"Winter Residential Optional Dynamic Pricing: British Columbia, Canada" (forthcoming in *Energy Journal*)

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Executive Summary

The impact of time-of-use (TOU) pricing and critical peak pricing (CPP) upon the resource needs and energy sales of a summer-peaking region has been extensively studied. However, less is known about the impact of such dynamic pricing programs upon the peak demand and energy requirements of a winter-peaking region like the coastal province of British Columbia (BC) in western Canada. Winter impacts may differ from the summer impacts of dynamic pricing programs because the differences in appliance holdings and weather may translate into different changes in consumption behavior.

This paper uses a Generalized Leontief (GL) demand system to estimate the daily kWh responses by TOU on a working weekday of 1326 single-family-home customers who voluntarily participated in BC Hydro's residential optional dynamic pricing (RODP) pilot. The GL specification is chosen because of its ability to characterize TOU demands with low price sensitivity.

Using the pilot's panel of non-missing customer-day observations of peak and off-peak kWh consumption observed over 83 working weekdays in November 2007 – February 2008, we estimate that the kWh reduction in the peak period of 4 - 9 pm *sans* an in-home display

(IHD) is 2.2% to 4.4% at time-of-use tariffs with peak-to-off-peak price ratios of 2.0 to 6.0 and 4.8% to 5.3% at critical peak pricing tariffs with peak-to-off-peak price ratios of 8.0 to 12.0. The IHD approximately doubles these estimated peak kWh reductions. It has an estimated conservation effect equal to 2.4% to 3.5% of the daily total kWh consumption. These findings corroborate those obtained for summer peaking utilities.

To illustrate the usefulness of our peak kWh response estimates, we calculate that at the pilot's CPP rate with a peak-to-off-peak price ratio of 8.0, an IHD-aided system-wide RODP program is projected to reduce BC's system peak demand by 11.5 MW to 34.6 MW, depending on the assumption used to characterize the program's participation rate. This peak demand reduction's expected cost saving is C$24.4 million to C$73.4 million. As BC residents already have smart meters with an IHD function, the policy implication is to explore using RODP to reduce BC's peak capacity need.