MARKET SURVEILLANCE ADMINISTRATOR

Assessment of Inter-jurisdictional Retail Electricity Rate Comparisons

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Taking action to promote effective competition and a culture of compliance and accountability in Alberta's electricity and retail natural gas markets

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1 Executive Summary

Retail electricity prices in Alberta receive considerable public attention and are often cited as indicators of performance for the deregulated market. Rate comparisons with other jurisdictions are widely cited, but these comparisons often do not compare like with like and in the MSA's view are of questionable benefit. This report outlines the results of recent studies comparing monthly electricity bills in municipalities and provinces between 2013 and 2016.

These studies suggest that Albertans have paid lower monthly electricity bills relative to many other North American jurisdictions in recent years. However, the MSA is of the view that inter-jurisdictional comparisons should be made judiciously, if at all, because of large structural differences between electricity industries across provinces. For example, provinces that rely heavily on hydroelectric generation (such as Manitoba, British Columbia and Québec) may currently have low electricity prices, but these come as a result of large historical capital investments. If the results from these studies are used, they should be interpreted carefully and in the appropriate context.

The studies examined took different approaches in accounting for jurisdictional differences and failed to compare prices using a methodology that effectively accounted for regional differences. This problem was often compounded by data collection issues, such as the use of voluntary survey data.

2 Literature Review

Studies of retail electricity rates by Hydro-Québec, Manitoba Hydro and London Economics have been reviewed. These studies focus on slightly different regions: the Hydro-Québec compares bills across major North American cities, the Manitoba Hydro study compares bills across Canadian municipalities, and the 2013 London Economics study compares average provincial bills, while making adjustments for jurisdictional differences.

2.1 Hydro-Québec – *Comparison of Electricity Prices in Major North American Cities*[1]

2.1.1 Overview & Methodology

Hydro-Québec has published an annual comparison of electricity prices across North American cities since 2010.[2]

The most recent publication compares the monthly all-in price[3] of electricity (in cents per kWh) on April 1, 2015 for 22 North American cities (12 Canadian and 10 American)[4] and 21 different consumption levels. Four primary consumer types were used in the comparison (residential, and small, medium and large power consumers), with the all-in price calculated for various

[1] Comparison of Electricity Prices in Major North American Cities, 2015.
[2] Hydro-Québec Electricity Price Analyses, 2010 - 2015.
[3] An all-in price refers to the effective price paid by consumers for electricity, including transmission, distribution, and other billed components.
[4] The exchange rate at noon on April 1, 2015 was used to convert American prices into Canadian.

consumption levels within each consumer type. At least one major city has been included per Canadian province; for Alberta, Edmonton and Calgary were included.[5]

Data were partially gathered by surveys sent to utilities, as well as by bill estimation performed by Hydro-Québec (where survey responses were unavailable). Rates are generally those charged on April 1, 2015, although where a utility uses time-of-use rates (where rates are adjusted by season and/or time of day), the authors used an annual average price. This includes Alberta, where the Regulated Rate Option varies monthly. The authors note that the direction of price fluctuations between summer and winter months can differ depending on geographic location. Variation of adjustment clauses (such as rate riders) throughout the year does not appear to have been factored into the analysis. These adjustment clauses only included nominal electricity charges; indirect charges (such as the effect of utility debt guarantees on provincial debt servicing costs) were not accounted for.

The authors have calculated prices and monthly bills including and excluding taxes. However, the access fees paid by consumers to the cities of Calgary and Edmonton are not classified as taxes, while municipal taxes paid to Winnipeg and Regina are listed as taxes. This has the effect of increasing the Edmonton and Calgary tax-free bills when compared to Winnipeg and Regina.

2.1.2 Results

The 2015 study finds that Edmonton and Calgary residential consumers pay some of the lowest electricity prices among cities studied,[6] at 11.55 and 11.66 ¢/kWh, respectively.[7] As has been the case in prior years, Montreal is found to pay the lowest price of 7.19 ¢/kWh. The two Albertan cities only pay more than cities that primarily use hydroelectric power.[8] When taxes are included, the relative performance of the Albertan cities changes little: Edmonton consumers pay 12.12 ¢/kWh and Calgary consumers pay 12.24 ¢/kWh.

Table 2.1 displays the residential rates by jurisdiction, excluding taxes, for households consuming 1,000 kWh per month:

[5] The responses of Edmonton (EPCOR) and Calgary (ENMAX) make use of Registered Rate Option billing rates.
[6] The same ranking holds where only Canadian cities are considered; the American city with the lowest residential price is Miami, at 12.31 ¢/kWh.
[7] For monthly consumption of 1,000 kWh/month, excluding taxes.
[8] Excluding Edmonton, Calgary pays higher prices than Montreal, Winnipeg, Vancouver and St. John's, all of which rely on hydroelectric power.

Table 2.1 – Results of *Comparison of Electricity Prices in Major North American Cities* for April 1, 2015 (Hydro-Québec, 2015)[9]

Jurisdiction	Results (All-In Price)
Montréal, QC	*7.19 ¢/kWh*
Winnipeg, MB	*8.11 ¢/kWh*
Vancouver, BC	*10.29 ¢/kWh*
Edmonton, AB	***11.55 ¢/kWh***
St. John's, NL	*11.55 ¢/kWh*
Calgary, AB	***11.66 ¢/kWh***
Moncton, NB	*12.30 ¢/kWh*
Miami, FL	12.31 ¢/kWh
Houston, TX	12.36 ¢/kWh
Seattle, WA	12.44 ¢/kWh
Portland, OR	13.94 ¢/kWh
Toronto, ON	*14.31 ¢/kWh*
Regina, SK	*14.37 ¢/kWh*
Nashville, TN	14.45 ¢/kWh
Ottawa, ON	*14.86 ¢/kWh*
Charlottetown, PE	*15.62 ¢/kWh*
Halifax, NS	*16.03 ¢/kWh*
Chicago, IL	16.79 ¢/kWh
Detroit, MI	17.77 ¢/kWh
San Francisco, CA	27.69 ¢/kWh
New York, NY	28.90 ¢/kWh
Boston, MA	30.03 ¢/kWh

Examining residential prices at different monthly consumption levels[10] demonstrates that the two Albertan cities have lower prices at higher consumption levels, relative to their counterparts.

These results are markedly different from the 2012 study,[11] where Edmonton and Calgary paid 12.90 and 13.89 ¢/kWh for 1,000 kWh of consumption respectively, among the highest rates for Canadian cities considered. This fall in Alberta retail rates is primarily due to lower wholesale electricity prices.

2.2 Manitoba Hydro – *Survey of Canadian electricity bills effective May 1, 2016*[12]

2.2.1 Overview & Methodology

Manitoba Hydro publishes an annual comparison of Canadian electricity bills every May. The study compares monthly bills on May 1, 2016 for a variety of customer types, each containing calculations for various consumption levels.[13]

[9] Comparison of Electricity Prices in Major North American Cities, 2015, Page 20.
[10] Consumption levels ranging from 625 kWh/month to 3,000 kWh/month were examined.
[11] Comparison of Electricity Prices in Major North American Cities, 2012, Page 20.
[12] Utility Rate Comparisons: Survey of Canadian electricity bills - effective May 1, 2016.

The study's data is gathered from utilities through a survey that requests hypothetical electricity bills for specified consumption bins. The May 2016 survey includes 13 Canadian utilities from 12 cities,[14] including Edmonton and Calgary.[15] The City of Medicine Hat has participated in previous years.[16] Neither the survey design nor the responses have been made public.

Similar to the Hydro-Québec study, indirect costs, such as those related to utility debt, were excluded from the calculation of electricity bills.

2.2.2 Results

The Manitoba Hydro survey arrives at conclusions similar to the Hydro-Québec study;[17] in May 2016, Calgary and Edmonton had lower residential electricity bills than over half the municipalities surveyed, with Calgary consumers paying $111.70/month and Edmonton consumers paying $105.08/month.[18]

Table 2.2 displays the residential rates by jurisdiction, excluding taxes, for households consuming 1,000 kWh per month:

Table 2.2 – Results of *Survey of Canadian electricity bills effective May 1, 2016* (Manitoba Hydro, 2016) [19]

Jurisdiction	Results (All-In Price)
Montréal, QC	*7.23 ¢/kWh*
Winnipeg, MB	*8.43 ¢/kWh*
Edmonton, AB	***10.51 ¢/kWh***
Vancouver, BC	*10.70 ¢/kWh*
Calgary, AB	***11.17 ¢/kWh***
Saint John, NB	*11.17 ¢/kWh*
St. John's, NL	*11.96 ¢/kWh*
Moncton, NB	*12.50 ¢/kWh*
Regina, SK	*14.65 ¢/kWh*
Saskatoon, SK	*14.65 ¢/kWh*
Halifax, NS	*15.88 ¢/kWh*
Ottawa, ON	*16.54 ¢/kWh*

Calgary and Edmonton consumers also receive lower bills relative to other municipalities when more energy is consumed (a result similar to the Hydro-Québec study); this is attributable to consumers in the two cities paying higher fixed charges but lower variable charges than their national counterparts.

[13] Customer types include: Residential, Small Loads, Medium Loads, Large Loads and Large Industrial Loads.
[14] St. John's, Newfoundland is served by both Newfoundland Power and Newfoundland & Labrador Hydro.
[15] The responses of Edmonton (EPCOR) and Calgary (ENMAX) use Registered Rate Option billing rates.
[16] Manitoba Hydro Utility Rate Comparisons: Survey of Canadian Electricity Bills – Effective May 1, 2008.
[17] However, the two studies examine different years, and contain differing methodologies in places; see Section 3.
[18] For 1,000 kWh of monthly consumption.
[19] Utility Rate Comparisons: Survey of canadian electricity bills - effective May 1, 2016, Residential, Table "Comparison at 1,000 kwh per month".

When comparing the 2016 survey results with those from the 2015 Survey, Calgary consumers pay (approximately) $10 less per month for 1,000 kWh of consumption, while Edmonton consumers pay almost $14 less per month. Again, this is primarily attributable to falling wholesale electricity prices.

2.3 London Economics – *Power prices in context*[20]

2.3.1 Overview & Methodology

In June 2014, London Economics, a consultancy, published a report prepared for the Manning Centre for Building Democracy (Manning Centre) and the Independent Power Producer Society of Alberta (IPPSA), examining Albertan power prices relative to other Canadian provinces.[21] In addition to its inter-jurisdictional bill comparison, the study analyzes the Alberta power market and its unique characteristics.

The authors compared residential electricity prices for most provinces using an all-in rate, calculated by dividing the electrical utilities' total revenue from residential customers by the electricity volume sold to residential customers, where such data was available. The Alberta all-in rate was calculated differently, using a weighted average of Regulated Rate Option energy, distribution and transmission rates for the four distribution service zones. It is notable that rate riders have been excluded from the Alberta calculation (with the exception of the Balancing Pool adjustment riders, which were included), because of their "transitional" nature, although this presents some inconsistency.[22] However, the calculation methodology used for other provinces included riders and infrequent charges in the estimates of all-in rates.

A fixed monthly consumption value of 592 kWh was used to convert Alberta fixed charges to an equivalent ¢/kWh rate, in order to estimate billing components.[23]

2.3.2 Results

In reviewing residential electricity rates, the authors found that in 2013 Alberta consumers paid approximately the 3rd highest all-in rates of all provinces at 14.5 ¢/kWh. When compared to provinces with less than 50% hydroelectric generation, however, Alberta residential rates were within 1% of the average rate.

Further analysis of rate differentials concluded that up to 4.01 ¢/kWh of the difference in rates between Alberta and hydro-provinces may be attributable to the resource mix.[24] After adjusting for various perceived distortions[25] that keep power prices low in other provinces, Alberta's 14.5

[20] Power prices in context: comparing Alberta delivered electricity prices to other Canadian provinces on a level playing field.
[21] The territories (Yukon, Northwest Territories and Nunavut) have been included sporadically throughout the report.
[22] The Balancing Pool rider was consistently negative (a refund) to consumers across all service zones in 2013. Transmission riders – generally positive (a charge) in 2013 across all zones – were excluded, despite their consistent application across years.
[23] This consumption value was calculated using the average monthly provincial average consumption for both regulated and competitive contracts between January 2012 and February 2014, with data available in the MSA Retail Statistics. The average consumption of customers with regulated bills over the same period is 561 kWh.
[24] Power prices in context: comparing Alberta delivered electricity prices to other Canadian provinces on a level playing field, page 17.
[25] Perceived distortions include heritage contracts, export revenues, implicit debt guarantees, suppression of return on equity and lower effective tax burdens. See pages 16-28 of Power prices in context: comparing Alberta delivered electricity prices to other Canadian provinces on a level playing field.

¢/kWh price is the 5th highest rate among provinces, and only 1¢/kWh above the provincial average.

The authors argue the share of disposable income spent on electricity bills is a better indicator of the affordability of electricity across provinces than the all-in price. They calculate that Alberta consumers spent 1.5% of disposable income on electricity in 2013, which ties Alberta with British Columbia for lowest share.[26]

Examining the first few months of 2014, the authors found that the Alberta price had fallen to 11.4 ¢/kWh.

Table 2.3 – Results of *Power prices in Context* for the Year 2013 (London Economics, 2014)[27]

Assumptions	Jurisdiction	Results (All-In Price)
Unadjusted for "Distortions" [28] Rates estimated either by: 1. Average Utility Revenue per Residential Customer 2. Use of Average Monthly Consumption to Estimate Rate Components[29] Taxes Excluded Residential Rates	*Québec*	*7.3 ¢/kWh*
	Manitoba	*7.7 ¢/kWh*
	British Columbia	*9.2 ¢/kWh*
	New Brunswick	*11.5 ¢/kWh*
	Newfoundland & Labrador	*13.7 ¢/kWh*
	Ontario	*13.8 ¢/kWh*
	Saskatchewan	*14.3 ¢/kWh*
	Alberta	***14.5 ¢/kWh***
	Yukon	*14.6 ¢/kWh*
	Nova Scotia	*14.9 ¢/kWh*
	Prince Edward Island	*17.4 ¢/kWh*
	Nunavut	*69.5 ¢/kWh*
Adjusted for "Distortions"[28] Rates estimated either by: 1. Average Utility Revenue per Residential	*Québec*	*8.3 ¢/kWh*
	Manitoba	*9.3 ¢/kWh*
	New Brunswick	*12.4 ¢/kWh*
	British Columbia	*12.7 ¢/kWh*
	Newfoundland & Labrador	*13.8 ¢/kWh*
	Saskatchewan	*14.4 ¢/kWh*
	Alberta	***14.5 ¢/kWh***

[26] Power prices in context: comparing Alberta delivered electricity prices to other Canadian provinces on a level playing field, page 46.
[27] Those all-in prices not explicitly stated in the report have been estimated based on figure 5, page 8, and figure 27, page 29 of Power prices in context: comparing Alberta delivered electricity prices to other Canadian provinces on a level playing field.
[28] Distortions include: Heritage Contracts, Export Revenue (used to keep domestic rates low), Lower taxes on provincial-utilities, Implicit debt guarantees.
[29] Estimates for Alberta were performed in this manner, but used a consumption weighted average to arrive at average rates across the four electricity distribution zones.

2. Customer Use of Average Monthly Consumption to Estimate Rate Components[29] Consumer-Incurred Taxes Excluded Residential Rates	*Nova Scotia*	*15.2 ¢/kWh*
	Ontario	*15.3 ¢/kWh*
	Yukon	*15.8 ¢/kWh*
	Prince Edward Island	*17.4 ¢/kWh*

The authors also compared Alberta industrial all-in electricity prices with those of American states (this analysis was not performed for residential prices), and concluded that Alberta industrial prices were competitive.

3 Methodological Considerations

The studies mentioned in Section 2, although similar in methodology and identified trends, differ in several respects. Among these are: sources of confirmation bias, survey design, and the comparison of annual average rates to standardized rates.

3.1 Potential for Methodological Bias

The studies considered in this report were either conducted or commissioned by those with a strong interest in the results. The MSA would not consider any of them to be truly independent and none to the MSA's knowledge have been peer reviewed. As such the methodologies need careful examination to ensure they do not unreasonably characterize bills.

While Hydro-Québec's 2010-2015 studies appear to make use of all incurred billing components in the total bill calculations, the other two studies appear to omit components that would have increased all-in rates. Although the London Economics analysis includes various factors that can impact provincial electricity bills (implicit debt guarantees, heritage contracts and export revenues) the addition of which reduces relative Alberta bills, many rate riders were omitted from the billing calculation which would have increased Alberta bills.

Similarly, Manitoba Hydro omitted taxes (at all levels of government) from its surveyed bill calculations. While this allows for a more direct comparison of utility performance, it underestimates the monthly electricity bills paid by consumers in all jurisdictions. Given Manitoba has one of the highest combined non-refundable tax rates paid on electricity (15.625%, given most consumption patterns)[30], omitting taxes has the effect of underestimating the relative bill paid by residential consumers in Winnipeg.

[30] See Reading Your Manitoba Hydro Bill, Page 2, and Hydro-Québec 2015 Study, Page 67.

3.2 Problems with Survey Design

The use of voluntary surveys by Manitoba Hydro and Hydro-Québec creates participation bias, as a responding utility has an interest in not appearing to have high relative electricity rates and may decline to participate as a result. This appears to have impacted Manitoba Hydro's annual surveys, which have had frequent turnover of participating utilities, especially those in Ontario. This bias has led to more low-priced utilities (with lower costs) participating in the Manitoba Hydro survey and complicates analysis over time (as the high-priced utilities may opt-out of future surveys).

While the Hydro-Québec study also has a similar participation bias issue, it has been resolved by using an unchanging set of 22 municipalities in each of its studies, with any non-responding utilities' bills accounted for using estimation by Hydro-Québec. Assuming the estimation is accurate, Hydro-Québec's methodology resolves the potential participation bias issue.

Additionally, neither Manitoba Hydro nor Hydro-Québec has publically released its surveys or the responses of the surveyed utilities. The MSA is of the view that more transparency would be helpful for efforts to ensure data reliability. The non-publication of responses can also encourage participation bias, as there is no mechanism to determine which utilities are non-responding as opposed to un-surveyed.

3.3 Use of Average Annual Rates

Some utilities (including ENMAX and EPCOR in Alberta) have rates that vary throughout the year (may be hourly, monthly, seasonally, etc.). All three studies substituted annual average rates for at least some variable rates, in order to estimate comparable all-in rates across jurisdictions.[31] This approach is problematic across the studies, as it assumes consistent consumption across high and low price periods. If high consumption periods are generally correlated with high-price periods, using a simple average would underestimate a residential consumer's all-in price paid over a year. This suggests that the studies are underestimating bills in Calgary and Edmonton (and perhaps Ontario, which uses daily time-of-use rates). A better method of estimating all-in price might use a consumption-weighted average.

3.4 Period of Studies

Inter-jurisdictional bill comparisons performed over a limited time period are not effective at identifying relative changes in cost. Rates are adjusted at different times and frequencies in each jurisdiction, which makes annual comparisons difficult. Longer term studies would be better suited for this purpose. Furthermore, different time periods are examined in the studies (Hydro-Québec – 2015, Manitoba Hydro – 2016, London Economics – 2013), which makes a methodologically-consistent examination of relative Alberta bill performance over time more

[31] These annual rates were compared with rates in the month of interest for utilities that did not make use of time-of-use rates.

difficult. Examining studies conducted by the same institution in previous years in order to cross-reference results with another study in the same year reveals discrepancies.[32]

4 Viability of Jurisdictional Comparisons

Institutional and market differences in provincial electricity markets make jurisdictional comparisons of limited value. This is especially true for Alberta, which has a unique market that is not easily comparable on a levelized basis.

Various factors influence differences in electricity prices between regions, including resource allocations, taxes, subsidies and regulation (among others), some of which create indirect consumer costs not accounted for by a simple comparison of all-in rates.

The surveys released by Manitoba Hydro and Hydro-Québec – while indicative of nominal electricity rates paid by consumers in different provinces and cities – were not designed to account for regional differences, and should not be used as indicators of a utility's (or indeed, a market's) performance.

While London Economics attempted to account for regional differences in its study, some of the "distortions" included accounted for why ratepayers in other provinces pay less, instead of quantifying the indirect costs paid by taxpayers in the province. For example, the inclusion of the rate-suppressing effects of low utility taxes and implicit debt guarantees in other provinces ignored the indirect costs that the associated government "revenue holes" and debt burdens imposed on taxpayers. Rather, by accounting only for the suppressing effects of these distortions, the authors attempted to levelize other provinces using an Alberta standard without considering the effects of market differences.

The market differences render jurisdictional comparison studies inadequate for anything but simple analyses, and should be used sparingly in discussions of the successes and failures of electricity systems. In general, the MSA is of the view that inter-jurisdictional comparisons should be made judiciously, if at all.

[32] For example monthly bills in Manitoba Hydro's 2015 Survey differ from Hydro-Québec's 2015 Study for the cities of Calgary, Edmonton and St. John's (for a residential consumer with 1,000 kWh of monthly consumption). The higher bill values for Calgary and Edmonton in the Manitoba Hydro survey can be explained through their use of annual average RRO Rates over different 12-month periods, while it appears that for St. John's, different utilities' bills may have been estimated.