Revenue Requirement Application

2004/05 and 2005/06

BC hydro

Volume 2

Appendix L.

System Performance Indicators

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System Performance Indicators

This appendix discusses BC Hydro's system performance in terms of generally accepted industry measures of service reliability. Since the mid-1980s, BC Hydro has been collecting and analyzing data that identifies specific system characteristics or components that affect performance. Concurrently, major electric utilities in Canada have been providing comparative data to the CEA so that utilities are able to monitor their performance over time as well as comparing their system performance with other utilities.

There are four indicators commonly used by electric utilities to measure distribution system reliability:

1. Average System Availability Index (ASAI)
2. System Average Interruption Frequency Index (SAIFI)
3. System Average Interruption Duration Index (SAIDI)
4. Customer Average Interruption Duration Index (CAIDI)

In the following figures, BC Hydro's reliability performance for the period F1994 to F2003 is compared to the CEA composite.

Average System Availability Index (ASAI)

ASAI, shown in Figure 1, measures the percentage of time during a year that power is available to customers. It is defined as:

$$1 - \frac{\text{Interrupted Customer Hours}}{\text{Available Customer Hours}}$$

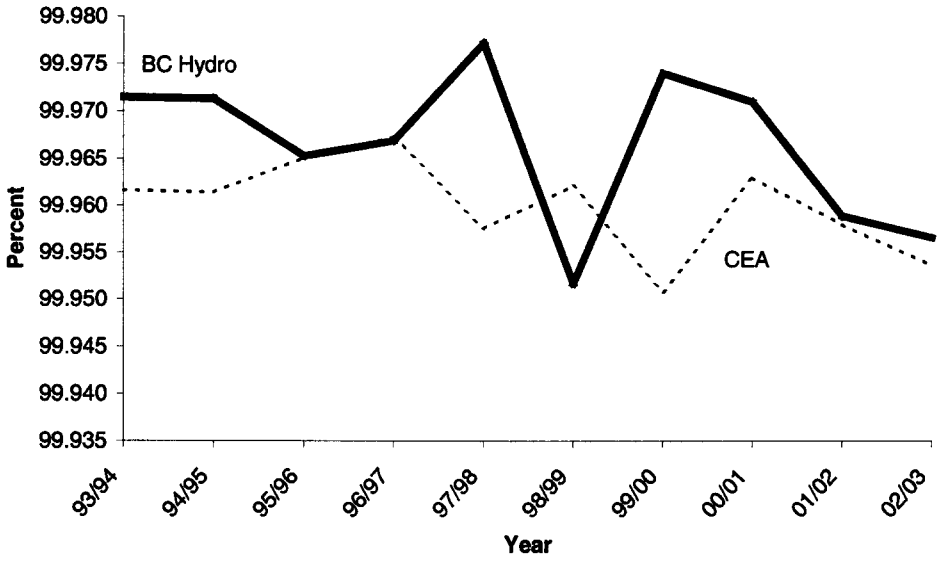

Figure 1. Average System Availability Index, F1994 to F2003

Since data was first collected in the mid-1980s, BC Hydro's ASAI has remained stable and has performed better than the CEA composite for most of the period.

In 1998, BC Hydro's ASAI was lower than the CEA composite because of adverse weather conditions experienced during the year. The CEA composite index for 1998 did not include impacts of the ice storm in Quebec and Ontario. The winter in 1998/99 was the stormiest November-March period in British Columbia in 27 years. Interrupted customer hours due to adverse weather and tree-related problems more than tripled compared to the previous year and accounted for 62% of the total interrupted customer hours in 1998.

BC Hydro's ASAI was lower in F2002 because of the impact of severe windstorms that hit both the Lower Mainland and Vancouver Island. The three-day windstorms in December were the cause of about 36% of the annual customer-hours lost during the 12-month period. Steady winds measuring between 80 to 100 km/hour were recorded in some parts of the Fraser Valley. During the storm, the above ground portion (around Texada Island) of the transmission line to Vancouver Island became loaded with ice and failed, resulting in significant reduction of supply to the Island.

There were also six major weather events in F2003. On April 14, 2002, a windstorm hit the Lower Mainland and parts of Vancouver Island, accounting for 4.9 per cent of the total customer-hours lost during this period. On December 15, 2002 another windstorm struck

the Lower Mainland and Vancouver Island and accounted for 6.9 per cent of the total customer-hours lost during this period. On December 25-26, 2002, another windstorm knocked down trees and power lines in the Lower Mainland, cutting electricity to parts of the area for much of Christmas Day. The two-day storm accounted for 4.0 per cent of the total customer-hours lost during this period. On January 2-3, 2003, another windstorm caused widespread power outage to thousands of customers in the Lower Mainland and south Vancouver Island for several hours. The two-day storm accounted for 8.9 per cent of the total customer-hours lost during this period. On the morning of March 13, 2003, a powerful windstorm blew in from the Pacific, causing numerous outages all across B.C. The storm accounted for 2.6 percent of the total customer-hours lost during this period. Finally, on March 22, 2003 a severe storm with high winds, heavy snowfall and lightning rolled across the path of 5L30 and 5L32 circuits feeding Vancouver Island. The source outage accounted for 3.1 percent of the total customer-hours lost during this period.

The number and magnitude of these storms over the last two years was greater than historically experienced and expected.

System Average Interruption Frequency Index (SAIFI)

SAIFI, shown in Figure 2, measures the average number of power interruptions per customer served during a year. It is defined as:

$$\frac{\text{Total Customer Interruptions}}{\text{Total Customers Served}}$$

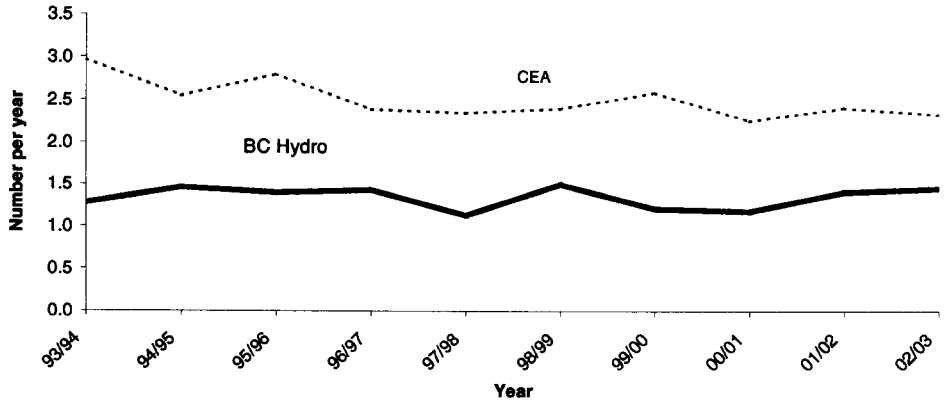

Figure 2. System Average Interruption Frequency Index, F1994 to F2003

BC Hydro has considerably fewer power supply interruptions than the CEA composite.

System Average Interruption Duration Index (SAIDI)

SAIDI, shown in Figure 3, measures the amount of time the average customer is without power during a year. It is defined as:

$$\frac{\text{Total Customer Hours of Interruptions}}{\text{Total Customers Served}}$$

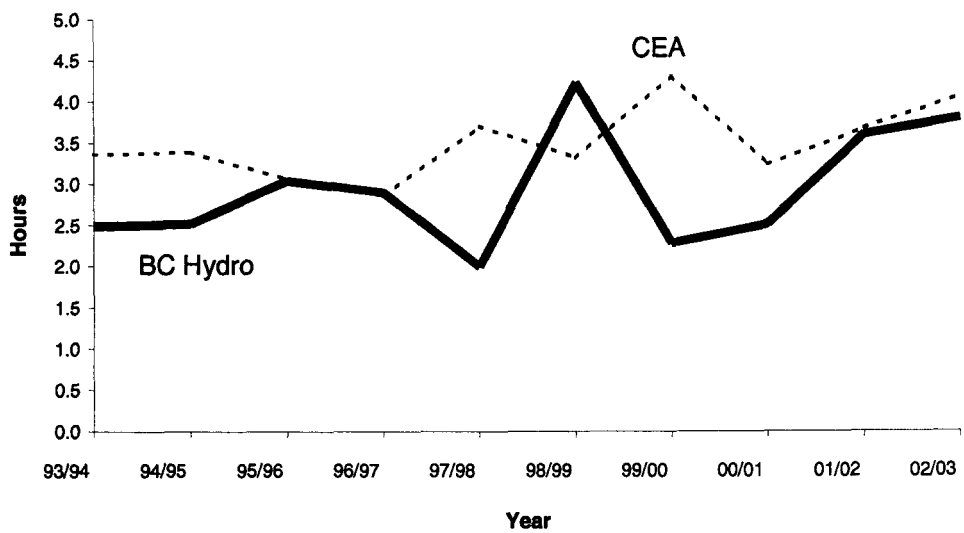

Figure 3. System Average Interruption Duration Index, F1994 to F2003

With the exceptions of 1998, when British Columbia experienced the stormiest November-March period in 27 years, and of F2002, when there were severe windstorms, BC Hydro's system average interruption duration index has been consistently better than the CEA composite.

Customer Average Interruption Duration Index (CAIDI)

CAIDI, shown in Figure 4, measures the amount of time the interrupted customer is without power during a year. It is defined as:

$$\frac{\text{Total Customer Hours of Interruptions}}{\text{Total Customer Interruptions}}$$

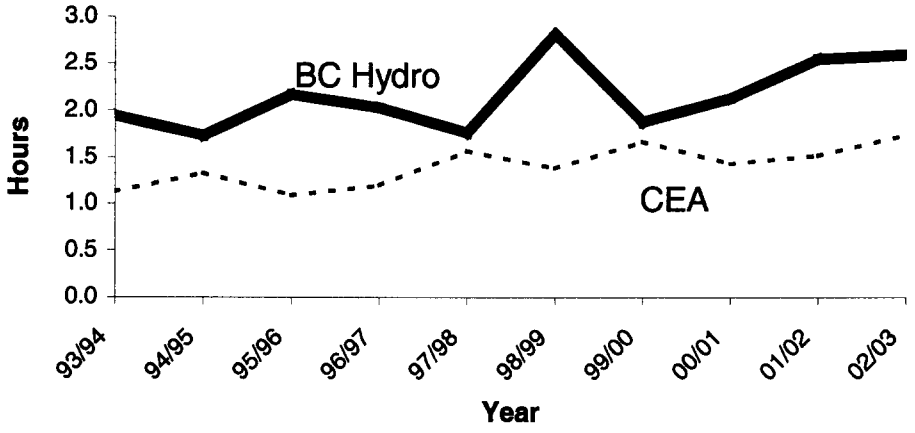

Figure 4. Customer Average Interruption Duration Index, F1994 to F2003

Storms and tree-related problems in 1998 resulted in a 60% increase in customer interruptions hours. The F2002 and F2003 windstorms that affected the Lower Mainland and Vancouver Island also heavily impacted CAIDI.