2003	2004
$/subscription	7.09	7.17	7.84	7.53	7.83

The indicator of efficiency of the activity "invoicing and collection" grew at an average annual rate in the order of 2.5%, that is to say 0.3% more than inflation. The postal expenses and the portion of the expenses connected to the realization of the SIC project into 2004 are the principal elements which explain the growth of this indicator.

1

Growth of processes

- Complete revision of the retroactive invoicing process (customer responsibility and Hydro-Quebec Distribution, covered periods, mode of calculation, etc).
- Renewing and facilitating agreements with the banks for the automated treatment of exchanges by customer account number.
- Modification of certain rules of invoicing in order to facilitate the relationship of the customer.
- Addition of invoicing/payment by Internet.
- New equipment for envelope opening by payment by cheque.
- Substantial increase in the delivery of confirmation of subscription to move-ins.
- Certification of Canada Post recognition software.

2

Growth 2004 – 2008

- Digitalization of the correspondence with the customers (ex: card dial, letter of confirmation of subscription…).
- The implementation of the SIC project will permit:
  - the replacement, starting 2004, of the printing and envelope stuffing equipment currently obsolete and expensive to maintain. This replacement will have the affect of improving the quality of work and the capacity for implementation,
  - the addition of functionalities of which the regrouping of invoices and the choice of the date of payment for certain business customers.

1

Tendencies of industry		
Hydro-Quebec	**Market or other similar companies**	**Comments**
Subscription invoicing linked to the exchange process.	Similar to very large companies still exploiting central information processing systems. Certain companies having already migrated towards modern systems centered on the needs of the customer, offer larger and more flexible functionalities. (new companies are sometimes more suited than older)	Structure of the actual IT systems is not customer but subscription oriented. SIC modifies this approach. The client-file currently has a limited informative role. Hydro-Quebec Distribution does not offer the notion of integrated customer-account. It is not alone. Bell realized in 2003 the integration of its services and subsidiaries (basic telephone, cellular, satellite)
High rate of rejects of special or manual cases.	Similar or better according to the available tools.	With SIC, reduction of the office work (Back-Office)
Mass treatment offering little flexibility.	Modern companies can multiply the customers/accounts analysis and treatment criteria according to variable rules and categories as well in accounting, for messages, insertions in accounts, offers personalized to the habits of customers, etc.	Conceptually, these analyses, studies and interventions are possible with the actual IT tools. In fact, the costs and delays of realization are so high, they render it impossible. Personalized interventions are thus impossible.
Output and performance in volume and automated elements.	Companies of high volume (invoicing and sending by mail) operate in the same levels of performance as Hydro Quebec Distribution.	Where the tasks are highly automated, Hydro Quebec Distribution performs well.

1

Tendencies of industry (cont'd)		
Hydro-Quebec	**Market or other similar companies**	**Comments**
Multi-channel treatment for payments.	Similar or better according to the tools used.	Hydro Quebec Distribution must manage the customer-account numbers linked with moving and restructuring of reading routes because of subscription management. This complicates the link with the payment channels: • Checks • Bank, counter or ATM • Bank, authorized payments The adoption of a customer-account simplifies this problem. The addition of new channels (Internet for example) is made in the abandon of the other channels (except the acceptance of cash payments)
Accepting post-dated cheques	Little used	Hydro Quebec Distribution accepts and treats post-dated checks (for many years) which few companies do on the same scale.
Penetration of the mode of payment (MVE).	Mode of payment not adopted as much elsewhere in Canada, fluctuations in the invoice amount being less pronounced due to the absence of electric heating.	The MVE method of invoicing each month (instead of bimonthly) Stake: minimize the spread between the paid amount and the monthly invoicing

2

3.5 Credit and recovery

Description of processes

- To limit the losses of revenues of the Distributor by managing the risk of credit and collection from the customers which had sums due, while acting as responsible distributor as regards to the social and economic aspects.
- 4 residential recovery areas: Île de Montreal, Laurentides (Joliette), Richelieu (Valleyfield) and Montmorency (Quebec, Trois-Rivières, Thetford Mines) and 1 credit risk and commercial recovery area: (Île de Montreal).
- Autonomous territories: Noroît (Rouyn-Noranda), the North-East (Chicoutimi), Not Connected (Îles-de-la-Madeleine and New Quebec).
- A total force of almost 590 people years.

Volumes of activities (2002)

- Inventory in recovery at December 31, 2002.
- Active accounts: $105.6 M.
- Final accounts: $35.8 M.
- A number of subscribers in recovery: 450 000 subscribers representing approximately 12.7% of the customers of Hydro-Quebec Distribution.

1

Activity management indicators

	2000	2001	2002
Bad credit expenses (M$)	59	53	47
Total inventories (M$)	144.5	144.3	141.4
Interruptions of service	32 747	25 704	19 770
Numbers of payment agreements.	600 893	650 522	615 816
% of respected agreements (value)	66.62%	73.72%	72.64%
Customer satisfaction regarding the recovery process (out of 10)	6.6	6.7	7.0

2

Indicator of efficiency

Net operating charges per subscription of the credit and recovery processes

(including the expenditure of bad credits)

	2000	2001	2002	2003	2004
$/subscription	28.79	28.93	26.00	26.63	25.51

The improvement of the indicator over the period 2000-2004 (-3.0% per year) is in large part due to the significant efforts of rectification which reduced the expenditure of bad credits.

1

Growth of processes

- New centralized organization permitting to change from 25 sites to 5 (4 sites residential and 1 commercial and business).
- Establishment of the risk management at the commercial and business level (office of commercial credit).
- Use of external firms to make the treatment of accounts previously transferred to irrecoverable ones.
- Putting in place the operational planning of activities (CPO) and virtual integration of the workload for the 4 residential sites.
- Putting in place definite behavioral standards with the employees.
- Putting in place an approach of employee coaching.
- Change in service conditions:
  - request deposit and guarantees based on a risk evaluation for the commercial and businesses customers and easing of the request for residential customers,
  - obligation to offer a payment agreement,
  - in winter, prohibition on interrupting a residential customer (principle residence) and obligation to restore a customer interrupted for non-payment. This practice, adopted by the company since 1993, became a legal obligation registered under the operating conditions since February 2003
  - submit a protocol representing a formal obligation to maintain and improve the methods of recovery.
- Use of the regular call center for the proactive management of the delays of payment:
  - increase in the volume of agreements taken by the call centre of $43 M in 2000 with $93 M in 2002
  - increase in the promotion of the MVE.

1

Growth of processes since 1999 (continuation)

- Change in the philosophy changing from a coercive approach to an approach of supporting the customers (reduction in the interruptions, increase in the agreements adapted to the situation of the customer).
- Put in place a work committee with customer associations in order to develop services adapted to the reality of the households with low incomes:
  - the CFR agreements (more flexible agreement framework for the customers with low incomes without administrative expenses),
  - the formation "regards to poverty…Beyond the prejudices" to facilitate the management of the change,
  - SEPA study (Possible Solutions and Agreements with Consumer Associations) for the customers for whom the current solutions are not appropriate,
  - transitional measures for the customers with very low incomes waiting for the conclusions of the SEPA study.
- Modification of the role of the recovery agent in keeping with the approach of supporting the customers.

1

Growth 2004 - 2008

- To establish and operate the total risk management for all the customers.
- To work out an offer of services in partnership with the appropriate interveners (e.g. Energy Efficacy Agency) for the customers with very low incomes following the conclusions of the SEPA study.
- To maintain and develop links with the groups and in particular with the native communities.
- To obtain a better knowledge of the customers in recovery and to consequentially adapt the practices related to credit and recovery.
- To establish a technology allowing a better management of the telephone load.
- Establishment of SIC allowing a treatment by customer rather than by account.

1

Tendencies in industry:

Certain differences having a significant impact on the cost of the activity emerge between Hydro-Quebec Distribution and the rest of the industry:

- public company with an obligation to serve.
- obligation to connect in winter (from December 1 to March 31).
- 700 000 moves/year (including 30% in June/July).
- 75% of the customers heat with electricity.
- variation of the invoice value within a year,
- the invoicing is done bimonthly with residential (compared to a monthly invoicing elsewhere),
- the cycle time is longer (more stages and slower recourse to the interruption of service when there is delay of payment),
- there is no requirement of a security deposit for the residential customers.

Certain agreements compared to the rest of the industry:

- the recourse to the external firms to recover sums due,
- put in place the call centres with the increased use of telephony technology,
- social preoccupation towards customers with low incomes.

4 BENCHMARKING PLAN

In addition to its activities of vigil, the Distributor takes part in structured benchmarking studies which in the long term will enable it to analyze its efficiency on its overall activities.

4.1 Objectives

The benchmarking studies have the objective of:

- allowing comparisons on the operational performance,
- releasing the main tendencies,
- identifying the factors explaining the differences observed,
- identifying the best practices with a possible aim to adopt them.

4.2 Sources

The benchmarking studies which are this plan's object come from two sources:

- Canada (Canadian Association of Electricity)
- The United States (PA Consulting Firm)

4.3 Expected results

Given the complexity of benchmarking, it is important that the data are analyzed in a rigorous way and that the explanatory factors are well controlled. These analyses will be done in close cooperation with the internal suppliers of the Distributor which is the Center of Shared Services. The analyses will be carried out in autumn 2003 as soon as the final reports are available.

The results of the two benchmarking exercises bearing over the years 2001 and 2002 could be submitted to the Régie in 2004.

4.4 Programs description

4.4.1 Canada

Canadian Association of Electricity (ACÉ) – program COPE [2]

The benchmarks of certain indicators have existed for many years within the ACÉ. It relates to the following elements:

- Continuity of service
- Safety of the employees
- Satisfaction

In 1994-95, some attempts coordinated by BC Hydro for the ACÉ made it possible to mark out processes connected to the services to the customers according to an approach inspired by the TB&A model (Theodore Barry & Associates, now PA Consulting).

Setting aside the participation in the related objectives in the performances of the networks (safety, continuity of service), the benchmarking activities were suspended of 1996 to 1998, because of the opening of the electricity markets in North America.

In 1999, it restarted the customer service benchmarking activities starting from a model which is based on separation of business units and the use of a financial spreadsheet.

In 2002, Hydro-Quebec Distribution began its participation in the benchmarking concerning the financial aspects of its network activities (COPE – Distribution)

[2] Committee on Corporate Performance and Productivity Evaluation (COPE)

Benchmarking model

- Benchmarking structure which is based on a reduction in business units (Production, Transmission, Distribution, Customer Service, Corporate Services)
- Define guidelines using a list of activities for which each business unit is responsible. For strategic reasons shared by all the companies, the Customer Service section excludes *the Sales process.* The Distribution section includes *the Measuring* process but excludes *the autonomous Networks*.
- Approximately 10 indicators grouped under three headings:
  - customers (e.g.: quality of telephone service, continuity of service, satisfaction),
  - employees (accidents, a number of subscriptions per employee, employees per 100 km of lines),
  - shareholder (e.g.: growth of the sales, cost per subscription, cost per km of lines).
- The model set up in 1999 especially stressed data of a financial nature. It has been in constant growth since then:
  - From 1999 to 2001: reports on the differences in the method of reporting information, many efforts to give a common comprehension of the model (guidelines of business units, components of cost to include/exclude, division process, addition of indicators of operational performance…).
  - In 2002: specifications brought in the definitions connected to the indicators of efficiency, matrix costs.

Comparison Pool

- Service to the customers: The number of participants varies from year to year but depends on a base of 7 regular participants. From 2004, BC Hydro and HydroOne envision to provide more detailed data by processes. They will continue nevertheless to participate in the aggregate data benchmarks.
- Distribution: in 2002, 16 companies took part in the Distribution group of the COPE program.

Process of benchmarks

- The COPE is a program of benchmarks directed by the company members of the ACÉ and whose good market depends on the level of interest and engagement of the participants (Presidency of the committees, modifications to the objectives model, data analyzing…).
- The objective information is collected annually on the Web site of the ACÉ. Approximately 50 cases will be completed (exclusive quantitative data).
- Information by company is accessible to all participants, subject to strict confidentiality.
- Until 2002, a great deal of difficulty was encountered validating the COPE bank data.
- Summary reports will be produced by the ACÉ (average Canadian and results of Hydro-Quebec Distribution).

Limitations of the study

- In Canada, the pool of companies is rather restricted for a company the size of Hydro-Quebec.
- Because of the changes in the definitions as well as to the bank data since 1999, one cannot ensure the continuity of the registered data.
- Even if a reduction in business units is undertaken, the concept of "complete cost of the activities" is not applied anywhere else in Canada and is not treated in the COPE model at the present time. In Hydro-Quebec, the invoicing of the services provided by the Center for Shared Services (CSP), for example, is done at complete cost. Thus, for the same service, the costs identified by the business units of Hydro-Quebec will be higher than those of the business units of another company which did not adopt this accounting practice.
- The data collected in the COPE bank are quantified exclusively. The bank does not contain data of descriptive or qualitative nature. In this context, a correct interpretation of the results can only be obtained by exchanges between the participants to supplement the analysis of the data and thus to obtain a better comprehension of the performance of each one.
- The COPE being a program based on co-operation, the quality of the results obtained depends on the implication of each member. However, this implication proved to be unequal and variable in time for the various participating companies.

4.4.2 The United States

PA Consulting Group (in the past TB&A) program

PA Consulting program has been in force since 1992 and is entirely directed by a group of experts who are independent from the participating companies.

Hydro-Quebec Distribution will participate this year in the program *Transmission & Distribution* (VP Network) and in the program *Customer Service* (VP Sales and Customer Service).

Benchmarking model

- Service to the customers:

The benchmarking structure is based on a reduction by processes:

- Call Center– regular, businesses, recovery
- Meter exchange,
- Invoicing,
- Collection,
- Recovery – office, ground activities,
- Volatility of electricity,
- Treatment of complaints,
- Maintenance of the inventory of measuring apparatuses.

The Sale process is not covered by the study, as in the case of COPE, the participants consider the information too strategic to be shared.

- Distribution:

  The definition of the PA Consulting model includes items which, for Hydro Quebec, are integrated into transmission. Only the part of the objectives which treats distribution lines is thus used.

  It is generally possible to segment the financial data (capital assets and the loads) according to the following activities:

  - operation and maintenance,
  - vegetation controls,
  - connections,
  - extension of the distribution networks and increase in the load,
  - measuring (purchase and maintenance).

  Many non-financial indicators are produced of which several concern the reliability of the electric service and the safety of the employees. Several sections are also devoted to the methods used for management of various activities.

- Guidelines define using a very precise description of each process and activity, and costs which they must contain.
- Very exhaustive and very bulky questionnaires
  - Service to the customers: 53 sections, 650 quantitative and qualitative questions.
  - Distribution: 56 sections, 858 quantitative and qualitative questions (a significant share of the questionnaire does not touch the activities of distribution of Hydro-Quebec).

Pool of comparison

- Customer Service: + or - 34 participants,
- Distribution: + or - 40 participants.

Benchmarking processes

- The processes comprise several stages, of which several conference calls and a meeting dedicated to the validation of the data. Another meeting is devoted to the analysis of the results.
- Several reports are available:
  - Service to the customers: in 14 volumes totaling more than 2000 pages (spreadsheet, analyses, statistics, etc.) stating the results on a very detailed level, of a summary report including about 150 indicators and of a report of analysis of best practices.
  - Distribution: 17 detailed reports totaling more than 2000 pages, a summary report of more than 200 indicators and a report of analysis of best practices.
- The identity of the participants is confidential in the reports produced by the firm.

Limitations of the study

- At Hydro-Quebec, the invoicing of the services provided by the Center of the Shared Services (CSP) is done at complete cost. Thus, for the same service, the costs identified by the business units of Hydro-Quebec will be higher than those of the business units of another company which do not adopt this accounting practice.

- There is never a perfect comparison between the companies (regional differences, rate of change, legal context, accounting systems in use, etc).
    - It is difficult for all the participants in the study to conform perfectly to a benchmarking model. For example, accounting of costs and investments associated with each process rest on the example of the FERC, accounting methods which do not always correspond to those of Hydro-Quebec or other Canadian and international companies. Additionally, the costs of the activities and processes are limited to the direct charges (direct salaries and related expenditure, FERC model), contrary to the model at complete cost in force at Hydro-Quebec.
    - Hydro-Quebec Distribution devoted a great deal of efforts to understand the model and conform to it on the one hand and to collect information and to ensure its coherence on the other hand.
    - Given the benchmarking model used for the distribution, some of the indicators produced are thus not appropriate for comparing the activities of Hydro-Quebec's distribution with that of other distribution companies.
    - The validation of the data concerns each participant and "PA Consulting", particularly when the latter notes certain inconsistencies in the data/results which can put in danger the credibility of their benchmarking.

- . Only one result is not significant; one must consider the overall indicators and analyze the quartiles (main tendencies) before drawing conclusions.

APPENDIX 1: RECORD SYNTHESES – OVERALL INDICATORS OF EFFICIENCY

Records of indicators

- Costs of distribution and SALC per kWh normalized for the temperature effect
- Net operating charges per subscription
- Net operating charges per kWh normalized for the temperature effect
- Net fixed assets by subscription

1

OVERALL INDICATOR:	**Cost of distribution and service by customers per kWh normalized (CD&SALC/kWhN)** Cost of distribution & SALC normalized kWh
UNIT:	¢/kWh
DÉFINITION:	The measure of the overall unit cost of the activities related to distribution and the customer service. It covers as much of the overall operational costs as the costs more directly related to activities which it uses, and provides a base of analysis directly comparable with the electricity rates.
PRINCIPAL COMPONENT: (IN % OF THE CD&SALC OF 2004)	1. Net operating charges (46%) 2. Cost of capital (32%), composed of the return on shareholder's equity (12%) and of the cost of debt (20%) 3. Amortization and depreciation (20%) 4. Other components (2%)

RÉSULTS AND DATA

	Actual 2001	**Actual 2002**	**Budget 2003**	**Forecast 2004**
CD&SALC/kWhN.	**1.42**	**1.37**	**1.30**	**1.29**
CD&SALC (M$)	2 189.1	2 183.6	2 123.8	2 149.3
CEN	938.6	982.4	969.3	977.2
Cost of capital	799.2	736.8	691.1	690.9
Amortization and depreciation	423.1	440.8	433.1	430.3
Other components	28.2	23.6	30.2	50.9
TWh normalized	154.6	158.8	163.2	166.3
Inflation (IPC)		2.2%	2.9%	1.3%
Annualized growth				**2001/04**
CD&SALC/kWhN.				-3.0 %
CD&SALC				-0.6 %
kWhN				2.5 %
Inflation				2.1%

1

OVERALL INDICATOR:	**Net operating charges per subscription (CEN/subscription)** Net operating charges # of subscriptions
UNIT:	$/subscription
DÉFINITION:	This indicator measures the operational unit costs per subscription. It reflects the costs which are related with the various operational processes of the division.
PRINCIPAL COMPONENT: (IN % OF CEN OF 2004)	1. Gross direct charges (88%) a Labour (60%) b Other direct charges (33%) c Recuperation of costs (-4%) 2. Shared service charges- CSP (40%) 3. Capitalized costs (-28%)

RÉSULTS AND DATA

	Actual 2001	**Actual 2002**	**Budget 2003**	**Forecast 2004**
CEN/ subscription	**263.9**	**273.2**	**266.3**	**265.7**
CEN (M$)	938.6	982.4	969.3	977.2
Gross direct charges	794.2	843.0	844.6	862.4
CSP	398.5	391.8	390.5	386.0
Capitalized costs	-254.1	-252.4	-265.8	-271.2
Subscriptions (' 000)	3 557	3 597	3 639	3 678
Inflation (IPC)		2.2%	2.9%	1.3%
Annualized growth				**2001/04**
CEN/subscription				0.2%
CEN				1.4%
Subscription				1.1%
Inflation				2.1%

2

1

OVERALL INDICATOR:	**Net operating charges per kWh normalized (CEN/kWhN)** Net operating charges normalized kWh
UNIT:	¢/kWh
DÉFINITION:	This indicator measures the operational unit costs of the Distributor. It reflects the costs which are related to the various operational processes of the division and provides a base of analysis directly comparable with the electricity rates.
PRINCIPAL COMPONENT:	See the indicator "CEN/abon."

RÉSULTS AND DATA

	Reality 2001	**Reality 2002**	**Budget 2003**	**Planning 2004**
CEN/kWhN.	**0.61**	**0.62**	**0.59**	**0.59**
CEN (M$)	938.6	982.4	969.3	977.2
Direct grossloads	794.2	843.0	844.6	862.4
CSP	398.5	391.8	390.5	386.0
Capitalized costs	-254.1	-252.4	-265.8	-271.2
TWh normalized	154.6	158.8	163.2	166.3
Inflation (IPC)		2.2%	2.9%	1.3%
Annualized growth				**2001/04**
CEN/kWhN.				-1.1%
CEN				1.4 %
kWhN				2.5 %
Inflation				2.1%

1

OVERALL INDICATOR:	**Net fixed assets in operation by subscription (IEN/subscription)** Net fixed assets in operation # of subscriptions
UNIT:	$/subscription
DÉFINITION:	This indicator measures the average value of the equipment used by the Distributor.
PRINCIPAL COMPONENT:	The net fixed assets in operation in 31/12/2001 were about $7.6 billion, including intangible assets of a value of $64 million. The level of the IEN depends mainly on the level of the startup services and annual amortization.

RÉSULTS AND DATA

	Actual 2001	Actual 2002	Budget 2003	Forecast 2004
IEN/subscription	**2 140.6**	**2 130.2**	**2147.9**	**2180.5**
IEN (M$)	7 614.6	7 661.4	7 816.5	8 019.8
Amortization[3]	413.4	414.5	426.5	413.4
Startup services	521.0	495.8	581.6	616.7
Subscriptions (' 000)	3 557	3 597	3 639	3 678
Inflation (IPC)		2.2%	2.9%	1.3%
Annualized growth				**2001/04**
IEN/subscription.				0.6%
IEN				1.7%
Subscription				1.1%
Inflation				2.1%

2

[3] The amortization from January 1 to December 31

APPENDIX 2: DEFINITIONS - INDICATORS

Net operating charges (CEN)

The net operating charges represent the costs of operation of the activities of the Distributor as presented in the statement of the division results. The net operating charges are thus different from the "Operating costs" presented elsewhere in the evidence. They do not take into account the corporate expenses, and are not decreased by the incomes arising from internal invoicing (*Considering these elements, for the calculation in the period ending and also as an indicator of efficiency would not be appropriate, given by example that the corporate expenses are not charged on a basis of direct consumption by activities).*

The CEN include the following elements:

- Gross direct charges (labour + other direct charges – cost recuperation revenue)
- Shared service charges
- Deductions in capitalized costs

Cost of distribution and customer service (CD&SALC)

This concept covers the overall costs of the Distributor except for those connected to supply and transmission.

More specifically, the CD&SALC includes the following elements:

- Net operating charges (as described they are high)
- Purchases of fuel
- Amortization, taxes and corporate expenses
- Cost of capital (according to rate of return granted on the basis of average 13 month rates)

Deduction made using the following elements:

- External invoicing sent
- Internal invoicing sent
- Exceptional elements

Net Fixed Assets in Operation

That is to say:

- Value of the net fixed assets in operation[4] (cost of fixed assets less cumulated amortization) at December 31.
- Intangible assets

The intangible assets are added to the net amount of the net fixed assets in operation, taking into account their contribution to the business processes of the division and the significance of these projects for the years to come (ex: SIC Project and Dcartes). Before the 2002 exercise, these credits were presented with the net fixed assets in operation.

[4] The net fixed assets in operation exclude the reported expenses of those associated with commercial programs.

Subscriptions

The heading includes the subscriptions relating to the Quebec customers at December 31 of each fiscal period, as published in the Annual Report of the company, including the subscriptions of the autonomous networks and excluding the subscriptions relative to the neighbouring networks close to activities to the business units of the market at large.

The enumeration includes the active and vacant subscriptions, and reflects the multiplier effect of the DM rate (multiple residences).

Sales in GWh normalized (temperature effect)

They represent the public sales relating to the division customers corrected in order to take into account the impact of the variations in temperature compared to the average climatic conditions.