

December 2020

COVID-19 Impacts on Electricity Demand in Canada By Victor Gallardo and Nurul Hossain

Introduction

Generally, the shock-induced by COVID-19 on Canada's economies and the provinces followed a similar trail. Social distancing and stay-at-home measures, combined with government mandates to shut down non-essential goods and services establishments, drove a significant decrease in consumer spending and triggered an unprecedented plunge in demand for goods and services. From a macro perspective, the closure of international borders halts the flow of final goods and intermediate inputs, creating significant bottlenecks in global supply chains and interruptions to local and multinational corporations' ongoing manufacturing operations¹.

Similar to other countries, federal and provincial governments in Canada urged people to practice social distancing, imposed stay-at-home measures and restrictions on non-essential travel to flatten the curve and avoid the risk of overloading the provincial health care systems. The overall demand for goods and services in the economy decreased, and as businesses experienced weaker earnings, cost-cutting measures were carried out². It follows that COVID-19 would result in a decline in economic activity in the industrial and commercial sectors due to the shutdown measures. Consequently, businesses would experience a reduction in their electricity usage. Given the variations in the provincial electricity demand makeup, COVID-19 has had an asymmetric effect on the electricity demand across provinces.

Empirical cases in Canada – overall provincial electricity demand

We analyzed historical electricity demand in six provinces - British Columbia, Alberta, Ontario, New Brunswick, Nova Scotia, and Prince Edward Island – to estimate the impact that COVID-19 has had on the overall provincial electricity demand and decompose the total reduction by main customer classes - industrial, commercial, and residential³. After controlling key factors of electricity demand and other unobserved fixed effects in each province, our results suggest that electricity demand in almost all provinces in the sample was affected adversely due to COVID-19 during the second quarter of 2020 (April to June). Table 1 summarizes our findings, and Figure 1 offers a graphical representation of these results.

¹ Conference Board of Canada. 2020. "U.S. and Global Economies Slammed by COVID-19: U.S. and World Outlooks." Ottawa, ON: The Conference Board of Canada.

² Gellatly, Guy, and Carter McCormack. 2020. "Recent Developments in the Canadian Economy, 2020: COVID-19, Second Edition." No. 106. Economic Insights. Ottawa, ON: Statistics Canada.

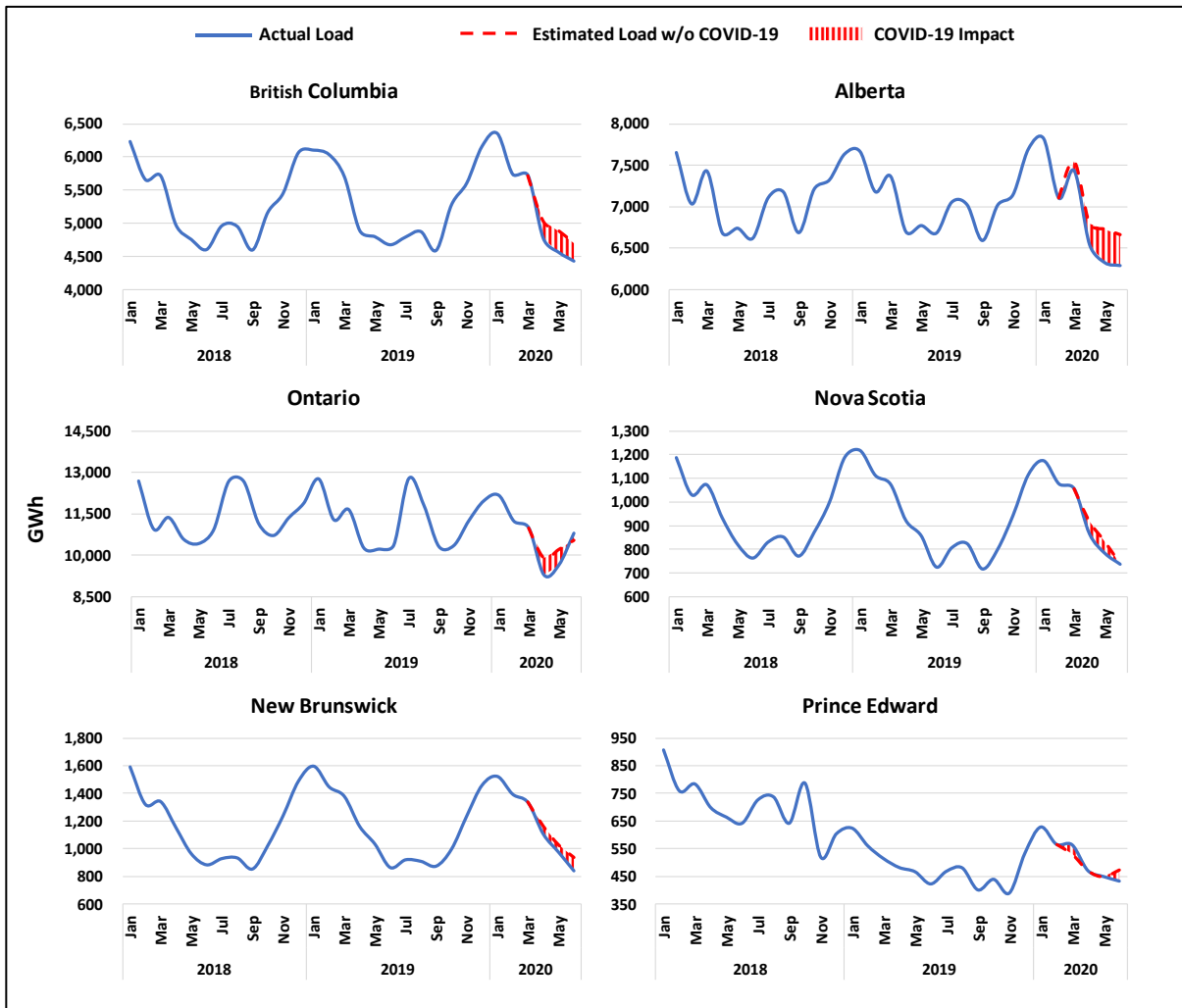
³ Data are sourced from the BC Hydro Power Authority (2020a) for British Columbia data, the Alberta Electricity System Operator (AESO 2020) for Alberta data, the Independent Electric System Operator (IESO 2020) for Ontario data, NB Power (2020b) for New Brunswick data, Nova Scotia Power (2020b) for Nova Scotia data, and PEI Energy Corporation for Prince Edward Island Electricity Data (2020).

Table 1: Estimated Effect of COVID-19 on Monthly Electricity Demand

Provinces	AB	BC	NB	NS	ON	PE
COVID-19 Months						
Mar_20	-1.5%***					6.4%**
Apr_20	-3.7%***	-5.2%***	-4.9%***	-5.7%***	-6.3%***	
May_20	-5.9%***	-6.6%***	-5.2%***	-5.8%***	-5.6%***	
Jun_20	-5.5%***	-5.7%***	-10.5%***		2.4%***	-8.7%**
Adj. R-Squared	0.839	0.078	0.346	0.484	0.924	0.872

Note: N=90. All models included year fixed effects, year-specific linear trends, temperature variables- HDD, HDD-squared, CDD, and CDD-squared. The dependent variable is the log of the monthly electricity load in MWh. *, **, and *** suggest significances at the 10%, 5% and 1% respectively.

Figure 1. Impact of COVID-19 on Provincial Electricity Demand



Impact by customer class – Industrial, Commercial and Residential users

Table 2 provides the estimated electricity demand changes by customer class in the six provinces between March and June 2020.

**Table 2: Estimated Effect of COVID-19 on Electricity Demand by Customer Class
(,000 MWh)**

Month	AB	BC	NB	NS	ON	PE
Industrial						
Mar_20	-95.5					-10.3
Apr_20	-173.6	-188.1	-32.8	-15.5	-290.5	
May_20	-252.0	-198.5	-31.5	-18.3	-379.8	
Jun_20	-243.5	-159.5	-29.0		-365.7	-22.2
Total	-764.7	-546.1	-93.4	-33.8	-1,035.9	-32.5
Commercial						
Mar_20	-60.1					-10.0
Apr_20	-168.5	-158.9	-24.6	-32.2	-472.9	
May_20	-227.2	-181.1	-24.0	-40.9	-645.5	
Jun_20	-206.6	-160.0	-20.7		-691.4	-27.1
Total	-662.4	-500.0	-69.3	-73.2	-1,809.7	-37.1
Residential						
Mar_20	28.2					20.4
Apr_20	63.5	79.8	0.9	-4.9	126.6	
May_20	56.1	49.9	1.7	10.6	426.4	
Jun_20	59.6	47.6	-48.2		1,234.0	3.0
Total	207.4	177.3	-45.5	5.8	1,787.1	23.4

Source: Authors' calculation from econometric estimation and Statistics Canada data.

Conclusion

Electricity demand is determined mainly by weather patterns and economic activity. In recent months, economic activity declined across the country as governments took actions to slow the spread of COVID-19. These actions forced many industrial and commercial businesses to close or curtail operations. Hence, electricity demand by customer classes shows significant variation during the COVID-19 months, with dramatic reductions in industrial and commercial customer classes only partially offset by a higher residential use.

COVID-19 offers a glimpse of what the electricity system could look like as we transition into a digitalized and virtual economy. The residential electricity demand increase experienced during the pandemic was partly due to employees needing to adapt and allow workers to perform their jobs remotely. Post COVID-19, employees' freedom to work remotely can permanently change the traditional daily electricity demand shape and, more importantly, allow for more effortless labour force mobility among provinces, reshaping some provinces' overall electricity demand makeup.

For a full analysis of the impact that COVID-19 has had on Canada's electricity sector, including the impact on the revenues for the utilities, please see [CERI Study 192D](#): 'Economic Recovery Pathways for Canada's Energy Industry: Part 4 – Electricity.'

CERI Electricity Report

Editorial Committee: Allan Fogwill, Ganesh Doluweera

About CERI

CERI provides decision-makers in government, industry and other market segments with analyses of economic and environmental issues in the energy production, transportation and consumption sectors. The institute is an independent, registered charitable organization funded by government, industry, associations, academic supporters and by individual donations.

For more information about CERI, please visit our website at www.ceri.ca or contact us at info@ceri.ca.