BC hydro

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August 21, 2006

Mr. Robert J. Pellatt
Commission Secretary
British Columbia Utilities Commission
Sixth Floor – 900 Howe Street
Vancouver, BC V6Z 2N3

Dear Mr. Pellatt:

RE: British Columbia Utilities BCUC (BCUC)
British Columbia Hydro and Power Authority (BC Hydro)
2004/05 to 2005/06 Revenue Requirements Application
Directive 66 (page 197)
Directive 69 (page 201)

This letter informs the BCUC of BC Hydro's compliance with:

Directive 66

The BCUC directs BC Hydro to file the executive summaries of its milestone evaluation reports and the full final evaluation reports of all its Power Smart programs.

First Part of Directive 69

BC Hydro is directed to provide information to the BCUC for on-going review of Power Smart performance through:

- Executive Summaries of milestone evaluation reports and full final evaluation reports for each program.

Please find attached the Executive Summary to the milestone evaluation report "Direct and Market Effects of BC Hydro's 2005-06 Residential CFL Program", completed in F2007.

Yours sincerely,

JC Sofield

Joanna Sofield
Chief Regulatory Officer

Enclosure (1)

SAMPSON
RESEARCH
Consulting Project

DIRECT AND MARKET EFFECTS OF BC HYDRO'S 2005-06 RESIDENTIAL CFL PROGRAM

FINAL REPORT

Prepared for:

Quality Assurance & Evaluation
BC Hydro
Burnaby, British Columbia

By:

Sampson Research

June 15, 2006

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Disclaimer

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DIRECT AND MARKET EFFECTS OF BC HYDRO'S 2005-06 RESIDENTIAL CFL PROGRAM

Executive Summary

The energy and peak demand savings associated with BC Hydro Power Smart's 2005-06 residential Compact Fluorescent Lamp (CFL) initiatives are disaggregated into direct and market (indirect) effects. Direct effects refer to the energy and demand savings attributable to BC Hydro's residential customers who used a BC Hydro sponsored rebate coupon to purchase screw-in CFLs, and who were unlikely to have purchased CFLs without the coupon. Market effects refer to the energy and peak demand savings attributable to incremental purchases of CFLs made as a result of BC Hydro's efforts to improve the availability, affordability, and acceptance of CFLs in British Columbia among manufacturers, retailers, and consumers. Market effects exclude all direct (coupon) purchases of CFLs, and baseline CFL sales. Together, direct and market effects constitute the total impact of the residential CFL program on BC Hydro's residential customer base.

The primary objectives of this evaluation were to:

- characterize the market for CFLs in BC Hydro's service area, from both supply- and demand-side perspectives;
- assess the impact of BC Hydro's residential CFL initiatives on energy savings; and
- assess the impact of BC Hydro's residential CFL initiatives on peak demand.

Primary research conducted to satisfy these objectives included:

- a retail shelf-space survey of household lighting products (n=49);
- a quantitative telephone survey of BC Hydro residential customers (n=400);
- a quantitative telephone survey of participants in BC Hydro's 2005-06 CFL initiatives (n=100); and
- a quantitative telephone survey of a comparison group of households (n=400).

This evaluation addressed CFL replacement behaviours, measure persistence, unused stocks of CFLs, household satisfaction with retailers' selection of CFL product, CFL purchase costs, and load-weighted hours-of-use.

E.1 Key Findings

E.1.1 Supply-Side Assessment

The most recent shelf-space study of medium base, screw-in CFLs confirmed improvements in the relative availability, accessibility, and affordability of CFLs available to BC Hydro residential customers.

Key supply-side findings include:

- CFLs occupied 13% of the total shelf-space allocated to medium screw-based household lighting by retailers in November 2005, up from 10.3% in 2004, and now more than double the initial baseline (2002) estimate of 6.1%.
- Multi-packs containing two or more CFLs are an increasingly popular method of packaging and selling CFLs, accounting for just under half (49%) of all packages (SKUs) on store shelves in 2005, which is equivalent to 75% of all CFLs surveyed.
- Spiral CFLs are the predominant CFL style available to consumers, accounting for 84% of all CFLs for sale by retailers in November 2005, up from 73% in November 2004. Spiral CFLs accounted for only 22% of all CFL product surveyed in 2002.

- CFLs in the 13 to 15 watt range accounted for 61% of all CFL product surveyed in 2005, a proportion that has varied little (between 59% and 63%) during the past three years.
- The number of CFL models increased to 196, up from 155 in 2004. Ninety (90) models were observed during the baseline year (2002).
- The relative share of CFLs rated at an 8,000 hour lifespan has increased sharply during the past year, accounting for 45% of all CFLs displayed, up from 14% in 2004. CFLs rated at 6,000 hours declined from 43% to 22% during the same period.
- The DOE Energy Star® logo was displayed on 79% of all CFLs surveyed in 2005, down from the 86% recorded in 2004, but up from 62% in 2002.
- The downward trend in CFL prices noted in past evaluations continued in 2005 with 54% of all CFLs now priced at less than $4 each (adjusted for multi-packs), compared to only 1.1% in 2003. The weighted average price of all CFLs surveyed in 2005 was $5.15 compared to $6.55 in 2004, a 21% decline in just one year.
- The purchase price (first cost) for a typical spiral CFL rated at 10,000 hours is now 39 cents per 1,000 hours of life – lower than the first cost of a typical 1,000 hour incandescent light bulb (50 cents).

E.1.2 Demand-Side Assessment

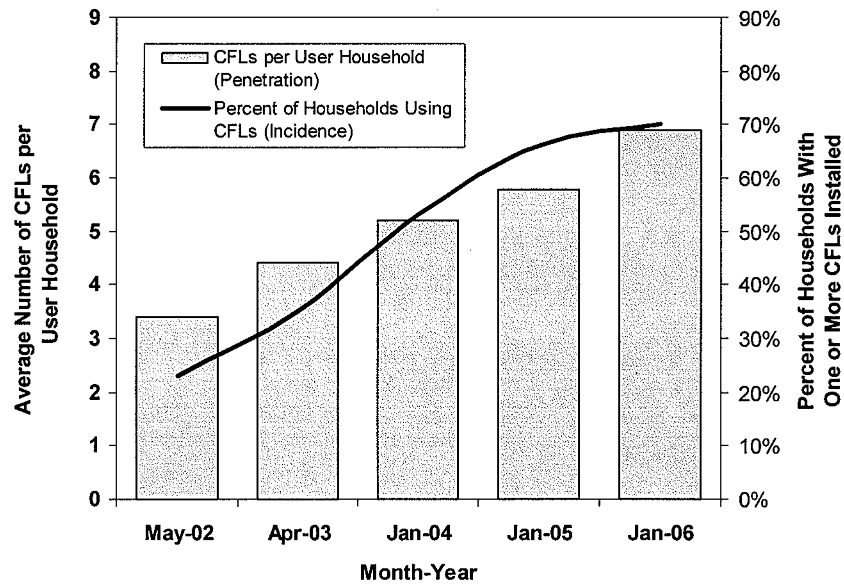
A telephone survey of 400 randomly selected BC Hydro residential customers (consumer survey), and a survey of 100 households who redeemed a BC Hydro sponsored $3 mail-in coupon (participant survey) were conducted in January 2006. These surveys addressed issues of CFL awareness, awareness of BC Hydro programming, stocks, purchases, installations, replacement behaviours, and hours-of-use. The two surveys updated information gathered from comparable surveys of BC Hydro residential customers conducted annually since 2002.

Key findings from the consumer and participant surveys include the following:

- Awareness of compact fluorescent lights has reached a plateau among BC Hydro's residential customers with 90% indicating they had heard of compact fluorescent lights. This is statistically the same proportion recorded during the previous two surveys: 89% in January 2005, and 90% in January 2004.
- Just under three-quarters of BC Hydro's residential customers (73%) recalled information, advertising, or promotions from BC Hydro regarding CFLs. Statistically speaking, awareness of CFL programming is unchanged from that recorded in January 2005 (75%), but up significantly from 22% in May 2002.
- Seven out of every ten (70%) BC Hydro residential customers have at least one CFL in use (incidence) as of January 2006, up from 66% in 2005, and 23% in May 2002. The average number of CFLs installed in homes increased from 5.8 to 6.9 over the past year. (Figure E-1).
- Respondents reported paying an average of $5.95 each for their most recent CFL purchase before taxes in 2005, down from the average $7.55 paid in 2004.
- Households that used a $3 and/or a $4 BC Hydro sponsored coupon to purchase their CFLs in 2005 purchased an average of 7.2 CFLs each with the coupons. Eighty-one percent (81%) of couponed purchases were installed as of January 2006.
- Thirty-one percent (31%) of households with one or more CFLs installed as of January 2006 have replaced a CFL. This is up from 24% recorded in January 2005. The number of CFLs replaced by these households averaged 2.6, up from an average of 1.9 CFLs recorded in January 2005.

Figure E-1

CFL Incidence Versus Penetration
BC Hydro Residential Customers



- Fifty-seven percent (57%) of CFL user households have CFLs in storage, averaging 3.1 CFLs each. Averaged across all households with CFLs installed, the number of CFLs in storage is equivalent to 1.8 CFLs per user-household.
- Only 39% of BC Hydro households rated their satisfaction with their local retailers' selection of CFLs as very good or excellent. Twenty percent (20%) rated the selection as fair or poor.
- Self-reported estimates of daily CFL hours-of-use ranged from an average of 6.1 hours per-day for the most heavily used CFL to an average of 2.0 hours per day for the fourth most heavily used CFL. The average load weighted hours-of-use, adjusted for self-reporting bias (0.77), is calculated at 2.6 hours per day.

A survey of 400 households from North Dakota and South Dakota (comparison group survey) was used to evaluate the current baseline used in the calculations of direct and market effects for BC Hydro's 2005-06 CFL initiative. These households were used as a comparison group because of their limited exposure to CFL programming by either utilities or government entities, and their relative similarity to BC Hydro residential customers in terms of key demographic and housing characteristics.

Key findings from the comparison group survey include the following:

- Compared to BC Hydro respondents, comparison group respondents exhibited significantly lower awareness of CFL technology (79% versus 90% for BC Hydro customers), a lower incidence of CFL use (44% with at least one CFL installed versus 70% for BC Hydro customers), and a lower incidence of CFL purchases during the past 12 months (29% versus 55%).
- Only 10% of purchases by comparison group respondents were made with coupons in 2005 compared to 40% for BC Hydro customers. The majority (91%) of comparison group coupon users identified the retailer as the source of the coupon.
- The lack of CFL programming directed at the comparison group respondents was confirmed by the lack of utility or government-sponsored coupons (0%), and by the relatively small number of households that credited their awareness of CFLs to a utility or government agency (3% and 1% of responses respectively).

- Prices paid for their most recent CFL purchase averaged $5.57 CDN. This is equivalent to that paid by BC Hydro residential customers ($5.95) if differences in sales taxes between the two regions are considered.
- Comparison group and BC Hydro respondents effectively gave the same average satisfaction rating for their local retailers' selection of CFLs (2.6 versus 2.7 for BC Hydro customers).

The results from the comparison group survey show that despite the equivalent relative affordability of CFLs in this region, awareness, incidence, and penetration of CFLs among comparison group respondents are at levels experienced in British Columbia prior to substantive CFL programming by BC Hydro. Since the comparison group results represent a snap-shot in time, the degree of market advancement implied by the comparison group findings may be understated if key variables of CFL awareness, incidence, and penetration are improving at rates slower than those occurring in British Columbia.

Based on the findings from the comparison group survey, it was decided to use this information to update the estimate of baseline CFL sales in British Columbia, and to calculate the direct and market effects for BC Hydro's 2005-06 residential CFL initiatives.

E.1.4 Direct and Market Effects

The energy and peak demand savings attributable to the direct and market effects of BC Hydro's residential screw-in CFL initiatives for the 2005-06 fiscal year were estimated separately and then summed to determine the program's overall impact.

Direct Effects

Run-rate energy savings attributable to the direct effects of BC Hydro's 2005-06 residential CFL initiatives, adjusted for cross-effects, are estimated at 4.2 GWh per year. Coincident peak demand reduction is estimated at 1.9 MW annually.

The number of CFLs purchased using BC Hydro sponsored $3 and/or $4 coupons, including participant spillover purchases, and less purchases by free riders is estimated at 125,692. Participant spillover purchases and free riders amounted to 47% and 24% of CFLs purchased with a coupon (102,839) respectively. Non-participant spillover is counted as part of market effects. A total of 93,012 CFLs were installed under direct effects for a net installation rate of 74%. Average load weighted hours-of-use (HOU), adjusted for self-reporting bias, was estimated at 2.6 hours per day. Based on this HOU, these CFLs are estimated to have an effective useful life (EUL) of 8.6 years. Satisfaction with the product, its reliability, and other factors (e.g., renovations, changes in residence, etc.) will likely mean that persistence of savings will be less than EUL.

Market Effects

Market effects attributable to BC Hydro's residential CFL initiatives arise from the utility's influence on the supply-side and demand-side characteristics of the residential CFL market. Market effects exclude any direct effects, instead referring to CFL purchases made by households that did not participate in BC Hydro's CFL promotions, less an estimate of baseline CFL sales – that is, CFL sales that would have occurred regardless of any BC Hydro programming. Market effects do not include any CFLs acquired directly through BC Hydro promotions (direct effects) – including any participant spillover, and less free rider purchases. This step is a refinement from past studies of market effects, and ensures that claims made under market effects do not duplicate those claimed under the program's direct effects.

A total of 628.3 thousand CFLs installed in the 2005-06 fiscal year are attributable to BC Hydro's market effects. Market effect CFLs installed in the 2004-05 fiscal year have been revised to 2.170 million from 2.529 million. Total run rate energy and peak demand savings attributable to BC Hydro's market effects for the 2005-06 fiscal year are estimated at 19.2 GWh/yr and 14.8 MW respectively. Run rate energy and peak demand savings for the 2004-05 fiscal year have been revised to 104.8 GWh/yr and 55.4 MW from the previously reported 119.6 GWh and 47.2 MW (imputed) (Sampson Research 2005).

Total Direct and Market Effects

Table E-1 summarizes the direct and market effects of BC Hydro's 2005-06 residential CFL initiatives in terms of installed CFLs, run rate energy savings, and run rate peak demand savings. The number of CFLs installed under the direct and market effects of the 2005-06 CFL campaign is estimated at 721.3 thousand. Annual energy savings from the campaign are estimated at 23.4 GWh. Total peak demand savings are estimated at 16.7 MW.

Table E-1
Summary of Program Impact – Direct and Market Effects
CFL Installations, Energy Savings, and Peak Demand Savings
Fiscal Year 2005-06

	Installed CFLs (000)	Energy Savings Run Rate GWh/Yr [1]	Coincident Peak Demand Savings (MW) [1]
Direct Effects	93.0	4.2	1.9
Market Effects	628.3	19.2	14.8
Total Evaluated Savings	**721.3**	**23.4**	**16.7**

[1] Represents annual savings for CFLs installed during the fiscal year in question, as of fiscal year end.

E.2 Summary and Recommendations

E.2.1 Summary

This evaluation assessed developments in the supply-side and demand-side aspects of the compact fluorescent lighting market in British Columbia to address the direct and market effects of BC Hydro Power Smart's residential CFL initiatives for the 2005-06 fiscal year. These effects are expressed in terms of energy and peak demand savings for the 2005-06 fiscal year. Updated estimates of market effects savings for the fiscal year 2004-05 are also provided, consistent with finalized coupon tallies that were unavailable at the time of the 2005 market effects evaluation.

The results of this evaluation show that the incidence and penetration rates of CFLs among BC Hydro's residential customers, and the quantity and variety of CFL product on store shelves, continue to improve. These improvements confirm trends observed in past CFL evaluations (Sulyma 2003, Sampson Research 2004, Sampson Research 2005). Other notable developments in the market for CFLs is the continued improvement in the "first cost" economics of CFLs with the purchase cost of a typical 10,000 hour spiral CFL now below the typical purchase cost of a 60 watt, 1,000 hour incandescent light bulb.

Price declines have also occurred outside of BC Hydro's service territory, and outside of BC Hydro's influence on the CFL market, as confirmed by the survey of households in North Dakota and South Dakota. Despite the equivalent relative affordability of CFLs in this region, awareness, incidence, and penetration of CFLs among the comparison group of households are at levels experienced in British Columbia prior to substantive CFL programming by BC Hydro. Of the factors that influence CFL use – college education, home ownership, dwelling size, and CFL programming (coupons) – the primary difference between the two regions appears to be the minimal amount of CFL promotions undertaken by utilities and governments in the comparison region. The degree of market advancement by BC Hydro implied by the comparison group findings may be understated as the rate of change for key market transformation markers in the comparison region is unknown at this time.

This evaluation also highlighted the growing prevalence of CFLs sold in packages of two or more CFLs. Multi-packs offer some of the best value to consumers, and they likely are a factor in the increase in annual per-household purchases observed in the 2006 research. As well, the presence of multi-packs is likely boosting the spillover effect attributable to BC Hydro sponsored coupons, as they make it significantly easier to reach the minimum purchase threshold specified by the coupon ($9.90). Setting the threshold amounts to capture this effect was smart programming by BC Hydro. A side effect of this strategy is, however, that 57% of households now hold unused CFL product in storage, although mostly in small numbers. Future CFL promotions by BC Hydro may see a decline in the average installation rate for newly purchased CFLs as households increasingly appear to be treating CFLs like incandescent bulbs. That is, households are less reluctant to purchase CFLs in quantities greater than their immediate need because the product is now relatively inexpensive.

The direct and market effects of BC Hydro's residential CFL initiatives in fiscal year 2005-06 are summarized below. All savings estimates have been adjusted for cross effects and represent run rate values:

- Revised energy and peak demand savings for 2004-05 market effects of 104.8 GWh and 55.4 MW from 119.6 GWh and 47.2 MW (imputed) respectively.
- Installation of an estimated 93.0 thousand CFLs attributable to direct programming (coupons), and an additional 628.3 thousand CFLs installed due to market effects.
- Run rate energy savings from direct effects of 4.2 GWh annually, and 19.2 GWh annually from market effects.
- Peak demand savings of 1.9 MW and 14.8 MW attributable to direct and market effects respectively.

E.2.1 Recommendations

The following recommendations have been prepared based on the findings of this evaluation.

- Progress in advancing the market for CFLs in British Columbia should be assessed in one year's time. A follow-up telephone survey of North Dakota and South Dakota households is recommended in January of 2007.
- The persistence of energy and demand savings for CFLs claimed under direct and market effects should be researched beginning with a review of published literature on the topic, followed by development of an appropriate and cost-effective methodology to address the issue.
- BC Hydro should continue to work with manufacturers and retailers to improve CFL choices for consumers as this is an area where consumers see room for improvement.
- In recognition of the substantial increase in the penetration of CFLs among its residential customers, and the impact on the hours-of-use of incremental installations, BC Hydro should adopt the weighted average hours-of-use estimates used in this evaluation for planning future residential CFL initiatives.

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