# COVID-19 Impact Study

*prepared by London Economics International LLC ("LEI") for the Ontario Energy Board ("OEB")*

**December 15th, 2020**

***The COVID-19 pandemic has had widespread economic and societal impacts across Ontario and the world. This report covers a selection of these impacts on electricity and natural gas utilities, including on their observable financial health, short- and longer-term electricity and natural gas consumption, and an examination of the roles of stimulus programs.***

***As detailed in this report, although utilities have seen negative revenue and cost pressures as a result of the pandemic, the observed financial impact has so far been controlled, although liquidity risks for smaller distributors could emerge in the event that bad debt levels increase substantially going forward. On the demand side, temporary lockdowns, continued physical distancing measures, and the economic consequences of the pandemic have led to increases in residential load and decreases in commercial and industrial loads. In the longer-term, more permanent demand pattern changes may emerge due to societal shifts attributable to the impact of the COVID-19 pandemic, through increased residential consumption and decreased commercial consumption. These issues may be exacerbated as stimulus programs wind down, which could strengthen the case for negative longer-term demand impacts and more pronounced impacts to utility financial health.***

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## List of acronyms

| | |
|---|---|
| APA | Arrears Payment Arrangement |
| ARRA | American Recovery and Re-investment Act |
| Bcf | Billion cubic feet |
| BLA | Biologics License Application |
| CARES | Coronavirus Aid, Relief and Economic Security |
| CBO | Congressional Budget Office |
| CEA | Council of Economic Advisors |
| CEAP | COVID-19 Electricity Assistance Program |
| CEAP-SB | COVID-19 Energy Assistance Program for Small Businesses |
| CER | Canada Energy Regulator |
| CERB | Canada Emergency Response Benefit |
| CEWS | Canada Emergency Wage Subsidy |
| CMA | Census Metropolitan Area |
| CMHC | Canada Mortgage and Housing Corporation |
| DER | Distributed Energy Resource |
| DOE | Department of Energy |
| Dx | Distribution |
| EGI | Enbridge Gas Inc. |
| GA | Global Adjustment |
| GDP | Gross Domestic Product |
| GLA | Gross Leasable Area |
| WAP | Weatherization Assistance Program |
| GJ | Gigajoules |
| GS | General Service |
| HDD | Heating Degree Days |
| ICI | Industrial Conservation Initiative |
| IESO | Independent Electricity System Operator |
| IMF | International Monetary Fund |
| IND | Investigational New Drug |
| ITC | Investment Tax Credit |
| LDC | Local Distribution Company |
| LEAP | Low-income Energy Assistance Program |
| LEI | London Economics International LLC |
| LIHEAP | Low-Income Home Energy Assistance Program |
| MCM | Million Cubic Meters |
| MERS | Middle Eastern Respiratory Syndrome |
| NAICS | North American Industry Classification System |
| NPEI | Niagara Peninsula Energy Inc. |
| NRCan | Natural Resources Canada |
| OEB | Ontario Energy Board |
| OESP | Ontario Electricity Support Program |
| OM&A | Operations, Maintenance, and Administration |
| OWS | Operation Warp Speed |
| PJ | Petajoules |
| PPP | Paycheck Protection Program |
| PTC | Production Tax Credit |
| Q1 | First Quarter |
| Q2 | Second Quarter |
| Q3 | Third Quarter |
| Q4 | Fourth Quarter |
| ROE | Return on Equity |
| RPP | Regulated Price Plan |
| RRR | Record Keeping Requirements |
| SARS | Severe Acute Respiratory System |
| SCIEU | Survey of Commercial and Institutional Energy Use |
| SGDP | Smart Grid Demonstration Program |
| SGIG | Smart Grid Investment Grant |
| SNAP | Supplemental Nutrition Assistance Program |
| ST | Sub-Transmission |
| Tx | Transmission |
| TOU | Time-of-Use |
| WAP | Weatherization Assistance Program |
| WHO | World Health Organization |

# 1 Executive summary

London Economics International LLC ("LEI") was engaged by the Ontario Energy Board ("OEB") to prepare a COVID-19 Impact Study ("the Study") in relation to the OEB's 'Utility Remuneration' and 'Responding to Distributed Energy Resources' consultations (EB-2018-0287 and EB-2018-0288, respectively). The Study assists in confirming the scope and next steps, including pacing and sequencing, of these two consultations. The Study is also expected to inform the OEB's separate Deferral Account consultation (EB-2020-0133).

As part of this process, LEI has prepared the following three separate reports:

1) A jurisdictional report on regulatory responses to COVID-19 to date across North America, which is jointly used in the OEB's separate Deferral Account consultation;[1]

2) A report covering the impacts of COVID-19 on utility financial health, short- and longer-term electricity and natural gas consumption, and an examination of the roles of stimulus programs; and

3) A report focused on: the drivers of distributed energy resource ("DER") adoption and how COVID-19 has impacted them; the impact changes in income patterns will have on perceptions of payback periods required to invest in DERs; the impact of the pandemic and associated governmental actions on Industrial Conservation Initiative ("ICI") participants; and the impact on pacing and prioritizing of relevant OEB policy development initiatives in light of the above factors.[2]

This report covers numbered item (2) above. **Section 2** begins with a review of publicly available data on the impact that COVID-19 has had on demand for electricity and natural gas to date. The first wave of the pandemic and associated lockdown restrictions was marked by a large decline in electricity demand, although demand recovery was seen following the lifting of restrictions and warmer-than-expected weather conditions. Declines in natural gas demand as a direct result of the pandemic were less obvious, and were primarily attributable to milder-than-normal weather conditions during the colder months. Going forward in the short-term, an emerging pattern of increased weather-normalized residential demand and declining commercial demand is likely to persist, although weather conditions and the ICI peak hiatus may counteract anticipated declines.

Following this, **Section 3** evaluates the observable financial impact that the pandemic has had on utilities to date. At a high level, the cost and revenue impacts that utilities have experienced due to COVID-19 include: expenses related to enhanced safety measures; expense changes resulting from operating, maintenance and/or capital project changes; costs related to increases in bad debt expenses; and the impacts that the pandemic has had on the revenue side. Based on publicly available information, in spite of these negative revenue and cost pressures, the observable

[1] Report titled "A report on regulatory principles, policies, and accounting treatments applied in other jurisdictions in response to COVID-19."

[2] Report titled "COVID-19 impact on distributed energy resources." Note this report is different from the 'DER Impact Study' that the OEB has commissioned from ICF.

financial impact of COVID-19 to date has been controlled, suggesting the sector as a whole has maintained its financial integrity thus far through the pandemic.

One specific area of concern going forward relates to liquidity risk that may emerge for utilities (particularly on the distribution side), which could grow in the event that bad debt and/or arrearage levels increase. There is currently a high degree of uncertainty around the impact the pandemic could have on customers' ability to pay and any resulting increases in bad debt going forward, tied largely to the extent of the pandemic and any associated lockdowns, as well as the resulting economic conditions. This issue is covered in **Section 4**, which includes an indicative range of potential losses from non-payment by customers in the utility sector under a high-case bad debt scenario – based on trends and projections in the level of household indebtedness, mortgage and non-mortgage delinquency rates, and business insolvencies. Under such a high-case bad debt scenario, the liquidity of Ontario's smaller distributors could be impacted.[3]

Next, **Section 5** pivots to assess the potential for longer-term demand pattern changes that may emerge from permanent behavioural and consumption changes due to the pandemic and associated economic crisis. Shifting behavioural patterns that result in permanent or longer-term effects are more likely to emerge in residential and commercial load. Those trends were in part already underway but were accelerated due to the COVID-19 pandemic (for example, work-from-home arrangements, and the transition to e-commerce). This section also includes a consideration of the potential demand impacts at an industry-by-industry level in Ontario, using publicly available data and showing regions and utilities that could be most impacted by this transition. As the "return to normal" can be tied in part to the timeline over which a vaccine could become available, this section includes a discussion of the potential for a COVID-19 vaccine, and the prospect of community immunity levels resulting from accelerated development of candidate vaccines.

It is likely that stimulus programs will play an important role in reducing the negative impacts of the COVID-19 pandemic on consumption (whether directly through allowing some customers to continue to pay their bills, or indirectly through supporting economic activity). Given the scope of stimulus programs, it is currently unclear what the consequences will be once they are eventually wound down. To get a sense of this issue, **Section 6** considers the programs enacted following the Great Recession and evaluates the extent to which they have impacted long-term demand. It also includes a description of the various stimulus programs enacted in the US, Canada, and Ontario in response to COVID-19.

Certain components of this report are enhanced through responses from utilities to a survey LEI conducted between October and November. To gain a better understanding of the implications of the COVID-19 pandemic on utility delivered volumes, revenues, and customers, LEI sent out a voluntary survey to all Ontario electricity and natural gas distributors. LEI received responses

[3] Although this may be a concern for all distributors, smaller utilities may have lower potential revenue offsets, less room for cuts in operating or capital costs, and limited committed credit facilities relative to larger utilities. In addition, smaller distributors may have a less diverse customer base, which could present issues if they rely on a limited pool of non-residential customers.

from 13 distributors, representing over two-thirds of the total electric load distributed in Ontario. The survey covered three broad timelines (historical, a short-term forward period, and a medium- to longer-term forward period), posed at both the aggregate and customer class level. Given the high degrees of uncertainty related to forward periods as a result of the pandemic, responses were meant to provide a preliminary indication of current thinking, but were not meant to reflect formal or official analyses conducted with any forecasting precision.

The ongoing COVID-19 pandemic and its resulting impacts (including those associated with stay-at-home orders and behavioural changes) have been unprecedented. Going forward, significant uncertainty remains with regards to the duration and severity of the pandemic, as well as its short- and long-term consequences. Therefore, while this report was compiled on a best-efforts basis based on information gathered largely between October and November 2020, resulting conclusions may be subject to change as the situation evolves and more information becomes available.

# 2 Short-term demand impacts of COVID-19

This section reviews publicly available data on the impact of COVID-19 on demand for electricity and natural gas to date. The first confirmed COVID-19 case in Canada occurred in late January 2020 and was followed by lockdown restrictions in the province in March. In the electricity sector, the Independent Electricity System Operator ("IESO") initially observed system demand reductions across all hours of between 6% to 18% of typical demand.[4] In the summer however, lifting of restrictions and warmer-than-expected conditions contributed to higher demand. In the natural gas sector, Enbridge Gas Inc. ("EGI") reported 7.1% lower volumes compared to 2019 volumes during the same period, noting that a milder spring resulted in 13% fewer heating degree days.[5] In addition to the data review, LEI conducted a survey of Ontario's electricity and natural gas distributors to better understand the impact of COVID-19.

## 2.1 Demand impact of COVID-19 in Ontario to date

In Canada, the first presumptive case of COVID-19 was recorded on January 25, 2020 in Toronto, Ontario, and as of December 13, 2020, just over 460,000 cases (of which around 74,000 remain active) had been recorded with around 13,000 deaths.[6] Throughout 2020, the spread of COVID-19 and measures taken to curb the spread have fundamentally changed the landscape of the global economy. As of the same date, Ontario represents a large share of the total case load in Canada, with over 140,000 total cases recorded (30.4%), and over 16,000 active cases.[7]

At the height of the first wave of the pandemic, the impact to the energy system in the province was most visible. For example, the IESO reported that "*at its lowest point during the first few months of the pandemic [mid-April to early-May], weekday Ontario electricity use fell approximately 12 per cent compared to similar days pre-pandemic*."[8] With respect to natural gas, Enbridge Gas Inc., the largest distributor of natural gas in Ontario, reported a decline in consumption of 7% relative to the same period in 2019.[9] Enbridge Gas did not directly attribute this decline to the impact of COVID-19.

In general on the electricity side, following the onset of lockdown restrictions in the province, there were notable declines in consumption patterns relative to previous years. However, these declines were tempered by warmer-than-expected weather in the spring and summer months which amplified already increasing residential consumption, while commercial and industrial loads witnessed some recovery.[10]

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[4] IESO. *An overview of COVID-19 impacts on electricity system operations*. April 23, 2020.

[5] Enbridge Inc. *2020 Second Quarter Supplemental Package.* July 2020.

[6] Government of Canada website. *Coronavirus disease (COVID-19): Outbreak update*. Accessed on December 14, 2020.

[7] Ibid.

[8] IESO website. *COVID-19 impacts on Ontario's electricity system.* News and updates. June 18, 2020.

[9] Enbridge Inc. *Second Quarter 2020: Supplemental Package.* July 2020.

[10] IESO. *Reliability Outlook: An adequacy assessment of Ontario's electricity system from October 2020 to March 2022*. September 2020.

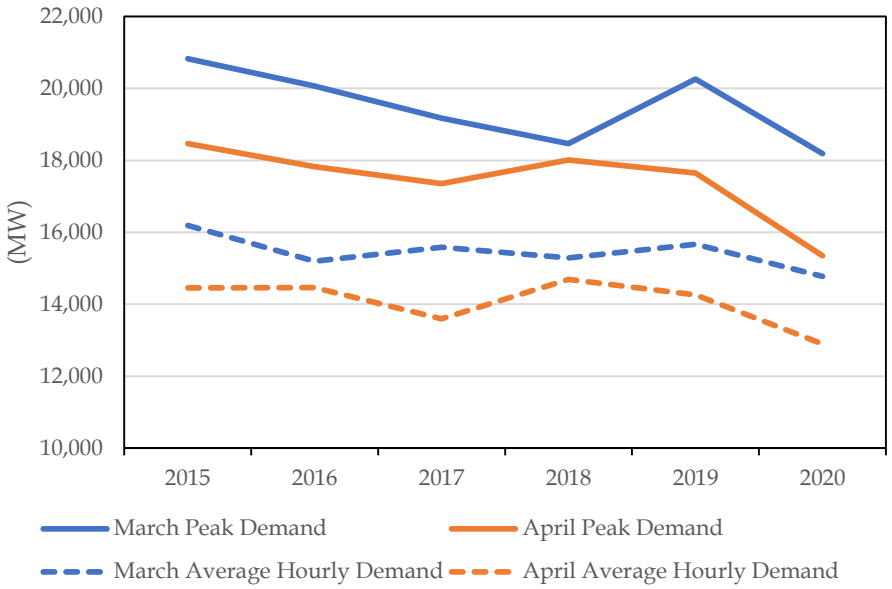
In the short-term, a return to greater restrictions in movement and commercial activity driven by a second wave of infections may lower the demand outlook, while a warmer-than-expected autumn and winter forecast may suggest sustained electricity demand (though mild weather would reduce demand for electric heat), but lower natural gas demand.[11]

In this section, we will evaluate available data and reports on demand for electricity (Section 2.1.1) and natural gas (Section 2.1.2) since the onset of the COVID-19 pandemic.

### 2.1.1 Electricity demand

During the peak months of the first wave of the pandemic, notably in April, system demand reductions were observed across all hours of between 6% to 18% of typical demand.[12] Using IESO's hourly demand data between 2015 and 2020, we observe that in March 2020, peak demand was 10.3% lower than in 2019, and 6.7% lower than the average peak between 2015 and 2020. In April, the decline was more pronounced, around 13% year-over-year, and 12% relative to the five-year average. Average hourly demand was also below previous year and historical levels. These declines are illustrated in Figure 1.

**Figure 1. Peak demand and average hourly demand in Ontario in March and April (2015 – 2020)**



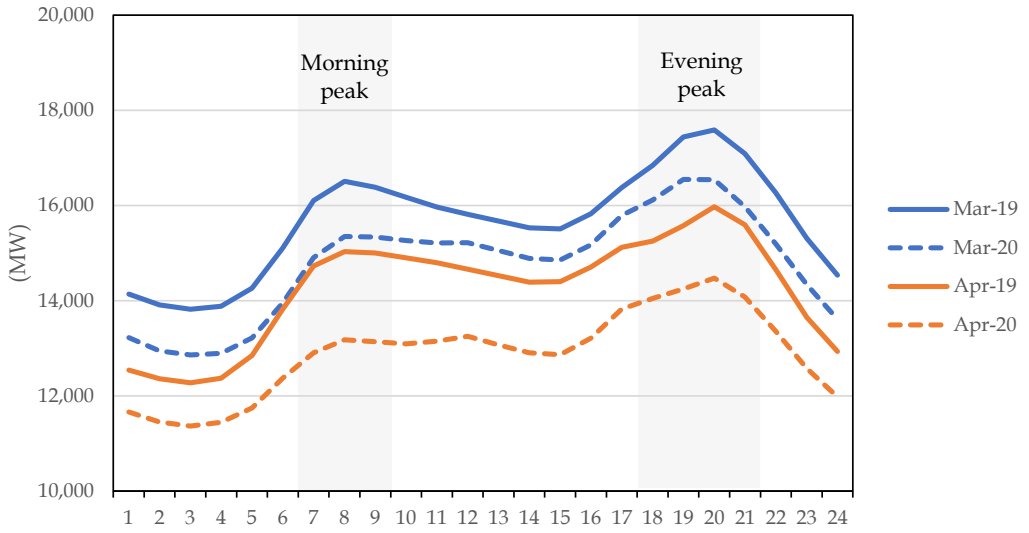

Source: IESO. *Hourly Demand Report*. 2015-2020.

Similar declines can be observed when looking at average hourly demand data, with April in particular witnessing a flattened morning peak, and an earlier decline in the evening peak. Average hourly data for the two months of March and April are illustrated below.

[11] It is estimated that around 11% of residential space heating in Ontario is fueled by electricity, with natural gas comprising 81% (Source: IESO. *Home Energy Survey*. November 2018).

[12] IESO. *An overview of COVID-19 impacts on electricity system operations*. April 23, 2020.

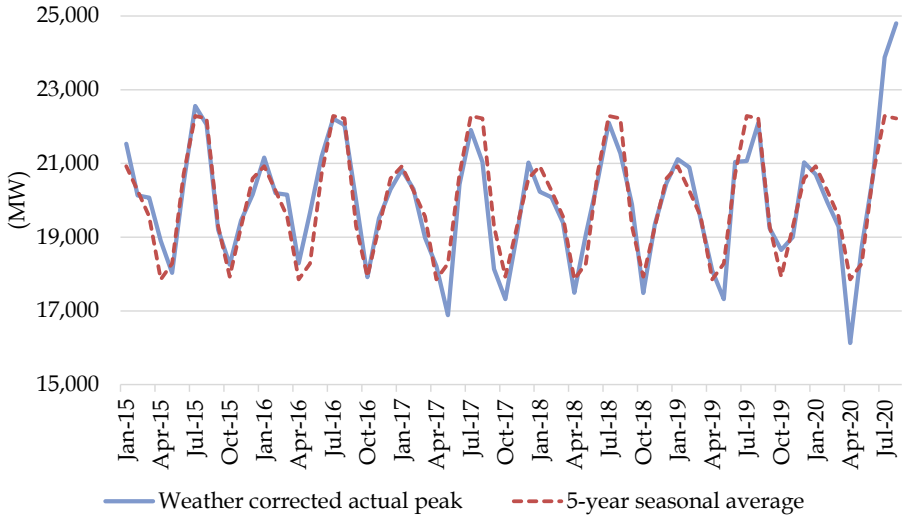
**Figure 2. Average hourly demand in Ontario in March and April (2019 and 2020)**




Source: IESO. *Hourly Demand Report*. 2019-2020.

By May and June, as the Ontario government began to loosen some restrictions, the demand impacts associated with the pandemic began to diminish. Specifically, residential demand increased over the summer months driven by warmer-than-expected conditions, and increased air conditioning load. An analysis of weather-corrected data from the IESO shows that compared to 2019, peak demand and average hourly demand were slightly higher in June by 5% and 4%, respectively. Similarly, relative to the five-year average, peak and average demand were higher by 2% and 0.5%, respectively. Figure 3 illustrates the weather-corrected monthly peak demand from January 2015 to August 2020.

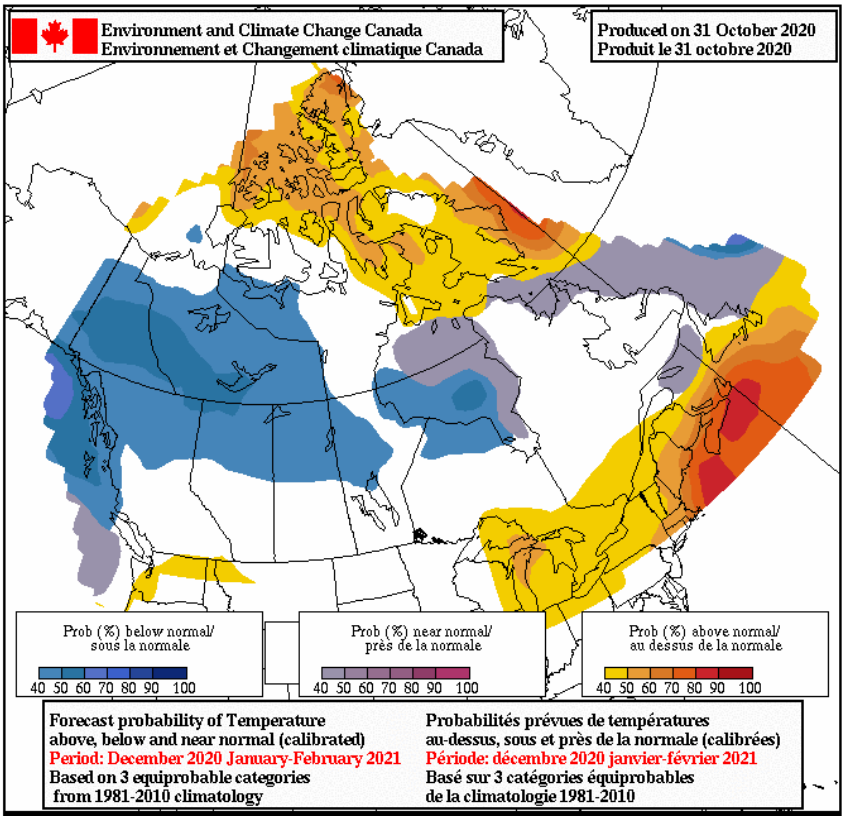
**Figure 3. Weather-corrected monthly peak demand in Ontario (January 2015 to August 2020)**




Source: IESO. *Reliability Outlook: An adequacy assessment of Ontario's electricity system from October 2020 to March 2022*. September 2020.

The warmer-than-normal summer in Ontario and the ICI peak hiatus[13] have driven up peak demand – with the IESO reporting the highest peaks since 2013.[14] The IESO observed that "*commercial loads have dropped but the declines have not offset the increase in residential loads.*" In the short-term, it is expected that consumption patterns may be altered driven by the temporary suspension of the ICI and anticipated warmer-than-normal weather in Southern Ontario, as illustrated in Figure 4.

**Figure 4. Temperature probabilistic forecasts for Canada (November 2020 – February 2021)**




Source: Environment Canada. *Temperature Probabilistic Forecasts - Current - 2-4 month*. October 2020.

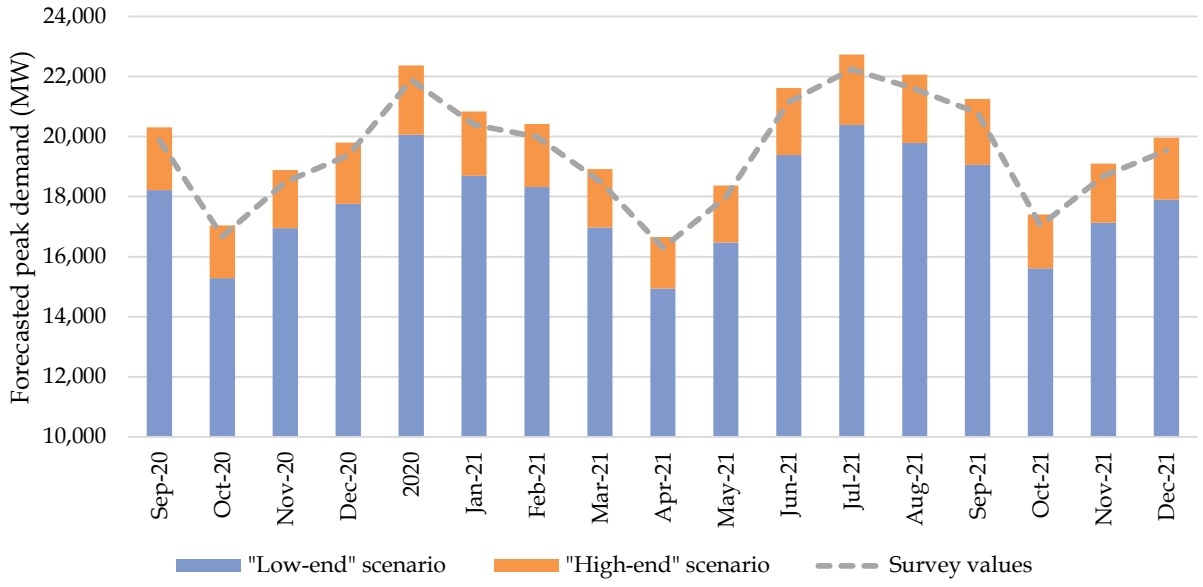
In the short term, it is likely that the impact of the COVID-19 pandemic and associated economic uncertainty may result in lower-than-anticipated demand growth. In particular, the incidence of a second wave of infections and rising cases has already led to renewed restrictions on movement and business activities. It remains to be seen the extent to which these restrictions will impact demand in the following months, relative to previous years, but it is unlikely to result in sharp

[13] The ICI is a form of demand response that allows participating customers to manage their global adjustment ("GA") costs by reducing demand during peak periods. On June 26, 2020, as part of the measures introduced by the Ontario government in its COVID-19 response, it amended the ICI regulation (Ontario regulation 429/04) and announced a mandatory ICI peak hiatus for its participants. The IESO expects a resumption in May 2021.

[14] IESO. *Reliability Outlook: An adequacy assessment of Ontario's electricity system From October 2020 To March 2022*. September 2020.

changes to demand as observed following the first strict lockdown measures. Assuming the initial lockdown measures represent a "low end" scenario for the demand outlook (i.e., a 10% reduction), and 'no impact' represents a "high end" scenario, illustrative ranges using the IESO's most recent Reliability Outlook forecast are shown in Figure 5 below. Also shown is the short-term forecast relative to expectations of utilities, surveyed by LEI in the months of October and November, as described later in Section 2.2.

**Figure 5. Illustrative short-term impact of lockdown on demand**




Source: LEI analysis using IESO's Reliability Outlook from September 2020.

### 2.1.2 Natural gas demand

Rate-regulated natural gas distribution in Ontario is delivered by two companies, EGI and EPCOR Natural Gas.[15] Of the two, EGI is responsible for delivery to 99.8% of all customers, and 99.6% of all gas volumes, following the merger of Union Gas and Enbridge Gas Distribution in January 2019. In its Q2 results for 2020, EGI reported 7.1% lower volumes in Q1 and Q2 2020 as compared to 2019 volumes for the same period.[16] With respect to Heating Degree Days ("HDD"), a milder winter and spring saw 13% lower HDD in 2020 than in 2019, and 4.5% lower than forecast based on normal weather.[17]

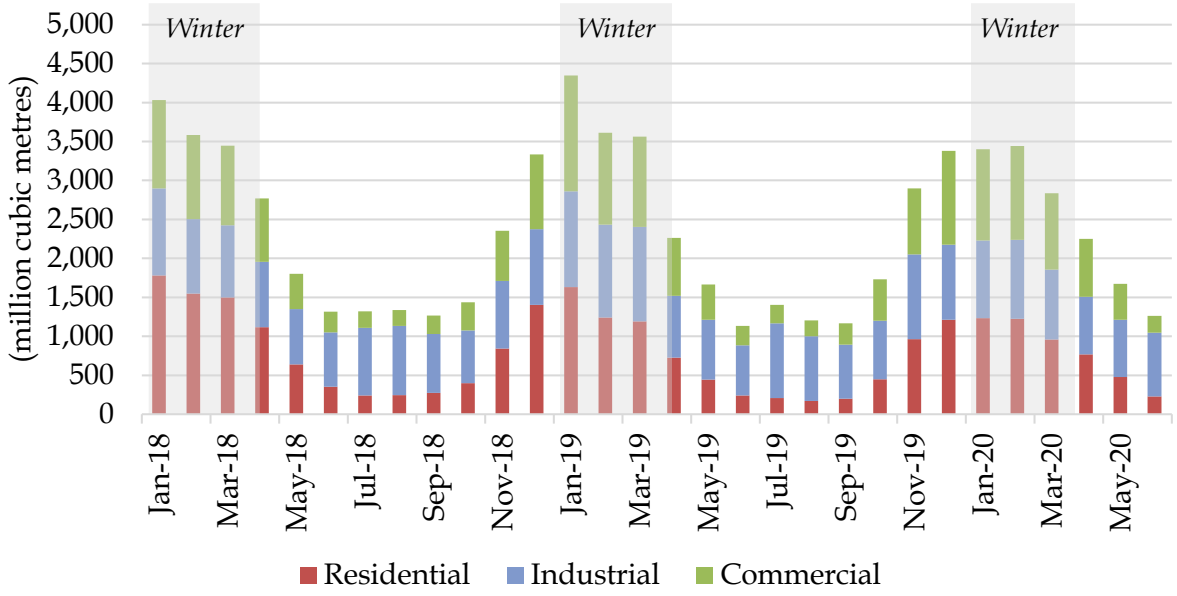
[15] In addition to the two rate-regulated companies, there are five small gas companies that are exempt from rate regulation under the OEB Act, as well as two municipally-owned gas companies that are not rate regulated by the OEB.

[16] Enbridge Inc. *2020 Second Quarter Supplemental Package.* July 2020.

[17] Ibid. P. 12.

Survey data from Statistics Canada tracks consumption by customer class in Ontario. Figure 6 tracks the change in consumption by customer class for the January 2018 to June 2020 period. Compared to 2019, natural gas consumption in March 2020 fell by 26%, driven by a decline in industrial consumption of 35%. In April, the total consumption decline relative to 2019 was just below 1%, as rising residential demand offset industrial declines.[18] Note that this data is not weather-normalized, and so weather conditions are an important driver in this graphic.

**Figure 6. Monthly natural gas consumption by customer class (January 2018 – June 2020)**



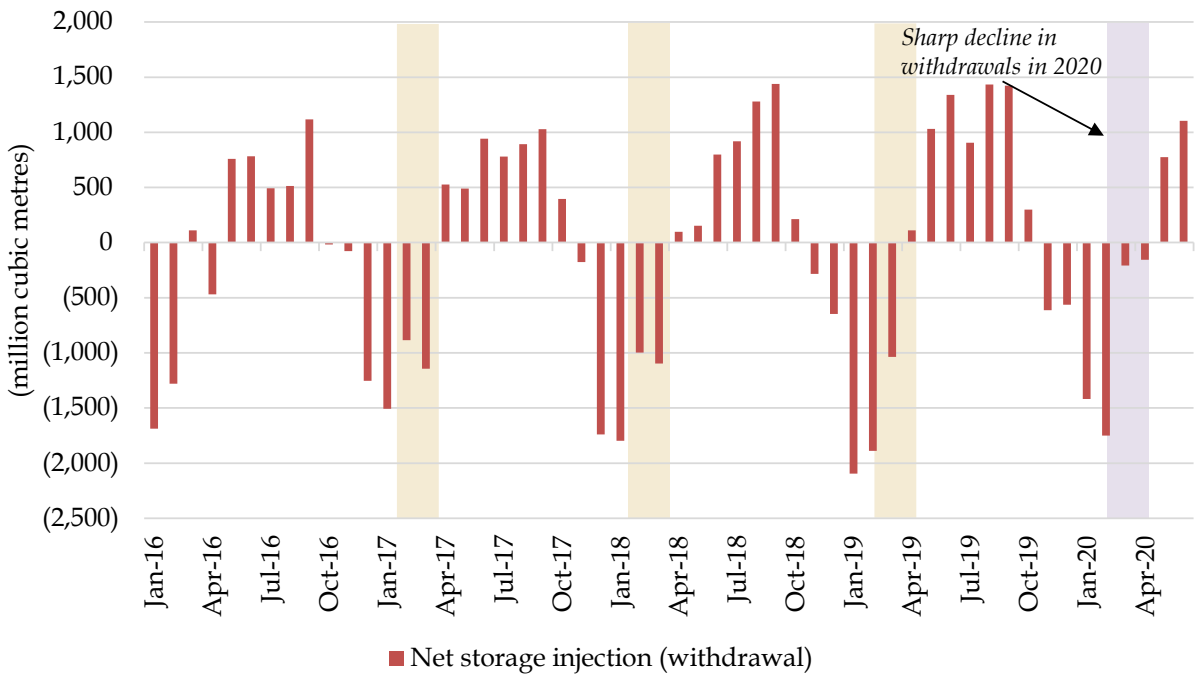

Source: Statistics Canada. *Supply and disposition of natural gas, monthly. Table: 25-10-0055-01.*

Statistics Canada also tracks changes in inventory as well as injections and withdrawals into storage facilities in the province. Changes in inventory showed a large decline in storage withdrawals in March 2020 compared to the same months in 2018 and 2019. In March 2020, storage withdrawals fell to 212 million cubic metres, compared to withdrawals of 1.04 billion cubic metres in 2019, and 1.1 billion in 2018, suggesting a large decrease in consumption in 2020 that saw more natural gas remain in storage through the winter.[19] Figure 7 below illustrates the net changes in storage between January 2016 and June 2020.

[18] Statistics Canada. *Supply and disposition of natural gas, monthly. Table: 25-10-0055-01.* DOI: https://doi.org/10.25318/2510005501-eng.

[19] Statistics Canada. Canadian natural gas storage, Canada and provinces, monthly. Table: 25-10-0057-01. DOI: https://doi.org/10.25318/2510005701-eng

**Figure 7. Net storage injections/withdrawals in Ontario (January 2016 – June 2020)**




Source: Statistics Canada. *Supply and disposition of natural gas, monthly. Table: 25-10-0055-01*

In the short term, it is anticipated that a warmer-than-expected autumn and winter may reduce residential demand for natural gas used for home heating, further reducing consumption below historic levels. However, restrictions on movement and a greater proportion of office workers and education occurring at home may increase residential consumption.

## 2.2 Survey of Ontario utilities

LEI's survey of Ontario's electricity and natural gas distributors, conducted between October and November 2020, sought in part to better understand the implications of the COVID-19 pandemic on utility delivered volumes, revenues, and customers. The survey was voluntary, with 13 of 67 utilities submitting responses. On the electricity side, respondents covered two-thirds of the total electric load distributed in Ontario. The survey covered three broad timelines as follows:

- The **historical** period between March and October 2020;
- The **short-term forward period**, defined as the 18-month period between November 2020 and April 2022; and
- The **medium- to longer-term forward** period, defined as the forward period between May 2022 and December 2025 (covered later in Section 5.1).

The survey was posed at both the aggregate and at specific customer class levels. For electricity distribution, these classes were specified as: Residential, General Service ("GS") < 50 kW, GS ≥ 50

kW, and Large Use/Sub-Transmission ("ST"). For gas distribution, the classes specified were: Residential, Commercial, and Industrial. In this section we discuss the results of the survey relating to the historical and short-term implications of COVID-19 on load, and key trends and takeaways that can be drawn from the respondents. For reference, the full list of survey questions is provided in Appendix C.

### 2.2.1 Historical period between March and October 2020

For the historical timeframe, utilities were asked about the estimated impact that the COVID-19 pandemic had on volumes delivered, relative to weather-normalized expectations or alternative internal baselines that existed prior to the pandemic. Results for electricity distributors are illustrated in Figure 8 below on a simple average basis.

**Figure 8. Survey responses to demand impact between March and October 2020**

**Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on volumes delivered over the historical period has been:**

| Grouping | Average | Median | n |
|---|---|---|---|
| **Total volumes** | -3.4% | -4.0% | 10 |
| **Residential customer volumes** | 6.8% | 7.0% | 11 |
| **General Service <50 kW** | -8.6% | -8.0% | 10 |
| **General Service ≥50 kW** | -10.0% | -10.0% | 10 |
| **Large Use/Sub-Transmission** | -10.3% | -10.5% | 6 |

Based on survey responses from electricity distributors, the impact of the COVID-19 pandemic on total volumes was an estimated decline of around 3.4% over the historical period. At a class level, the estimated impacts were: an increase of around 6.8% for residential customers; a decline of around 8.6% for GS <50 kW customers; a decline of around 10% for GS ≥50 kW customers; and a decline of around 10.3% for Large Use/Sub-Transmission customers. One respondent who offered additional commentary indicated during this period volume impacts were "*highest over the April – June 2020 period, where strict public health measures had the largest impact.*"

For gas distribution, the survey results indicated a decline in total volumes of 1%. Among various customer classes, the estimated impact was an increase of 3% for residential customers, and declines of 3% each for commercial and industrial customers.

### 2.2.2 Short-term (November 2020 – April 2022)

For the short-term forward period, utilities were asked to provide their expectations on the impact that the COVID-19 pandemic could have on volumes delivered, relative to weather-normalized expectations or alternative internal baselines that existed prior to the pandemic. Results for electricity distributors are illustrated in Figure 9 below on a simple average basis.

Given the high degrees of uncertainty related to forward periods as a result of the pandemic, responses were meant to provide an indication of current thinking, but were not meant to be formal or binding estimates arrived at with any forecasting precision. For example, one respondent observed that this period is "*difficult to forecast*", and that if "*the pandemic does not end in 2021, the reductions could be substantially greater*" than indicated in their response. Similarly, another respondent observed that their estimate of the impact is dependent on a number of factors, such as the overall duration of the pandemic, the degree and duration of public health measures that are put in place, and the extent that government assistance/policy to ultimate consumers continues.

**Figure 9. Survey responses to demand impact in the short-term period**

**Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on volumes delivered over the short-term is expected to be:**

| Grouping | Average | Median | n |
|---|---|---|---|
| **Total volumes** | -2.1% | -3.0% | 7 |
| **Residential customer volumes** | 3.4% | 2.0% | 7 |
| **General Service <50 kW** | -6.6% | -6.0% | 7 |
| **General Service ≥50 kW** | -7.3% | -6.0% | 7 |
| **Large Use/Sub-Transmission** | -3.0% | -4.0% | 5 |

Based on survey responses from the electricity distribution sector, the potential impact the pandemic could have on total volumes delivered over the short-term could be a decline of around 2.1% (compared to prior expectations for the same period). At a class level, the estimated impacts were: an increase of around 3.4% for residential customers; a decline of around 6.6% for GS <50 kW customers; a decline of around 7.3% for GS ≥50 kW customers; and a decline of around 3% for Large Use/Sub-Transmission customers.

For gas distribution, the survey results suggest that based on current thinking the impact on total volumes delivered could be a decline of 1%, with impacts varying among customer classes. Residential customer volumes are not expected to see any change, but commercial and industrial customers may experience declines of 1% and 3% respectively.

# 3 Examination of changes to date in utility cost drivers, expenditures, and financial health resulting from COVID-19

In addition to the short-term demand impacts of COVID-19, utilities have seen financial impacts due to the pandemic arise through a number of avenues on both the revenue and cost sides. At a high level, these financial impacts have included:

- **Expenses related to enhanced safety measures** (including but not limited to cleaning supplies and protective equipment) and the implementation of alternate working and operating conditions. In some instances, additional costs were incurred during the initial period of the pandemic to ensure sufficient availability of critical equipment, as supply chain issues and threats emerged;
- **Operating, maintenance and/or capital projects,** including deferral of planned projects, or delays to ongoing projects as a direct result of the COVID-19 pandemic;
- Costs related to increases in **bad debt expenses** as a direct result of the pandemic (also covered later in Section 4); and
- **Revenue impacts**, including lost revenues due to: postponing previously approved rate increases; lost load; and any actions taken to provide customers with relief (including for example waiving or reducing late payment charges).

In this section, we will evaluate the potential magnitudes of these revenue and cost impacts to date (Sections 3.2 and 3.3, respectively), based on publicly available data and information. At a high level, the combination of the above income and cost factors (and their associated magnitudes) vary by individual utilities based on a number of factors, including: their position in the value chain (distribution, transmission, generation), customer class makeup, and size. In many areas, electricity distributors with larger proportions of commercial and industrial customers seem to have borne the brunt of the negative impacts of COVID-19 so far.

In spite of these negative revenue and cost pressures, through maintaining operations as essential businesses the utilities sector has been better able to withstand the negative implications of COVID-19 compared to most other industries.[20] Given the scale of the economic impact caused by the COVID-19 pandemic, Section 3 briefly covers for comparative purposes the GDP impact on the utilities industry and the wider Ontario economy.

The impact these revenue and cost pressures have had on the perceived financial health of utilities is covered in Section 3.4. Publicly available information indicates a generally controlled observable financial impact as a result of the pandemic, suggesting the sector as a whole has maintained its financial integrity thus far throughout the COVID-19 pandemic. As relevant quarterly financial information is only available for Ontario's largest utilities (OPG, Hydro One, Toronto Hydro, Enbridge Gas Inc.), financial constraints that have been faced by smaller local distribution companies ("LDCs") are far more difficult to assess (with smaller LDCs also facing

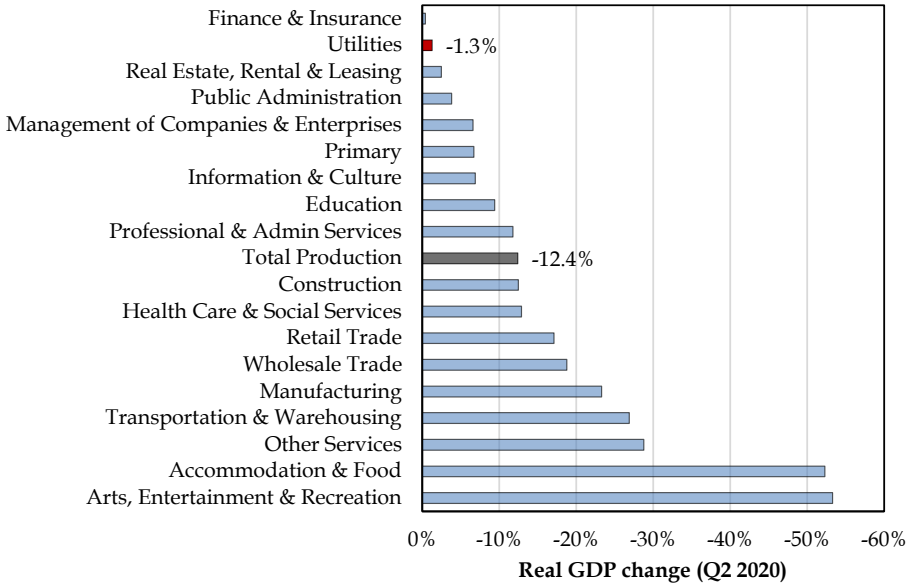
[20] Note the terms 'industry' and 'sector' are used interchangeably in this section, with utilities being referred to as an industry in Section 3.1 to maintain terminological consistency with the source data.

negative revenue and cost impacts as a result of the pandemic). However, as part of the OEB's monitoring of the impact that the COVID-19 pandemic has had on utility financial health using confidential monthly data submitted by individual utilities, it has noted "that reporting has not identified any acute financial issues for utilities."[21]

## 3.1 Overall impact of COVID-19 on industry output

While the global COVID-19 pandemic and the resulting economic crisis has caused profound impacts on all industries, utilities have been comparatively insulated. This can be seen in Figure 10, which shows Ontario's seasonally adjusted real Gross Domestic Product ("GDP") percentage declines by industry for Q2-2020. Declines in output can be seen across all industries presented below, but the declines for utilities (-1.3%) were less significant relative to all other industries with the exception of 'finance and insurance', as compared to the decline in total production (i.e., output across all industries) of 12.4%. This can also be seen in Figure 11, which presents quarterly GDP growth rates over the 2006 to 2020 timeframe for these two datasets (utilities and total production). This longer-term data provides a more obvious depiction of the impact COVID-19 has had on the overall economy, which included the largest quarterly GDP decline on record. In contrast, the decline in real growth rates for the utilities industry is not particularly noticeable for Q2-2020, as the impact of the COVID-19 pandemic on utility outputs was mitigated through continued operations as essential businesses during the heights of the economic downturn.

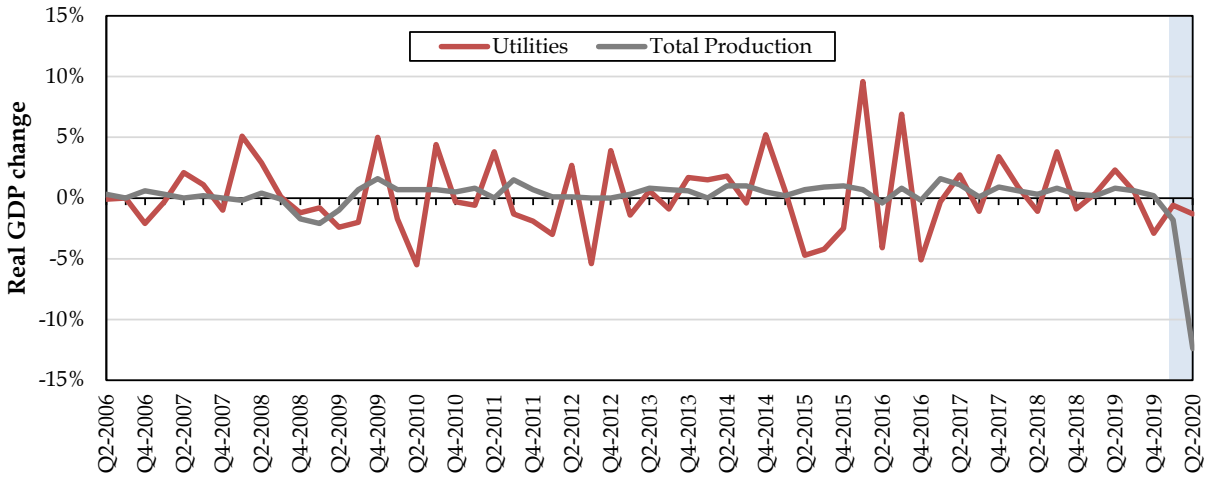
**Figure 10. Real GDP change by industry for Q2-2020**




Source: Ontario Ministry of Finance. Ontario Economic Accounts Tables, Table 15 - Ontario Production by Industry at 2007 Prices, seasonally adjusted data at annual rates, millions of chained (2012) dollars.

[21] Information being reported includes: customer bill receipts; energy purchase costs; distributor operations costs; total cumulative arrears; increase to provision for uncollectable accounts; cash available at month's end; available credit; and risk of default by significant customers. See: OEB. *Re: Consultation on the Deferral Account – Impacts Arising from the COVID-19 Emergency – Next Steps (EB-2020-0133)*. September 24, 2020.

**Figure 11. Quarterly real GDP growth rates for total production and the utilities industry**




Source: Ontario Ministry of Finance. Ontario Economic Accounts Tables, Table 15 - Ontario Production by Industry at 2007 Prices, seasonally adjusted data at annual rates, millions of chained (2012) dollars.

## 3.2 Impact on revenues

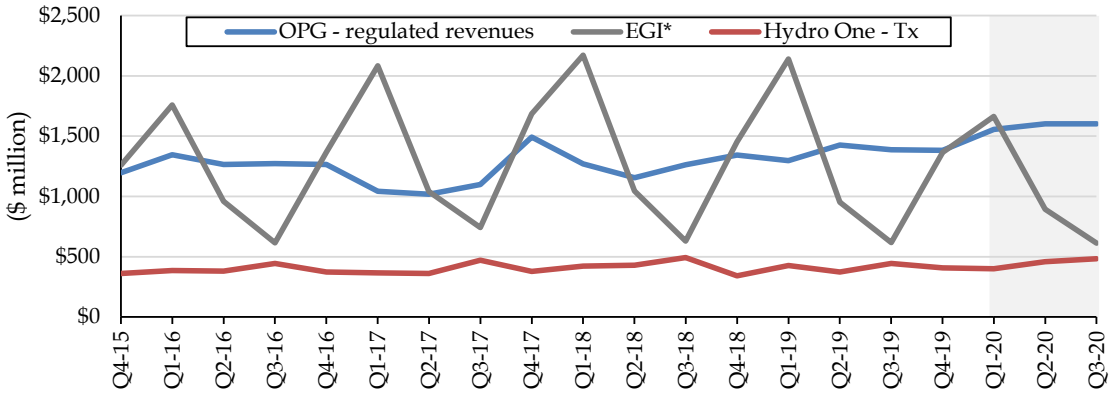
Quarterly revenues over the past five years for OPG's combined regulated nuclear and hydro segments, EGI, and Hydro One's transmission segment are presented in Figure 12, followed by Hydro One's distribution segment and Toronto Hydro Corporation in Figure 13. The selection of company revenues being presented is based on those Ontario utilities that publish quarterly financial updates.[22] Revenues are not seasonally adjusted and are not weather normalized, meaning there is a significant amount of volatility in the data presented (this is most visible for EGI, although these factors also impact electric utilities). Nevertheless, the revenue data presented in Figure 12 does not show an overall revenue disruption in the second and third quarters of 2020, with revenues in those periods being higher for OPG's regulated segments as well as Hydro One's transmission segment, as compared to the same periods for 2019.

On the electricity distribution side (Figure 13), Hydro One's second and third quarter revenues were also higher as compared to the same periods for 2019. For Toronto Hydro, declines in second and third quarter revenues were partially the result of lower electricity consumption and lower 2020 distribution rates (where lower electricity consumption was attributed to commercial usage declines as a result of the COVID-19 pandemic).[23] Combined, these two factors lowered revenues by $14.4 million and $7.3 million in Q2 and Q3, respectively.

[22] Larger non-Ontario companies such as Fortis Inc. that own Ontario utilities are not included, as segment-level information for Ontario holdings exclusively were not available.

[23] Toronto Hydro's second and third quarter financial reports.

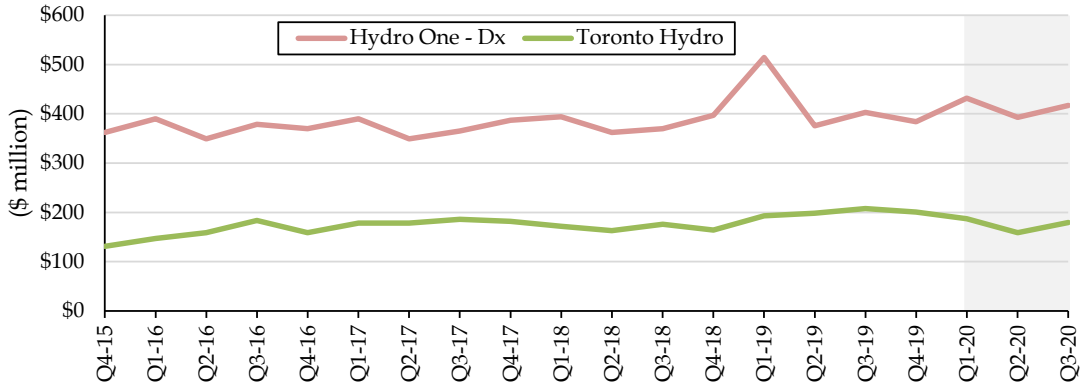
**Figure 12. Quarterly segment revenues for selected Ontario utilities (Q4-2015 to Q3-2020)**




* "EGI" revenues presented from Q4-2015 to Q4-2017 are the sum of Enbridge Gas Distribution Inc. and Union Gas Limited revenues.

Sources: S&P Global Market Intelligence; quarterly financial reports for Hydro One, Enbridge Gas Inc., and OPG.

**Figure 13. Quarterly distribution revenues for selected Ontario utilities (Q4-2015 to Q3-2020)**




Sources: S&P Global Market Intelligence; quarterly financial reports for Hydro One and Toronto Hydro.

As revenue on the electricity distribution side has most likely been hardest hit by the COVID-19 pandemic so far, amounts reported by utilities in the OEB's deferral sub-accounts for lost revenue may provide a potential indication of some of the revenue impacts across electricity distributors. However, it should be noted that the amounts being reported are neither definitive nor consistent in what they include.[24, 25] Based on the amounts reported for the period up to October 2020, lost

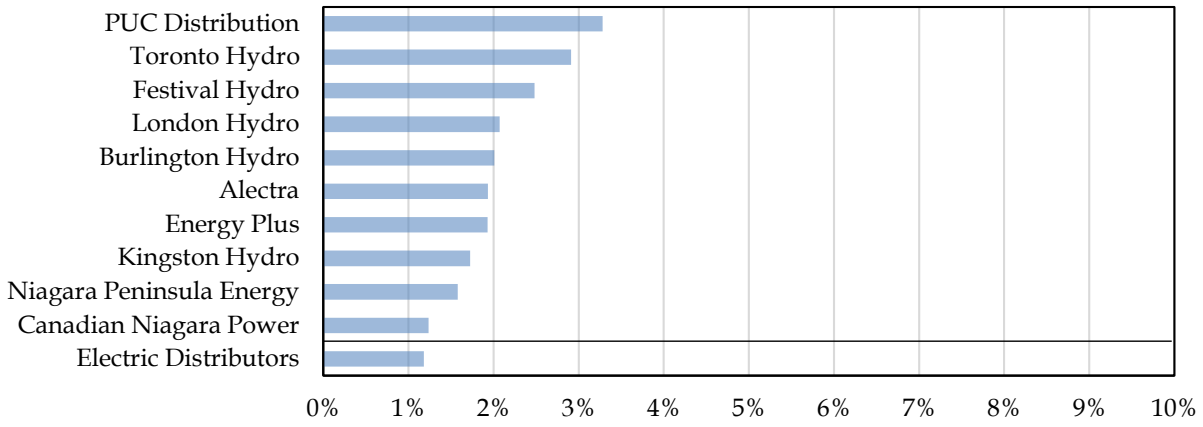
[24] On March 25, 2020, the OEB established the "Deferral Account 1509 – Impacts Arising from the COVID-19 Emergency" plus sub-accounts for all rate-regulated electricity utilities, and for natural gas utilities under Account 179. Overall, the Account shall be used to "track any incremental costs and lost revenues related to the COVID-19 pandemic." Sub-accounts currently consist of those for: costs associated with billing and system changes; lost revenues; other costs; forgone revenues from postponing rate implementation; and bad debt.

[25] Lost revenues related to the COVID-19 pandemic that can be tracked in this sub-account include those associated with any actions taken to provide customers with relief (through, for example, waiving or reducing customer late payment charges), but should exclude forgone revenues from postponing rate changes.

revenues have totaled around $46.9 million, almost entirely related to electric distributors (one reporting of $13,992 by EPCOR Natural Gas), with around 46% associated with one utility (Toronto Hydro).

To get a sense of the potential scale and proportional impact of these reported lost revenues, Figure 14 presents the lost revenue amounts reported for a selection of utilities divided by individual utility annual distribution revenues for 2019. Values are presented for the utilities that had the ten highest resulting percentages, as well as for the weighted average for electric distributors. The resulting weighted average of the reported lost revenues for all LDCs was around 1.2% of 2019 revenues ($46.9 million in reported lost revenues compared to $3.9 billion in 2019 revenues), with most LDCs so far reporting lost revenues below this average.

**Figure 14. Ratio of reported lost revenues compared to 2019 revenues for selection of LDCs**




Note: revenues for LDCs taken from the OEB's 2019 'yearbook of electricity distributors.'

Sources: OEB's COVID-19 Account Balances Reported by Electric Utilities as of October 31, 2020; OEB's 2019 yearbook of electricity distributors.

One major area of lost revenues relates to those lost revenues that emerged due to changes in consumption/demand patterns as a result of the pandemic. Electricity distributors have so far been impacted by these lost revenues more so than gas distributors, although the magnitude of each utility's lost revenues due to changes in consumption/demand will depend on a number of factors, including its size, customer class breakdown, and the utility's class-specific load changes.

By way of example, Figure 15 provides an illustrative depiction of the flowthrough for a 1% change in consumption and peak demand on distribution revenues for LDCs. As fixed and variable charges differ by LDC, these percentages are not meant to depict with precision the revenue impact of a change in load, but rather to provide an indication of what customer classes drive load-sensitive revenues at LDCs. Specifically, as residential customers mostly see fixed monthly distribution rates, unexpected changes to their consumption levels would not impact distribution revenues in most instances. For GS and large use customers, as more bill components are based on either consumption (kWh, for GS <50 kW) or demand (kW, for GS >50 kW and large use), the revenue impacts from unexpected consumption/peak changes would flow through to LDC revenues – although not entirely, as a portion of the bill includes fixed monthly charges.

As discussed in Section 2, the COVID-19 pandemic has resulted in an increase in residential load and a decrease in commercial and industrial load. The resulting impacts of these load changes, all else equal, would mean a decline in LDC revenues from GS and large use customers (although not a 100% flow-through due to fixed service charges), and little to no change in residential customer distribution revenues as a result of increasing residential load (i.e. no offset). All else equal, utilities with higher exposure to commercial and industrial load would therefore be at greater risk of seeing revenue losses as a result of declining customer load.

**Figure 15. Illustrative distribution revenue impact due to a 1% change in consumption/peak**

| Rate related to | Change in | Residential | GS <50 | GS ≥ 50, Large use |
|---|---|---|---|---|
| **Distribution** | Consumption (kWh) | 0% | ~0.7% | 0% |
| **Distribution** | Peak (kW) | 0% | 0% | > 0.8% |

Note: based primarily on Toronto Hydro's 2019 cost allocation model. Rates and charges vary by utility, meaning different percentages, but for most LDCs that have transitioned to fixed residential distribution rates the overall principle of magnitude by customer class is the same.

For reference, Figure 16 shows the 2019 breakdown of consumption by customer class for LDCs, along with the Ontario-wide breakdown (top bar). A small number of LDCs have majority-residential consumption. In contrast, the LDC with the highest proportion of GS and large use load was Toronto Hydro. The full impact of lost revenues due to lost load for Toronto Hydro is not known; however, as mentioned in its second and third quarter 2020 financial reports, the estimated decline in distribution revenues by $21.7 million over the six month period between April and September 2020 was partially attributable to lower commercial electricity consumption due to the COVID-19 pandemic (although some of this $21.7 million was also attributable to lower distribution rates, i.e. unrelated to lost revenues from lost load).[26]

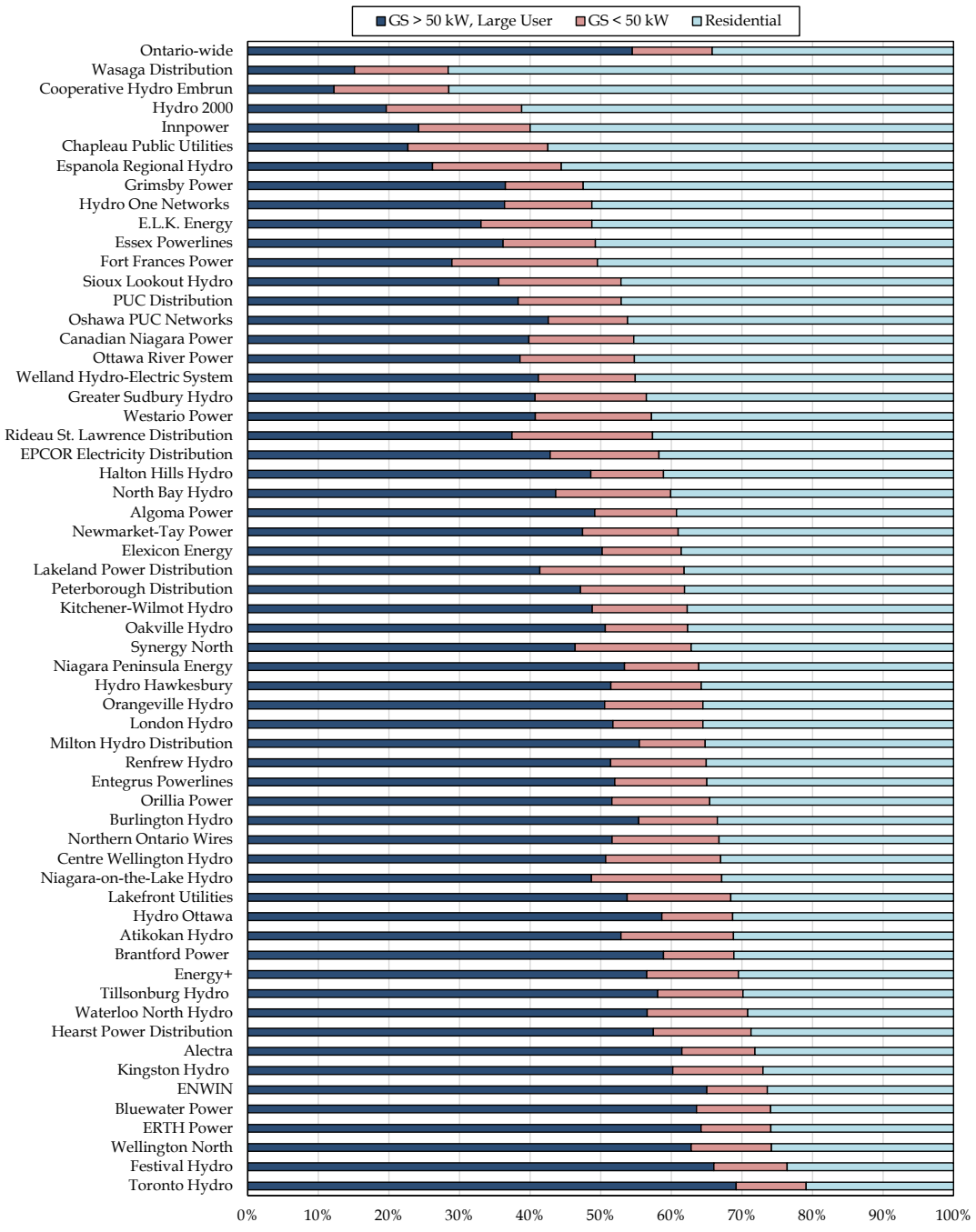
Although most LDCs do not publish quarterly financial reports, internal financial updates have been made available in some instances through ongoing rate applications, which in turn provide insight into some LDCs' own estimates of the impact the pandemic has had on revenues, including their own estimates of lost revenues due to lost load. Of note, according to Burlington Hydro, overall distribution revenue for 2020 was forecasted to be down by $948,000 when comparing its updated forecast for the year to its 2020 budget (which works out to around a 3% decline), with declines in small commercial consumption due to pandemic-related closures having "the most significant impact on the decrease."[27] Similarly, Niagara Peninsula Energy's ("NPEI") actual 2020 revenues for the 9-month period up to September were also lower compared to budget for that same period, by around $956,000 (which works out to around a 4% decline), with NPEI estimating around $419,000 was related to lost revenue due to lost load.[28]

[26] Toronto Hydro Corporation. *Third Quarter Financial Report*. November 20, 2020.

[27] Burlington Hydro Inc. *2021 Cost of Service Application (EB-2020-0007) - Appendix B – BHI 2021 Business Plan*. October 30, 2020.

[28] Niagara Peninsula Energy Inc. *NPEI Interrogatory Responses (EB-2020-0040) - Attachment 9: Report to NPEI's Board of Directors-September 2020 Financial Statements*. November 19, 2020.

**Figure 16. Breakdown of consumption by customer class for LDCs (percentage, 2019)**




Note: Algoma Power's residential data contained in the yearbook consists of the following rate classes: seasonal, R1(i) (traditional residential), and R1(ii) (deemed residential, including customers that would be classified as GS <50 kW in the absence of O.Reg. 442/01). To get a proxy for Algoma Power's GS <50 kW breakdown, data above uses the 2018 ratio of R1(ii) consumption to total residential consumption, and applies this ratio to its 2019 yearbook data.

Source: OEB 2019 yearbook of electricity distributors, Algoma Power Inc.'s 'Exhibit 3 – Revenues' from its 2020 Cost of Service application [EB-2019-0019].

**Distribution utility survey: Implications of COVID-19 on revenues and customer count**

**1. Impact of COVID-19 on revenues**

LEI's survey of distribution utilities included questions related to the impact that COVID-19 had on revenues (as compared to internal baselines or weather-normalized expectations that existed prior to the pandemic).

Based on a simple average of survey responses, the estimated impact to **electricity distributor** revenues over the **historical** period, by customer class, was as follows: declines in GS < 50 kW customer revenues by 4.9%; declines in GS ≥ 50 kW customer revenues by 6.1%; and declines in large use and ST customer revenues by 4%. Across all customer classes (i.e. total revenues), respondents reported declines of around 2.2%. For the **forward-looking period**, current thinking based on a simple average of survey responses is that the declines in total revenues attributable to COVID-19 may be 2.6% in the short-term (up to 18-month forward period), and 1.7% in the medium to longer term (5-year forward period, excluding the short-term forward period).

On the **gas distribution** side, the estimated impact to revenues over the **historical** period was 0% (in total and for residential, commercial, and industrial customers). For the **forward-looking period**, current thinking is that declines in total revenues attributable to COVID-19 may be 1% in the short-term, while the impact in the medium to longer term may be 0%.

It is important to note that these values summarize only the responses received to the survey, which was not meant to be a formal view arrived at with precision. As such, it does not provide a comprehensive indication of what is being observed or expected by all utilities across the province, but does serve as an indication of present thinking among a selection of LDCs (albeit with high degrees of uncertainty).

**2. Impact of COVID-19 on customer count**

As electricity distributors have transitioned or will transition to entirely fixed monthly distribution charges for residential customers, changes in household formation counts (and hence, changes in the number of residential customers served) are one avenue for incremental distribution revenue growth over time. Generally, the COVID-19 pandemic may impact household formation through changes in three primary drivers:

i. **immigration:** as observed by industry analysts, "the flow of immigrants that typically fuel demand for housing of all types has slowed to a trickle."[29] As of Q2 2020, total net migration in Canada decreased by 94% year-over-year (from just under 153,000 people in Q2 2019 to just under 10,000 people by Q2 2020).[30] While Canadian government policy is to add to quotas in future years to compensate for lost arrivals, failure to do so may result in a permanent loss of load from these foregone households;

*continued…*

[29] RBC Economics. *Seven Ways COVID-19 Is Affecting Canadian Housing.* October 29, 2020.

[30] Ibid.

ii. **motivation to move from existing housing arrangements:** during the first lockdown period across Canada, the national housing market demonstrated a significant decline in sales, as social distancing restrictions limited open houses. However, sales rebounded over the July-September period as restrictions eased in the summer.[31] Another concern relates to increases in vacancy rates, although 2020 data from the Canada Mortgage and Housing Corporation ("CMHC") on vacancies is not yet available.[32] These considerations will impact the timing of household formation; and

iii. **economic circumstances:** increased unemployment and financial strain resulting from the pandemic, which has been experienced most severely among lower-income earners and younger Canadians, is expected to delay household formation as it limits the means with which individuals can move out from inter-generational housing.

As the pandemic is ongoing and uncertainty is still high, the impact it has had on each of these drivers cannot be easily quantified,[33] and declines in each of the drivers may correct themselves in the period following the pandemic.

With this preamble in mind, LEI's survey of distribution utilities also included questions related to the anticipated impact that the COVID-19 pandemic may have on customer counts and customer growth rates, compared to expectations prior to the pandemic. Additional commentary provided by utilities around their survey responses highlighted the high degree of uncertainty and the large numbers of unknowns, but did indicate the potential for a decline in expectations with respect to residential customer counts (average response among nine respondents was 1%, with a median of 0%). As would be expected, the main concern on the electricity side centres around GS customers, where the simple average response for GS < 50 kW customer count changes was a decline of around 3%, while the simple average for GS ≥ 50 kW was 2%; for large use and ST customers the average response was 0%.

## 3.3 Impact on expenses and cost drivers

Utilities have seen their expenses and expenditures impacted in various ways as a result of the COVID-19 pandemic. Upside pressure was generally seen across utilities through higher COVID-related operating expenses and at distribution utilities through bad debt expenses, while some utilities saw temporary downward pressure through deferrals of operating and capital projects and work re-prioritization, for example. The direction and magnitude of costs/savings arising from COVID-19 also varied by utility.

Quarterly financial reports for Ontario electric utilities that publish them (Hydro One, Toronto Hydro, and OPG) provide relevant insights in this regard. For example, Hydro One's Q2-2020

[31] RBC Economics. *Seven Ways COVID-19 Is Affecting Canadian Housing.* October 29, 2020.

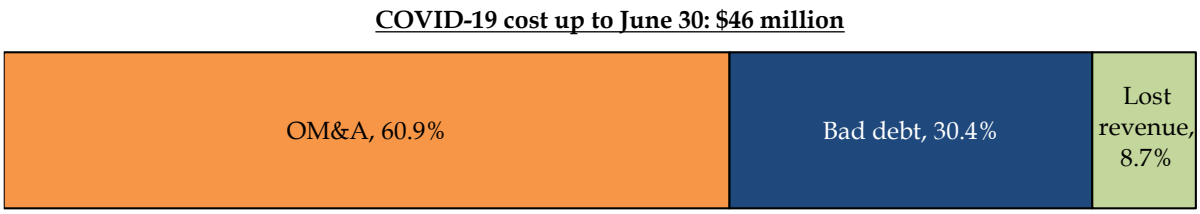
[32] However, a special edition outlook published in June 2020 states "lower immigration and less mobility within Canada coupled with an overhang of buildings under construction could lead to vacancy rates increasing the rental market. Any such spike is likely to be short-lived as demand for rental continues to grow in the medium term." Source: CMHC. *Housing Market Outlook – Special Edition – Summer 2020.* June 23, 2020.

[33] Data on household formation in Canada is reported every five years as part of Statistics Canada's Census Program (the most recent release was 2016). *See* Statistics Canada. *Census Program.*

financial report indicated that: transmission operations, maintenance, and administration ("OM&A") costs were higher in part as a result of COVID-19 primarily due to "labour-related costs and direct expenses, including purchases of additional facility-related and cleaning supplies," while distribution OM&A was lower in part due to "lower work program expenditures as the Company prioritized essential and high priority work and temporarily deferred other work" (although higher COVID-related labour and direct expenses were also noted on the distribution side, overall distribution OM&A was still lower).[34] OM&A was also affected by these direct COVID-19 related expenses in Q3-2020.

Figure 17 shows Hydro One's tracked COVID-related cost for the period up to June 30, 2020. Tracked COVID-related costs were mostly attributable to OM&A ($28 million), followed by non-recovery of revenue (bad debt, $14 million); also included is a small amount attributable to lost revenues ($4 million). Hydro One's Chief Financial Officer also noted in their August earnings call that the company did not expect operating costs to continue at the higher rates seen in Q2-2020, and that bad debts had remained relatively flat (and were "slightly down on last year").[35] As of September 30, 2020, tracked COVID-related costs increased by around $9 million to $54 million, with COVID-related OM&A costs increasing by $5 million in the quarter, while tracked bad debt amounts remained unchanged compared to Q2-2020.

**Figure 17. Breakdown of Hydro One's tracked COVID-19 costs up to Jun 30, 2020**




Source: Refinitiv Streetevents. *Edited Transcript: H.TO - Q2 2020 Hydro One Ltd Earnings Call*. August 11, 2020.

Temporary COVID-related savings were seen by Hydro One in the second quarter as the company temporarily deferred certain capital and operating projects, which provided some offset against increases in costs in other areas. Lower than planned quarterly capital expenditures were also reported by OPG in its Q2-2020 financial report as a result of its COVID-19 response measures, with the company temporarily suspending or deferring on-site activities at a number of projects (notably postponing the commencement of the refurbishment process at Darlington Unit 3 from Mid-May to early September).

Finally, Toronto Hydro's Q3-2020 financial report noted that its operating expenses were higher for the quarter due to the utility's estimates for expected credit losses as a result of the pandemic (bad debt expenses of around $17.7 million as of September 30, 2020). Toronto Hydro also noted that operating expenses of $1.3 million were incurred in the third quarter for "COVID-19 testing kits, cleaning supplies, protective equipment and other support costs directly related to the

[34] Hydro One Limited. *Second Quarter 2020 Results*. August 11, 2020.

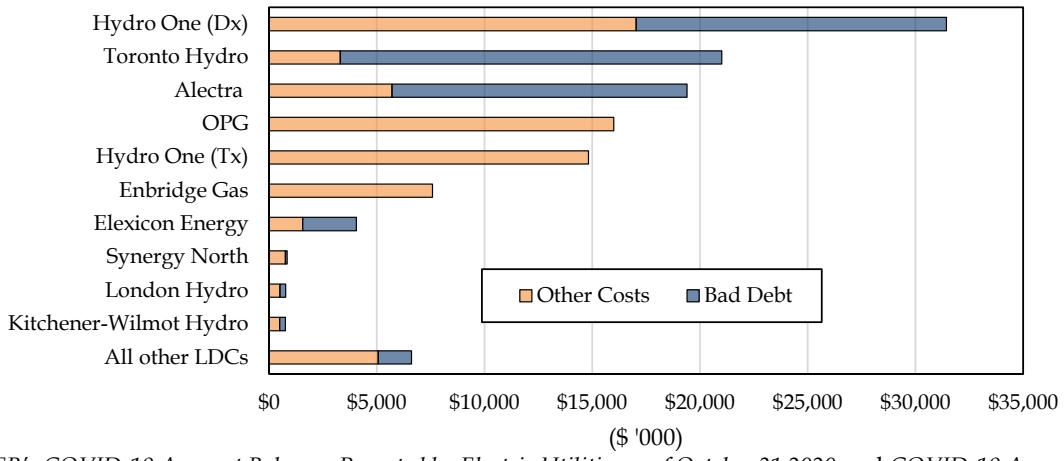
[35] Refinitiv Streetevents. *Edited Transcript: H.TO - Q2 2020 Hydro One Ltd Earnings Call*. August 11, 2020.

implementation of safety measures as a result of the COVID-19 pandemic," compared to $1.5 million and $0.3 million in the previous two quarters, respectively.[36]

### 3.3.1 OEB sub-accounts[37]

Although monetary amounts reported by utilities in the OEB's 'Other Costs' and 'Bad Debt' sub-accounts are not definitive, and items included in the accounts may vary by utility, these sub-accounts do provide a picture of potential incremental expense impacts that COVID-19 has had across individual utilities. Based on the information contained in these sub-accounts, a total of around $123.8 million has been reported by utilities up to October 31st, 2020, broken down into $50.5 million related to bad debt and $73.3 million related to Other Costs (these values include natural gas utility reported amounts). The ten largest total amounts reported in these sub-accounts by entity are shown in Figure 18, along with the remaining amounts reported by all other LDCs (bottom bar). As shown in the figure, a large portion of these reported expenses were concentrated within a handful of entities, with OPG and Hydro One (combined transmission ("Tx") and distribution ("Dx")) making up 65% of reported Other Costs, and three LDCs (Toronto Hydro, Hydro One, and Alectra) making up 91% of reported bad debt expenses.

**Figure 18. Amounts reported in 'Other Cost' and 'Bad Debt' sub-accounts by utility ($ 000)**



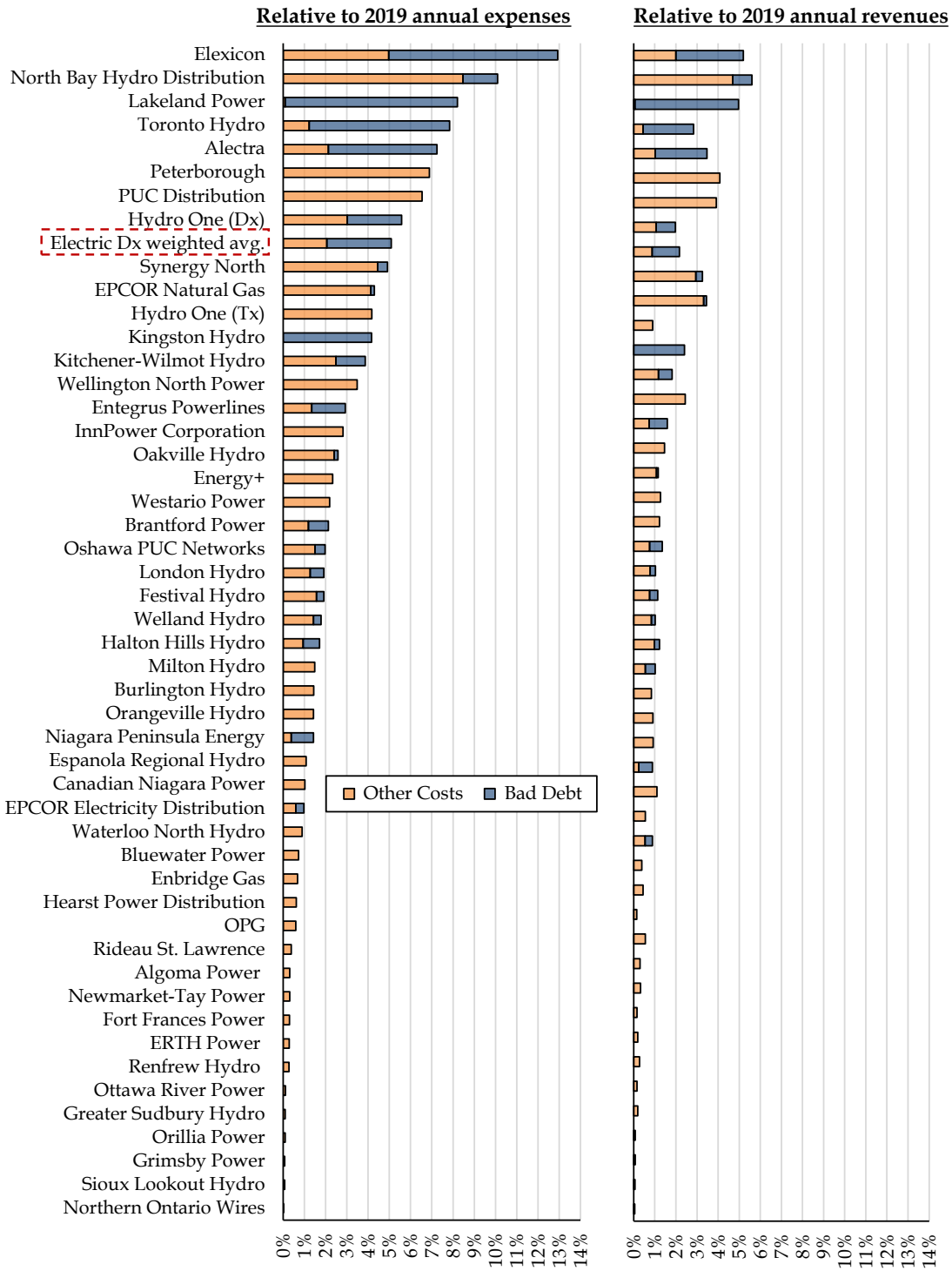

Sources: *OEB's COVID-19 Account Balances Reported by Electric Utilities as of October 31,2020* and *COVID-19 Account Balances Reported by Natural Gas Utilities as of October 31, 2020.*

To get a sense of proportionality, Figure 19 presents the reported bad debt and Other Cost amounts relative to 2019 OM&A expenses and revenues for each utility. Reported bad debt and Other Cost amounts as a proportion of total OM&A expenses for each utility are presented on the left side of the figure (with the cumulative stacked bars representing the total of these two costs divided by 2019 OM&A costs for each utility). Reported bad debt and Other Cost amounts as a proportion of 2019 total revenues for each utility are presented on the right side of the figure.

[36] Toronto Hydro Corporation. *Third Quarter Financial Report*. November 20, 2020.

[37] The sub-account for costs associated with billing and system changes are not included in this section as reported amounts were minimal.

**Figure 19. Reported bad debt and other costs as a proportion of 2019 expenses and revenues**




Note: An additional 19 electricity distribution and transmission entities are not included above; most reported $0 values in these sub-accounts, although some did not report any values.

Sources: *OEB's COVID-19 Account Balances Reported by Electric Utilities as of October 31, 2020* and *COVID-19 Account Balances Reported by Natural Gas Utilities as of October 31,2020;* OEB's 2019 and 2018 yearbook of electricity distributors; OEB's 2019 yearbook of natural gas distributors; OPG and Hydro One 2019 Annual Reports.

## 3.4 Impact on utility financial health

The impact of the COVID-19 pandemic on financial health is more observable among the largest utilities, for which routine quarterly updates are available in the public domain. As noted in LEI's separate report entitled 'A report on the OEB's cost of capital parameters and the impacts of COVID-19,' in general we have not seen reports of utilities subject to financial distress or receiving negative attention from ratings agencies, suggesting they have maintained their financial integrity thus far throughout the COVID-19 pandemic. A selection of relevant excerpts from LEI's separate report on Cost of Capital Parameters are included in the textbox below.

**Excerpts from LEI's Report on Cost of Capital Parameters**

LEI has assessed the financial integrity metric through a comprehensive qualitative review of the utility landscape in Ontario, and reviewed rating agency outlooks for utilities. In general, we find no evidence of Ontario utility defaults since the beginning of the pandemic in the province, and notes from both Canadian and global ratings agencies have generally been stable.

Of significance is a note by S&P Global in June 2020 that assessed all six major investor-owned utilities in Canada as having "strong" or "excellent" business risk profiles, on account of their improved business and financial risk profiles in 2019.[38] Only Fortis Inc. had a "Negative" outlook, but Hydro One maintained a stable credit rating. An excerpt of the agency's rating summary is shown below.[39]

| S&P criteria | ATCO Ltd | Emera Inc. | Fortis Inc. | Hydro One Ltd |
|---|---|---|---|---|
| **Business risk profile** | Excellent | Excellent | Excellent | Excellent |
| **Financial risk profile** | Significant | Aggressive | Significant | Significant |
| **Issuer credit rating** | A- | BBB | A- | A- |
| **Outlook** | Stable | Stable | Negative | Stable |
| **FFO to debt range** | 14%-15% | 11%-11.5% | 10.5%-11% | 10.5%-11% |
| **Downside threshold** | 15.0% | 10.0% | 10.5% | 11% |
| **Upside threshold** | 20.0% | 13.0% | 10.5% | 16% |
| **Most recent rating action** | Affirmed | Ratings lowered | Affirmed | Outlook revised to stable |

*continued…*

[38] S&P Global Ratings. *Can Canadian Regulated Utilities Sustain 2019 Improvements Amid COVID-19 and an Oil Price Slump?* June 11, 2020.

[39] Adapted from S&P Global Ratings. *Can Canadian Regulated Utilities Sustain 2019 Improvements Amid COVID-19 and an Oil Price Slump?* June 11, 2020.

Consistent with this analysis, DBRS Morningstar, a Canadian ratings agency, has issued ratings reports for the Canadian investor-owned utilities since the start of the pandemic: for Hydro One, in April it affirmed the utility's existing debt issues as A (high) based on the utility's "*key credit metrics which are expected to remain supportive of the current ratings*"[40]

Further, in October 2020, Hydro One issued $1.2 billion in medium-term notes comprising of $200 million re-opening of 2.71% (Series 47) due in 2050, $600 million at 0.71% (Series 48) due in 2023, and $400 million at 1.69% (Series 49) due in 2031, and were deemed as "A (high)" by DBRS Morningstar.[41]

Commonly used financial ratios can provide further indication of anomalous financial circumstances at utilities based on available quarterly reports, with a particular focus on anomalous changes to ratios for the two most recent quarters compared to previous quarters. These financial ratios include the:

- **Current ratio** – an indicator of liquidity, which measures the ratio of a company's current assets to current liabilities (higher ratios indicate higher liquidity);
- **Debt to equity ratio** – an indicator of leverage, which measures the ratio of a company's total debt (short- and long-term) to equity (higher ratios indicate higher leverage);
- **Return on equity ("ROE")** – an indicator of financial performance, which measures the ratio of a company's net income to its equity; and
- **Debt to EBITDA** (earnings before interest, taxes, depreciation, and amortization) - which provides an indication of a company's ability to generate income and service debt (higher ratios may indicate higher debt load).

Figure 20 presents these ratios for the Ontario utilities that publish quarterly financial information (Hydro One Limited, EGI, OPG Inc., and Toronto Hydro Corporation) over the past six quarters.[42] In general, changes in the most recent quarters compared to previous quarters have not been significant. Of note, OPG's debt to equity and current ratios were impacted by short- and long-term debt increases in Q2-2020 unrelated to COVID-19 (including OPG's issuance of green bonds totaling $1.2 billion in April 2020).[43] For EGI, large swings in its quarterly ROE and debt to EBIDTA were driven by seasonality. Toronto Hydro's higher costs and lower revenues as a result of COVID-19 (discussed in previous subsections) impacted EBITDA and therefore its debt to EBITDA ratios (most noticeably in the second quarter), while the ROE shown below provides an indication of Toronto Hydro's financial performance after movements in regulatory balances.

40 DBRS Morningstar. *Hydro One Inc. Rating Report.* April 9, 2020.

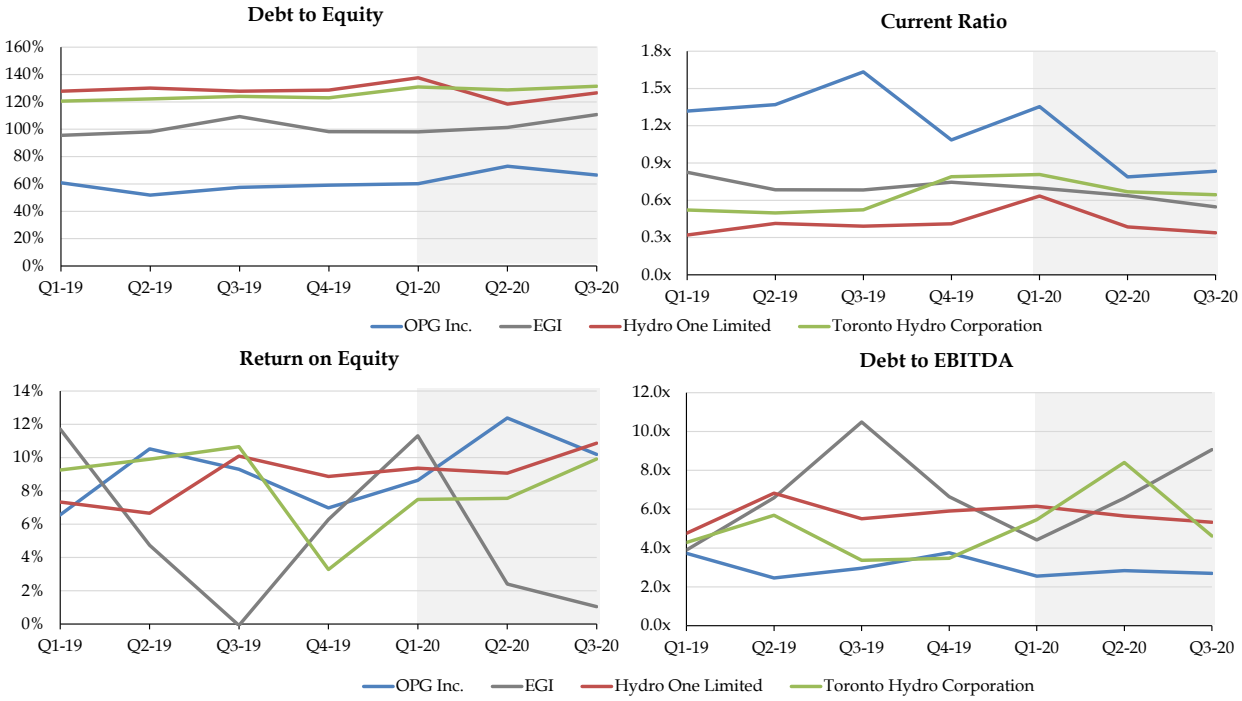
41 DBRS Morningstar. *DBRS Morningstar Assigns Ratings of A (high) with Stable Trends to Hydro One Inc.'s $1.2 Billion Medium-Term Notes Issues*. October 9, 2020.

42 Includes non-regulated activities in at least some instances.

43 OPG. *2020 Second Quarter Results*. August 13, 2020.

In addition to these financial ratios, S&P credit ratings for all four of these companies are provided in Figure 21, along with their last review dates. Of note, all credit rating reviews were performed after March 2020, and none were revised as a result of the COVID-19 pandemic.

**Figure 20. Selected financial ratios for available Ontario utilities (Q1-2019 to Q3-2020)**




Note: For Q2-2020 only, ROE presented for Hydro One Limited was based on its adjusted net income attributable to common shareholders, as net income without this adjustment would have included deferred tax recovery of $867 million.

Source: Capital IQ, Hydro One's second quarter financial report.

**Figure 21. Credit ratings for selected utilities**

| Company | S&P credit rating | Last review date | Outcome of review |
|---|---|---|---|
| **Hydro One Limited** | A- | 16-Sep-2020 | No ratings change |
| **OPG Inc.** | BBB+ | 17-Jul-2020 | No ratings change, outlook revised from negative to stable |
| **Toronto Hydro Corp.** | A | 21-Apr-2020 | No ratings change |
| **Enbridge Gas Inc.** | A- | 14-Apr-2020 | No ratings change |

Source: Capital IQ.

Based on information reviewed throughout this section, the financial impact of the COVID-19 pandemic to date on the utilities sector as a whole has generally been controlled. However, electricity distribution utilities were relatively harder hit, and LDCs with higher exposures to customers with load reductions and higher exposures to bad debt expenses were, comparatively

speaking, more negatively impacted. Based on publicly available information, this was visible at Toronto Hydro, for which commercial customers make up a large proportion of its total customer base. Information contained in internal financial updates for NPEI and Burlington Hydro also indicated similar trends of distribution revenue declines and increases in certain operating expenses impacting their 2020 performance compared to budget. For NPEI, EBITDA over the nine-month period up to September 2020 was down 15% compared to budget,[44] while Burlington Hydro's updated outlook for full-year 2020 was up 7% compared to budget (as declines in distribution revenues were offset by increases in other operating revenues, and overall O&M costs saw reductions).[45]

For the remaining utilities that do not provide quarterly financial updates, information in the public domain does not allow for an assessment of the severity of the financial impact that COVID-19 has had to date, other than the additional COVID-related expenses and lost revenue amounts reported in the various OEB sub-accounts. However, as part of the OEB's monitoring of the impact the pandemic has had on utility financial health using confidential monthly data submitted by individual utilities,[46] the OEB has noted "that reporting has not identified any acute financial issues for utilities."[47]

Going forward in the short-term, liquidity risk for utilities (particularly on the distribution side) could increase in the event that negative cost and revenue pressures persist – notably, continued or increasing delayed payments and bad debt levels (discussed next in Section 4), combined with lower revenues due to reduced customer loads.

[44] Niagara Peninsula Energy Inc. *NPEI Interrogatory Responses (EB-2020-0040) - Attachment 9: Report to NPEI's Board of Directors-September 2020 Financial Statements*. November 19, 2020.

[45] Burlington Hydro Inc. *2021 Cost of Service Application (EB-2020-0007) - Appendix B – BHI 2021 Business Plan*. October 30, 2020.

[46] Information being reported includes: customer bill receipts; energy purchase costs; distributor operations costs; total cumulative arrears; increase to provision for uncollectable accounts; cash available at month's end; available credit; and risk of default by significant customers.

[47] OEB. *Re: Consultation on the Deferral Account – Impacts Arising from the COVID-19 Emergency – Next Steps, Ontario Energy Board File Number: EB-2020-0133.* September 24, 2020.

# 4 Impact of bad debt on utilities

As covered in Section 3.3, bad debt formed a large component of COVID-related costs for distribution utilities. Given the unprecedented nature of the COVID-19 pandemic, the extent of its impact on bad debt going forward depends on the duration of the pandemic and the nature of any associated restrictions, such as quarantines, temporary business closures, and customer limits generally imposed by governments to control the spread of COVID-19. To develop an indicative range of potential losses from non-payment by customers in the utility sector, LEI analyzed trends and projections in the level of household indebtedness, mortgage and non-mortgage delinquency rates, and business insolvencies in Ontario to provide a general sense of their ability to pay. To provide further context to the discussion, the section begins with an assessment of the historical magnitude of the bad debt expense among Ontario's utilities.

## 4.1 Historical magnitude

Under the OEB's Uniform System of Accounts, electricity distributors in Ontario record their bad debt expense in Account 5335, which "shall be charged with amounts sufficient to provide for losses from uncollectible utility revenues."[48] Generally, bad debt is categorized in a utility's income statement as a 'billing and collection' expense, which is incorporated in the total OM&A cost.[49] Given that "the OEB has adopted an outcomes-based approach to regulation … the review of OM&A expenses [focuses] on the examination of outputs and programs, … rather than the discrete line items or inputs to the OM&A budgets."[50] However, while bad debt may be included among OM&A expenses, extraordinary amounts may be reviewed on a case by case basis.[51]

According to a 2019 OEB Staff discussion paper, the bad debt expense across the province's entire electricity distribution sector totaled $49 million per year on average over the 2012-2017 period, representing 3% of the total OM&A cost.[52] As a comprehensive breakdown of bad debt expense by rate class and utility was not available,[53] LEI analyzed a subset of available data from a selection of Ontario's largest electricity distributors to garner these insights, relying on the cost allocation models for Hydro One, Toronto Hydro, and Hydro Ottawa.

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[48] OEB. *Accounting Procedures Handbook for Electricity Distributors.* January 1, 2012. p. 176.

[49] OEB. *Staff Discussion Paper: Activity and Program Based Benchmarking for Electricity Distributors (EB-2018-0278).* February 25, 2019. *See* Figure 4.

[50] OEB. *Handbook for Utility Rate Applications.* October 13, 2016.

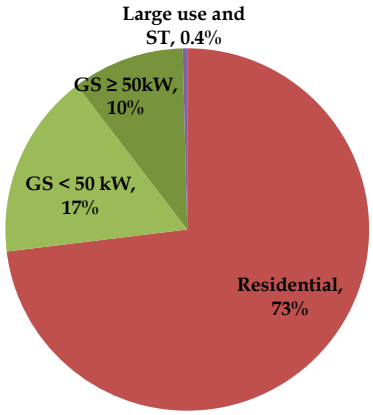
[51] *See for example* Toronto Hydro Corporation. *Financial Report.* December 31, 2016 which states with regards to bad debt that *"[w]hile LDC would be liable for the full amount of the default, there can be no assurance that the OEB would allow recovery of the bad debt expense. Established practice in such cases is that the OEB would examine any electricity distributor's application for recovery of extraordinary bad debt expenses on a case-by-case basis." (p. 28-29)*

[52] OEB. *Staff Discussion Paper: Activity and Program Based Benchmarking for Electricity Distributors (EB-2018-0278).* February 25, 2019.

[53] Per the OEB's reporting and record keeping requirements ("RRR") with regards to bad debt, utilities are only required to report one line item for total bad debt expense for the year – as such, a breakdown by customer class for each utility is not readily available.

Implied breakdowns based on this data are presented in Figure 22. In terms of the variation in the bad debt expense between major rate classes, this data suggests residential customers generally contributed the largest share to the expense (73%), followed by GS < 50 kW customers (17%), then GS ≥ 50 kW customers (10%). Large use and sub-transmission classes contributed minimally to bad debt expenses based on this data, at around 0.4%.

**Figure 22. Proportion of bad debt expense by rate class for a selection of electric distributors**

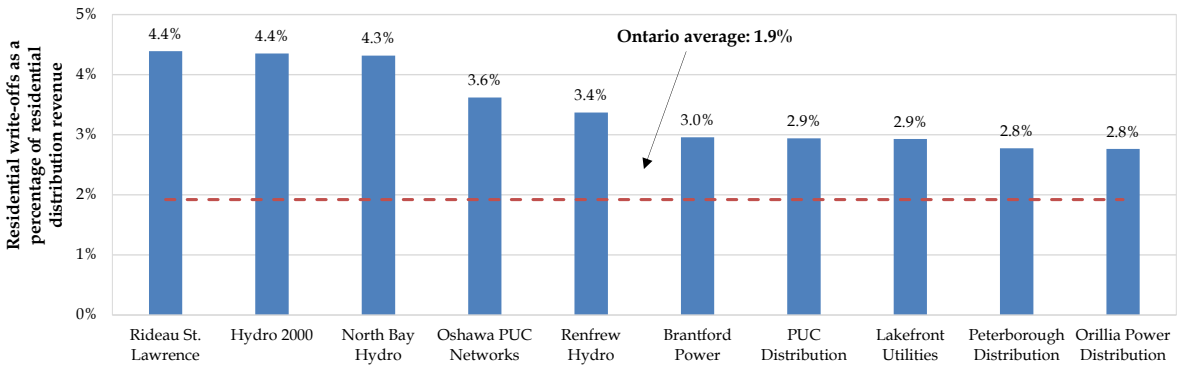



Notes: Based on total bad debt expenses reported by Hydro One (2013-2015), Toronto Hydro (2015-2017), and Hydro Ottawa (2012-2014).

Sources: Hydro One. *EB-2017-0049, Exhibit G1, Tab 1, Schedule 1.* March 31, 2017; Toronto Hydro. *EB-2018-0165, 2019 Cost Allocation Model.* January 21, 2020; Hydro Ottawa. *EB-2018-0044, 2016 Cost Allocation Model.* August 12, 2019.

As for the variation among utilities, in addition to the bad debt amounts shown in the subsequent section, LEI compared the amounts of residential write-offs per year as a proportion of reported residential distribution revenue for the same year. Using data for the 2013-2016 period (i.e., the most recent period for which comprehensive data was published), residential write-offs ranged from 0.1% to 4.4% of residential distribution revenues, averaging 1.9% across the province. Figure 23 presents the ten utilities with the highest proportion of residential write-offs for the historical 2013-2016 period.

**Figure 23. Residential write-offs (dollar amount) as a percentage of residential distribution revenue by utility (2013-2016 average, top ten utilities)**




Sources: OEB. *Disconnection and late payment data by utility.* 2013-2016; OEB. *Electricity distributor yearbooks.* 2013-2016.

## 4.2 Outlook and range of potential losses

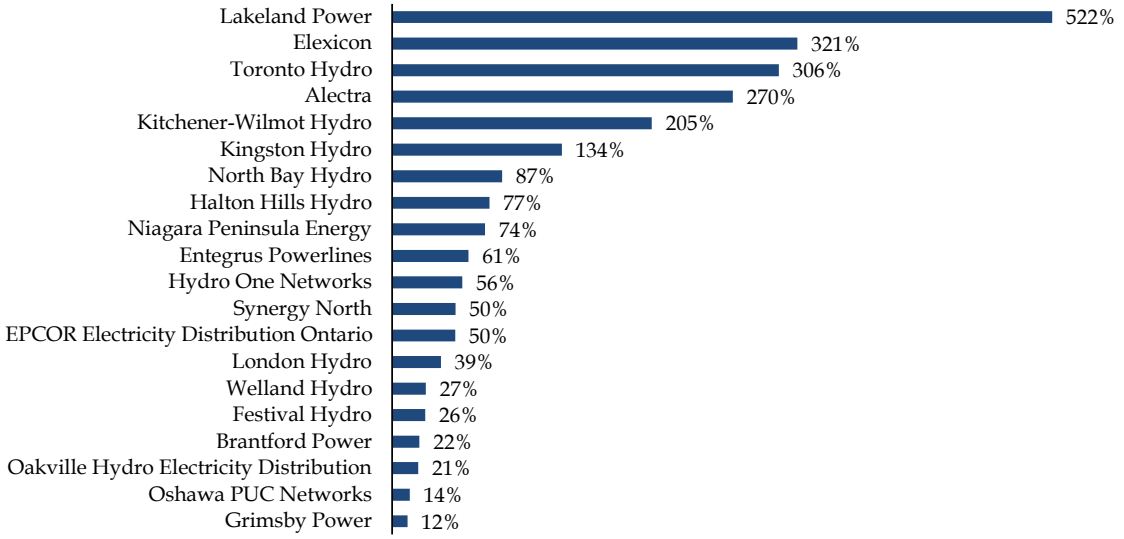
Since the onset of the COVID-19 pandemic, utilities have reported an increase in their expected bad debt expenses. The following subsections assess the evidence available in Ontario to date, as well as the outlook for the extent of this increase going forward.

### 4.2.1 Evidence of bad debt impact from COVID-19 to date

As discussed previously, on March 25, 2020, the OEB established the "Deferral Account 1509 – Impacts Arising from the COVID-19 Emergency" ("the Account") to "track any incremental costs and lost revenues related to the COVID-19 pandemic."[54] This includes a 'Bad Debt' sub-account in which utilities may report bad debt amounts separately. As of October 2020, approximately $50.5 million had been reported in the sub-account; for reference, the average bad debt expense for the 2013-2019 period as reported in Account 5335 was $46.3 million per year.

For electricity distributors that have reported non-zero amounts in their COVID-19 Deferral Account sub-accounts so far, Figure 24 shows the ratio of this reported bad debt divided by their historical average reported bad debts in Account 5335 over the 2013-2019 timeframe. For some distributors, reported bad debt amounts appear significantly higher than historical average amounts. This is most visible for Lakeland Power, where reported bad debt amounts were around five times that of historical (for reference, these bad debt amounts would translate to 5% of its 2019 distribution revenue).[55]

**Figure 24. Ratio of reported bad debt attributable to COVID-19 versus historical bad debt**




Sources: OEB data on *COVID-19 Account Balances Reported by Electric Utilities as of October 31,2020*, and OEB data on Account 5335 for 2013-2019.

[54] OEB. *Accounting Order for the Establishment of Deferral Accounts to Record Impacts Arising from the COVID-19 Emergency.* March 25, 2020.

[55] Based on distribution revenue amounts from the OEB's 2019 yearbook of electricity distributors.

While not reflected in this aggregate data, a notable difference compared to historical trends has been the increase in late payments, arrearages, and potential bad debt levels among non-residential rate classes, particularly among smaller and medium sized commercial customers.[56]

**Distribution utility survey: Implication of COVID-19 on bad debt and late payments**

This trend of rising bad debt during the pandemic has been further corroborated by utilities in response to a survey conducted by LEI. Therein, 9 out of 11 electricity distributors responded that they witnessed a material increase in bad debt or late payments relative to internal baselines or expectations prior to the pandemic. For those that reported an increase, it was most apparent among residential customers (observed by 7 respondents), followed by GS < 50 kW customers (6 respondents), GS ≥ 50 kW customers (4 respondents), and large use and ST customers (2 respondents). Across all customer classes, respondents reported receiving payments around 30 days later than under their usual collection cycle (based on 4 responses).

Respondents that provided further commentary noted that late payments and amounts in arrears have so far been up compared to the period prior to the pandemic. Concerns over bad debt amounts and potential increases to it reflected uncertainty around the duration of the pandemic, the continued pressure on commercial and industrial customers (particularly in relation to more stringent restrictions), and the increasing arrears from residential customers during the winter disconnection moratorium period.

Similar trends were witnessed based on gas survey responses, with bad debt or amounts in arrears increasing among all customer classes (although more prevalent among commercial and industrial customers). According to survey responses, residential customers who were paying later were doing so by up to 1 month later, while commercial and industrial customers who were paying later were doing so by up to 2-3 months.

#### 4.2.1.1 Evidence of COVID-19 impact on customers' ability to pay

There is significant uncertainty as to how severely the pandemic will impact bad debt. As observed by the Bank of Canada ("the Bank"), "[e]conomic activity came to a sudden halt due to the COVID-19 pandemic," which "has resulted in widespread income losses, creating a challenging situation for many Canadian households, especially those that are highly indebted."[57] Although the magnitude of the economic fallout from the pandemic is currently unknown, it will ultimately affect the financial positions of households and businesses, and in turn impact their ability to pay their bills. To begin to estimate the potential losses that utilities may experience as a result of rising bad debt expenses, one can look to trends and projections for other facets of

[56] For example, when comparing information as of June 30 versus March 31, 2020, Hydro Ottawa (which has not reported any amounts in the COVID-19 Deferral Account pending further guidance), witnessed accounts receivable aged arrears balances greater than 60 days increase among: GS < 50 kW customers by 160%; GS > 50 kW customers by 310%; and residential customers by 30%. While total amounts were up 70%, amounts attributable to residential customers declined from around 78% to 59% due to the disproportionate increase among GS customers. Source: Hydro Ottawa. *Technical Conference Undertaking Responses Day 1 [EB-2019-0261].* July 29, 2020.

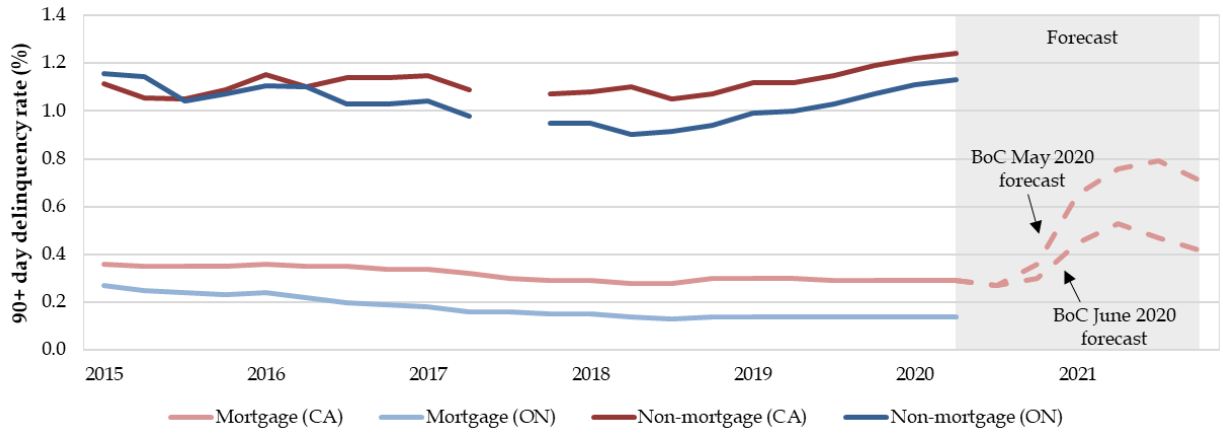
[57] Bank of Canada. *Household indebtedness risks in the wake of COVID-19.* June 2020.

consumer debt, such as mortgages, as well as credit cards, auto loans, and lines of credit (together, non-mortgage debt).

Figure 25 presents historical delinquency rates for mortgage and non-mortgage accounts until the end of the second quarter of 2020, for both Ontario and Canada. The delinquency rates indicate the share of loans or balances where customers have missed payments for three months or more, and hence reveal the proportion of accounts that are at risk of defaulting.[58] As demonstrated in the chart, mortgage delinquencies in Ontario and Canada have remained flat over the first half of 2020, at 0.14% in Ontario and 0.29% across Canada, while non-mortgage delinquencies in both regions have continued their upward trend from 2019, reaching 1.13% in Ontario and 1.24% across Canada by the end of Q2-2020.

> *"Despite the deferrals and added borrowing, some households are likely to fall behind on their loan payments. This typically appears first in missed credit card and auto loan payments and later in mortgage payments."*
>
> Bank of Canada. *Financial System Review – 2020.* May 14, 2020.

**Figure 25. Mortgage and non-mortgage delinquency rates, Ontario and Canada (actual: Q1-2015 to Q2-2020, forecast: Q3-2020 to Q4-2021)**




Note: Non-mortgage delinquency rates for Q3-2017 are not available through Equifax's public press releases.

Sources: CMHC; Equifax; Bank of Canada. *Household indebtedness risks in the wake of COVID-19.* June 2020.

However, it is important to note that these historical delinquency rates do not capture events occurring in the latter half of 2020, which are expected to place upward pressure on the number of defaulting accounts. For example, at the outset of the pandemic, financial institutions across Canada offered mortgage payment deferral agreements to customers. Approximately 760,000 customers entered into these agreements, which allowed them to defer mortgage payments for up to six months (amounting to approximately $1 billion in deferred payments per month).[59] As

[58] Ibid.

[59] Canada Mortgage and Housing Corporation. *Residential Mortgage Industry Report.* September 10, 2020.

these agreements come to an end in the latter half of 2020, "there continues to be a risk that a significant increase in mortgage delinquency will be observed."[60]

The Bank has projected the short-term impact that the expiration of these payment deferrals could have on mortgage delinquency rates going forward (see the dotted lines in Figure 25). In a forecast issued in May 2020, the Bank anticipated that the rate across Canada could peak at 0.79% in the third quarter of 2021, which is almost double the peak reached during the 2008 global financial crisis.[61] Later in June 2020, the Bank predicted that the rate could peak earlier and lower than initially expected, reaching 0.53% in the second quarter of 2021.[62] Despite these forecasts being released only a month apart, the trajectories for future mortgage delinquencies are markedly different. As noted by the Bank itself, "[t]he unprecedented nature of the pandemic … makes the uncertainty around the results exceptionally high."[63] However, while the extent of the increase in mortgage delinquency rates is uncertain, the forecasts do agree on the directionality of the effect – that as payment deferral programs expire, we should begin to see increases in delinquency rates. This may also be observed in the utility sector through increased instances of non-payment during the current winter disconnection moratorium[64] (as residential customers are protected from disconnection for non-payment), and potentially increased instances of bad debt following the expiration of payment deferral programs offered by utilities.[65]

Another factor that will impact households' ability to pay their bills is their level of indebtedness. To measure this, the Bank assessed the number of months that households with mortgages could continue making their mortgage payments by drawing only on their liquid assets. A summary of this analysis is illustrated in Figure 26, which found that 20% of indebted Canadian households could only cover up to two months of payments, indicating an extremely limited financial buffer. These households also aligned with the occupations most at risk during the pandemic, namely those in the sales and trades industries.[66]

Taken together, these factors have led some financial analysts to predict that between 5% and 20% of borrowers that were on a mortgage deferral program during the first few months of the

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[60] Ibid. p. 15.

[61] Bank of Canada. *Financial System Review – 2020.* May 14, 2020.

[62] Bank of Canada. *Household indebtedness risks in the wake of COVID-19.* June 2020.

[63] Bank of Canada. *Financial System Review – 2020.* May 14, 2020.

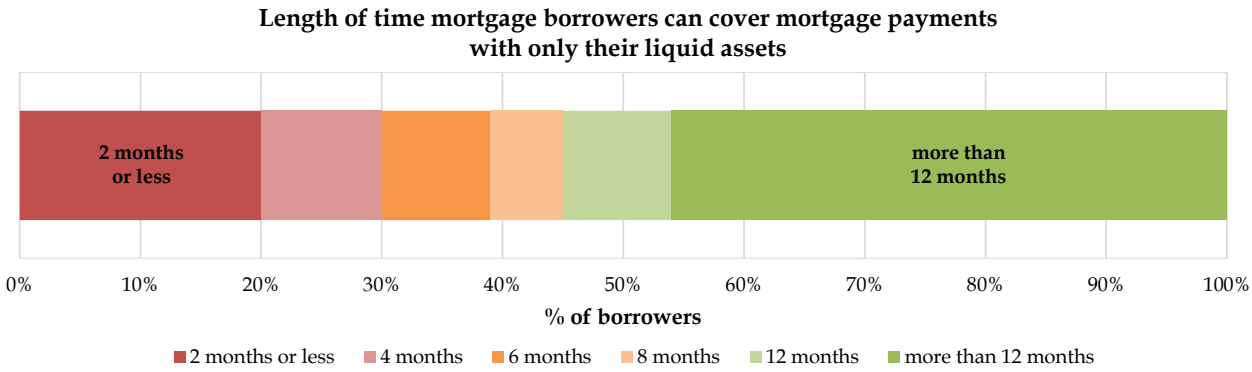
[64] On March 19, 2020, the OEB extended its winter ban on electricity disconnections for non-payment for residential customers to July 31, 2020. While the COVID-19 moratorium has since expired, the annual winter ban (for occupied residential properties) commences on November 15, 2020 and ends on April 30, 2021. (Sources: OEB. *Decision and Order (EB-2020-0109) Amending Electricity Distributor Licenses to Prohibit the Disconnection of Low-volume Consumers and Related Matters in light of the COVID-19 Pandemic.* March 19, 2020; OEB. *Rules for electricity utilities.*)

[65] On March 19, 2020, in its Order extending the winter disconnection moratorium (cited above), the Board encouraged distributors to "focus efforts on promoting solutions for customers that have arrears," including providing greater flexibility in payment terms, offering customers arrears payment arrangements ("APAs"), and increasing customer awareness of available support programs.

[66] Bank of Canada. *Household indebtedness risks in the wake of COVID-19.* June 2020.

pandemic could be at risk of defaulting once these deferred payments come due.[67] On the lower end, 5% of these borrowers defaulting would translate to a mortgage delinquency rate of around 0.9%; on the upper end, 20% of these borrowers defaulting would translate to a mortgage delinquency rate of 2.3%. The latter scenario is relatively less likely to materialize, as this rate is almost four times higher than any peak reached in Canada in the last three decades.[68]

**Figure 26. Household indebtedness in Canada**




Source: Bank of Canada. *Financial System Review – 2020.* May 14, 2020.

> *"What started as a cash flow problem could develop into a solvency issue for some businesses. This becomes more likely if the loss in revenues extends over a long period. Lingering concerns about COVID-19 could lower demand in some industries, damaging their earning capacity."*
>
> Bank of Canada. *Financial System Review – 2020.* May 14, 2020.

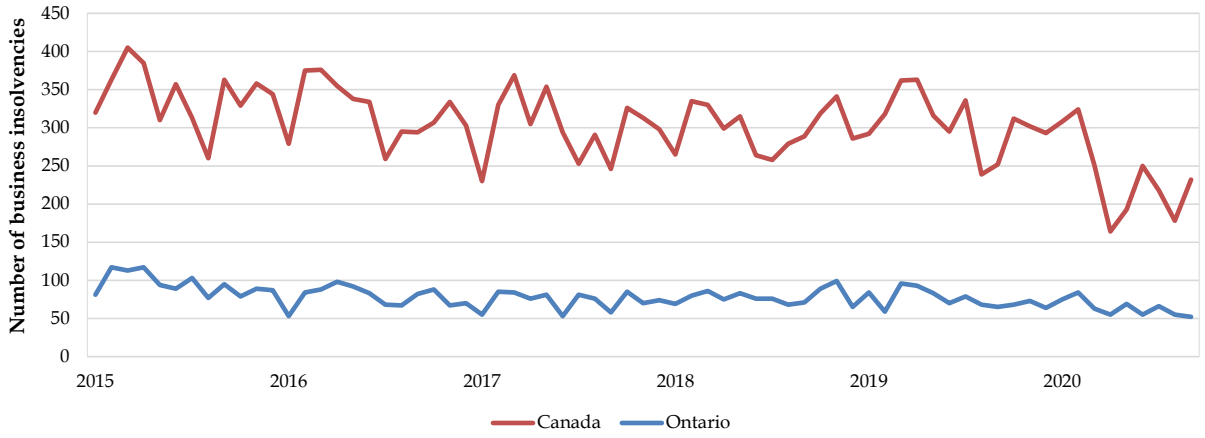
One method for assessing the effect of the pandemic on the financial position of businesses is to track changes in the number of insolvencies reported. In September 2020, business insolvencies were down 8% year-over-year across Canada, and down 20% year-over-year in Ontario (see Figure 27). While this seems to point to a relative resilience among Canadian businesses, this may instead be a reflection of the effect of deferral programs, which have eased pressure on businesses to make payments, and thus "helped to put off some bankruptcy filings."[69] As deferral programs come to an end, the effect of the pandemic on businesses' ability to pay may become more apparent through rising levels of business insolvencies.

[67] *See for example* The Globe and Mail. *How will the end of COVID-19 relief affect Canada's housing market? Here are the most likely scenarios.* September 2, 2020. *or* Financial Post. *Posthaste: Don't be alarmed but as much as 20% of Canadian mortgages are at a 'higher risk of defaulting.'* October 9, 2020.

[68] Ibid.

[69] CBC News. *Bankruptcies are down, but experts fear good news short-lived.* July 24, 2020.

**Figure 27. Business insolvencies, Ontario and Canada (January 2015 – September 2020)**




Source: Office of the Superintendency of Bankruptcy Canada. *Historic Insolvency Statistics – Monthly (from 1987).*

#### 4.2.1.2 Indicative range of potential utility losses

Amid projections for increasing mortgage delinquency rates in 2021, as well as already rising non-mortgage delinquency rates, arrearages could be expected to grow in the months to come. According to research conducted for the US National Energy Assistance Directors' Association among low-income customers, "utility bills tend to be deprioritized in times of financial hardship."[70] As deferred mortgage payments begin to come due, this suggests that utility non-payment may increase among cash-strapped households.

In the US, it is estimated that between 15% to 20% of "residential customers are at least 60 days behind on their electric and natural gas bills."[71] In Canada, results from TransUnion's October edition of its monthly survey suggests that 26% of households are concerned about their ability to pay their utility bills.[72] Notably, the report surveys 1,051 households which represent the general population on the dimensions of age, gender, household income, and region.

Although both of these estimates relate to arrearages as opposed to write-offs, we can develop an indicative range of potential losses for Ontario's electricity distributors by assessing the ratio of accounts that have been written off to those that are in arrears (i.e., accounts with payments that are 30 or more days past due). Using data for the 2013-2016 period, Ontario's electricity distributors reported an average write-off to arrears ratio of 0.26 (i.e., around 2 accounts written-off for every 10 accounts in arrears).[73] If household concerns regarding their inability to pay come to fruition, between 10% and 20% of residential accounts could end up in arrears as a result of the

[70] S&P Global. *Consumer advocates suggest forgiveness for unpayable utility-bill arrears.* August 11, 2020.

[71] National Energy Assistance Directors' Association. *Electric and Gas Residential Arrearages are Growing Rapidly.* October 1, 2020.

[72] TransUnion. *The COVID-19 Pandemic's Financial Impact on Canadian Consumers.* October 14, 2020.

[73] OEB. *Disconnection and late payment data by utility.* 2013-2016.

pandemic.[74] This would translate to a residential bad debt expense of between $54-108 million.[75] If we assume the same proportion of GS < 50 kW customers end up in arrears, this would bring the bad debt expense up to between $67-133 million.[76] Ultimately, an elevated level of bad debt expense under what can be considered a **high-case bad debt scenario** could impact the liquidity of Ontario's smaller utilities.[77]

[74] The upper bound of the range of residential accounts that could end up in arrears (20%) is based on an average of the estimates reported in the US (15-20%) and Canada (26%). The lower bound (10%) is provided for illustrative purposes and demonstrates a relatively more conservative estimate.

[75] Using average residential distribution revenue reported for the 2015-2019 period.

[76] Using average residential and GS < 50 kW distribution revenues reported for the 2015-2019 period. As mentioned previously in Section 4.2.1, commercial customers were already impacted by the initial lockdowns, while additional pressure and enhanced restrictions could lead to further impacts.

[77] S&P Global. *Can Canadian Regulated Utilities Sustain 2019 Improvements Amid COVID-19 And An Oil Price Slump?* June 11, 2020.

# 5 Long-term demand impact of COVID-19

The preceding sections have largely dealt with historical or short-term forward period impacts of the pandemic. In the longer-term, several demand patterns may emerge because of changing behaviour and consumption patterns stemming from the pandemic and the resulting economic crisis. To assess how these patterns may unfold in Ontario, we have considered a variety of approaches. First and as has been discussed previously, we have conducted a survey of distribution utilities in Ontario to obtain preliminary data on their expectations of future demand because of the pandemic – we note again that responses provided in this survey are meant to reflect preliminary indicative views and are not based on official analysis conducted by respondents. Second, we discuss the potential for a COVID-19 vaccine, and the prospect of community immunity levels resulting from accelerated development of candidate vaccines. Third, we develop an illustrative long-term impact model for Ontario that demonstrates the potential impact of permanent changes to customer behaviour. Finally, we consider the potential demand impact at an industry-by-industry level in Ontario, using publicly available data, showing regions and utilities that could be most impacted by this transition.

## 5.1 Survey of Ontario utilities

LEI's survey of Ontario electricity and natural gas distributors over the historical and short-term forward period was discussed in Section 2.2. Similarly, distribution utilities were also asked to provide their current thinking around what impact the COVID-19 pandemic could have on volumes delivered over the medium- to longer-term forward period, defined as the period between May 2022 and December 2025. Utilities were asked to assess this impact relative to weather-normalized expectations or alternative internal baselines that existed prior to the pandemic. Results for electricity distributors are illustrated in Figure 28 below on a simple average basis.

**Figure 28. Survey responses to demand impact in the medium- to longer-term period**

**Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on volumes delivered over the medium-term is expected to be:**

| Grouping | Average | Median | n |
|---|---|---|---|
| **Total volumes** | -1.7% | -1.0% | 6 |
| **Residential customer volumes** | 1.0% | 0.5% | 6 |
| **General Service <50 kW** | -5.0% | -4.5% | 6 |
| **General Service ≥50 kW** | -4.7% | -2.5% | 6 |
| **Large Use/Sub-Transmission** | -1.0% | -1.0% | 5 |

Based on survey responses, the potential impact that the pandemic could have on total volumes delivered over the medium- to longer-term could be a decline of around 1.7% (compared to prior expectations for the same period) for the electricity distribution sector. In the gas distribution sector, there was little to no change expected in total volumes over the medium- to longer-term.

At a class level among electricity distributors, the estimated impacts were: an increase of around 1% for residential customers; a decline of around 5% for GS <50 kW customers; a decline of around 4.7% for GS ≥50 kW customers; and a decline of around 1% for Large Use/Sub-Transmission customers. For the gas distribution sector, the estimated impacts were a decrease of 1% each for residential and commercial customers, and no change to industrial customers.

In general, respondents expressed difficulty in forecasting future demand impacts given the significant amounts of uncertainty associated with the overall impact of the COVID-19 pandemic on load. This included uncertainties around the length of the pandemic, the degree and extent of public health measures, the length of the economic recovery, and the extent of government assistance going forward.

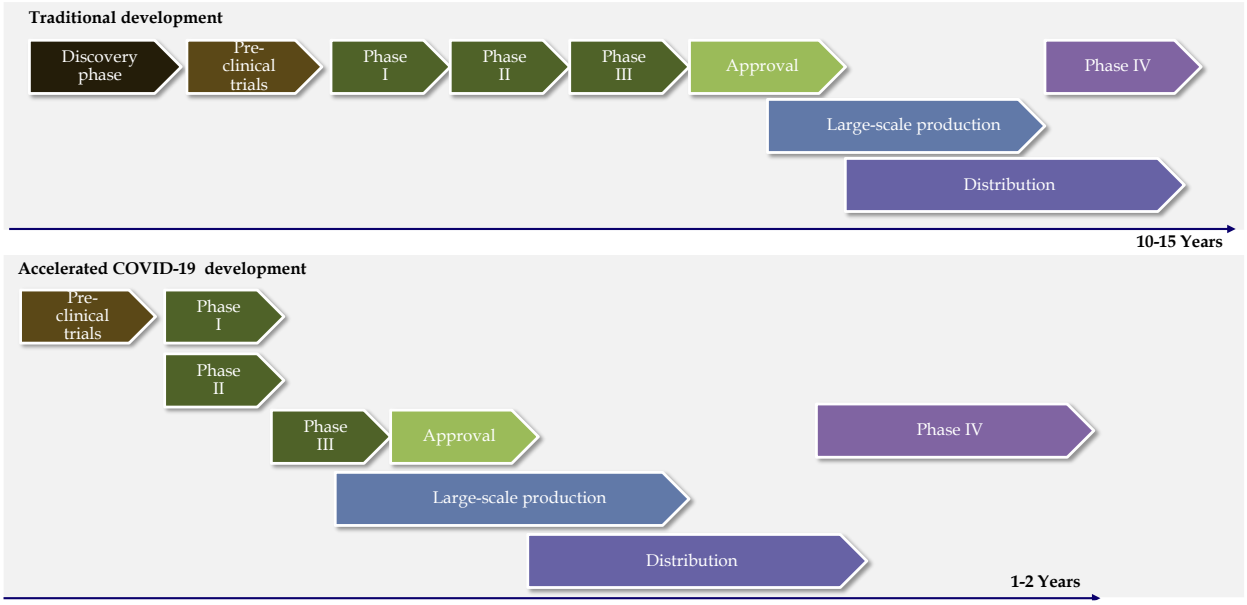
Related to this, the survey also asked respondents to opine on their expectations for when they anticipated weather-normalized load to recover to 2019 levels. The median view among seven electricity distributor respondents was 2022, with one utility suggesting as far as 2027 due to slower economic growth and conservation measures, and another expressing some uncertainty that load would ever fully recover. In the gas distribution sector, a return to 2019 levels for weather-normalized consumption was expected by 2021 among respondents.

## 5.2 Prospects for a COVID-19 vaccine

To develop a realistic timeline for a return to normalcy, it is useful to consider the timing for when a vaccine could become available. COVID-19 is caused by a novel coronavirus known as SARS-CoV-2, which emerged in late 2019. Vaccine development began as early as January 2020, when the genetic sequence of the virus was made publicly available for researchers to begin work. COVID-19 vaccine development has been undertaken at an extremely compressed timeline of less than two years, compared to the usual timeline of approximately ten to fifteen years.[78] To understand how this development has been accelerated, the key phases involved in vaccine development are discussed (see Figure 29).

[78] Krammer, Florian. "SARS-CoV-2 vaccines in development." *Nature* (2020): 1-16.

**Figure 29. Traditional versus accelerated COVID-19 vaccine development**




Adapted from: World Health Organization. *Coronavirus update 37: What we know about COVID-19 vaccine development.* October 6, 2020.

As shown in the graphic, vaccine development begins with a discovery phase, where the vaccine is designed and preclinical experiments are conducted, usually involving animal studies. Successful preclinical candidate vaccines will then file an application for an Investigational New Drug ("IND"), and then proceed to Phase I, II and III clinical trials.[79] Following clinical trials, a successful candidate will file a Biologics License Application ("BLA") and following regulatory review, a license is granted. At this point, large-scale production can begin, and the vaccine enters Phase IV, where long-term effects assessment and evaluation is performed, referred to as post-marketing surveillance.[80]

The accelerated development of the COVID-19 vaccine has been made possible due to a number of factors, notably: the initial discovery phase was omitted due to existing processes from prior studies and work involving the coronaviruses that cause Severe Acute Respiratory Syndrome ("SARS") and Middle Eastern Respiratory Syndrome ("MERS"); several Phases of the clinical trial running in parallel; and accelerated approvals for licenses.[81]

[79] Each phase entails trials on different human population groups, with Phase I conducted on healthy adults, Phase II involving population groups for whom the vaccine is intended, and Phase III involving thousands of volunteers. (Source: World Health Organization).

[80] Krammer, Florian. "SARS-CoV-2 vaccines in development." *Nature* (2020): 1-16. P.2.

[81] World Health Organization. *DRAFT landscape of COVID-19 candidate vaccines.* November 3, 2020.

The World Health Organization ("WHO") reports that historically, candidate vaccines that reach clinical trials usually have a 20% chance of succeeding and, as of October 2020, the agency was tracking forty-two candidate vaccines, of which ten were in Phase III clinical trials.[82]

In October 2020, Health Canada entered into an agreement with one of the developers of a candidate vaccine, AstraZeneca, to purchase 20 million doses, conditional on successful completion of clinical trials, for which the developer estimated a primary completion date of December 22, 2020.[83, 84] In the US, the federal government under Operation Warp Speed ("OWS") selected three candidate vaccines to fund for Phase III clinical trials: Moderna's mRNA-1273, the aforementioned University of Oxford/AstraZeneca's AZD1222, and Pfizer/BioNTech's BNT162.[85] The latter candidate vaccine developed by Pfizer and BioNTech concluded its Phase III clinical trial around mid-November, showing promising signs of success – it was found "*to be 95% effective against COVID-19 beginning 28 days after the first dose.*"[86] Around the same time, the candidate vaccine developed by Moderna also disclosed promising results from its Phase III trial, with the data from five patients who received the vaccine and were infected with SARS-CoV-2 showing "*a vaccine efficacy of 94.5%.*"[87]

In December 2020, the Public Health Agency of Canada's 'COVID-19 Immunization Plan' indicated that (pending regulatory authorization) immunization of priority populations could commence in that same month, with general immunization commencing in April 2021, and the immunization campaign reaching completion by the end of 2021.[88] As of December 10, 2020, the first such authorization was granted by Health Canada to the Pfizer/BioNTech vaccine for emergency use.[89] Following this, on December 11, 2020, the provincial government released its three-phase vaccination implementation plan; the first phase, which includes the vaccination of over 2,500 healthcare workers, is expected to begin on December 15, 2020.[90]

Even with earlier-than-anticipated vaccine development timelines, the logistics surrounding distribution and administration is anticipated to take several more months. Public health experts estimate that up to 60 to 70% of the population will need immunity, either from vaccination or

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[82] World Health Organization. *Coronavirus update 37: What we know about COVID-19 vaccine development.* October 6, 2020.

[83] Health Canada. *Health Canada begins first authorization review of a COVID-19 vaccine submission.* October 2, 2020.

[84] US National Library of Medicine. *A Phase III Randomized, Double-blind, Placebo-controlled Multicenter Study in Adults to Determine the Safety, Efficacy, and Immunogenicity of AZD1222, a Non-replicating ChAdOx1 Vector Vaccine, for the Prevention of COVID-19.* August 18, 2020.

[85] US Department of Health and Human Services. *Fact Sheet: Explaining Operation Warp Speed.* Accessed on November 3, 2020.

[86] Pfizer website. *Pfizer And BioNTech Conclude Phase 3 Study of COVID-19 Vaccine Candidate, Meeting All Primary Efficacy Endpoints.* November 18, 2020.

[87] Moderna website. *Moderna's COVID-19 Vaccine Candidate Meets its Primary Efficacy Endpoint in the First Interim Analysis of the Phase 3 COVE Study.* November 16, 2020.

[88] Public Health Agency of Canada. *Canada's COVID-19 Immunization Plan: Saving Lives and Livelihoods*. December 3, 2020.

[89] CBC News. *Ontario to begin vaccinations next week in Toronto, Ottawa*. December 10, 2020.

[90] Ontario Office of the Premier. *Ontario Begins Rollout of COVID-19 Vaccine*. December 11, 2020.

natural immunity following contraction of the coronavirus.[91] Many of the current vaccine candidates also require specialized conditions for storage and administration of multiple doses, which may increase logistical complexity and even present compliance issues. The Pfizer vaccine and the AstraZeneca candidate vaccine, for example, require two doses, administered within 28 days via an intramuscular injection.[92] In addition, these positive vaccine announcements may have the effect of creating false confidence, causing populations to reduce vigilance, resulting in higher spikes in successive waves of outbreaks.

In summary, while the COVID-19 vaccine development timeline has exceeded historical precedent in both scale and speed, current government plans still point towards the end of 2021 as the potential timeframe whereby most of the population could be vaccinated or inoculated. In the meantime, some restrictions in movement and economic activity will likely serve as the main tool to curb the spread of the virus during subsequent waves of infection. Although these timelines are rapidly changing, this provides some indication of when human activity may return to "normal," and thus an indication of when energy demand patterns would revert to pre-pandemic norms.

## 5.3 Assessing the long-term demand impact

Regardless of when a vaccine becomes available, some changes to power and natural gas demand prompted or accelerated by COVID-19 may become permanent. Given that these changes are partly driven by potential changes in the utilization of commercial space, they may not become fully evident until after the vaccine is available, as companies choose not to renew leases even if COVID-19 abates. In recent analysis of the long-term demand impact of COVID-19 in the US, the primary drivers of incremental changes in demand are expected to stem from changes in residential demand and shifts in consumption among commercial customers.[93] In Ontario, analyses by the Canada Energy Regulator ("CER") and the IESO suggest that the patterns observed in the US will also be mirrored in the province.[94, 95]

Some changes in consumer patterns observed during the COVID-19 pandemic are more likely than others to be permanent. Work-from-home arrangements are likely to persist among some employees, which may flatten load shapes, but also slightly increase residential load. More significant changes may be observed in commercial consumption patterns, as the shrinking of the retail sector accelerates, although this may be offset by an increase in warehouse and logistics space dedicated to online merchants and retailers. In this section, we will provide a background

[91] Global News. *COVID-19 vaccine remains months away but officials look to speed up approval process.* October 8, 2020.

[92] World Health Organization. *DRAFT landscape of COVID-19 candidate vaccines.* November 3, 2020.

[93] Goulding, AJ et al. *Potential Implications of the COVID-19 Crisis on Long-Term Electricity Demand in the United States.* October 2020. Columbia Center on Global Energy Policy.

[94] Canada Energy Regulator. *Market Snapshot: Ontario consumes less electricity since the beginning of the COVID-19 pandemic*. April 29, 2020.

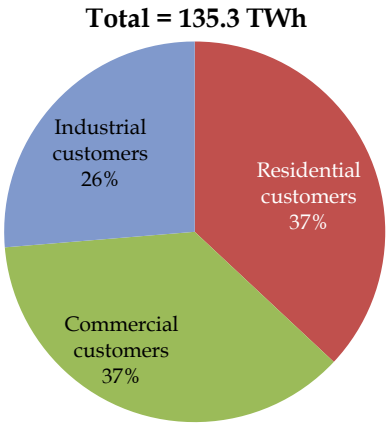
[95] IESO. *Reliability Outlook: An adequacy assessment of Ontario's electricity system From October 2020 To March 2022.* September 2020.

of publicly available data on electricity demand in Ontario, and design scenarios around the impact that COVID-19 may have on these segments.

### 5.3.1 Establishing a baseline for composition of load

Energy consumption is generally distinguished into three major customer types: residential, commercial, and industrial. Illustrative breakdowns of these customer types in Ontario are provided for electricity in Figure 30 (as measured by annual consumption), and for gas in Figure 31 (as measured by annual deliveries).

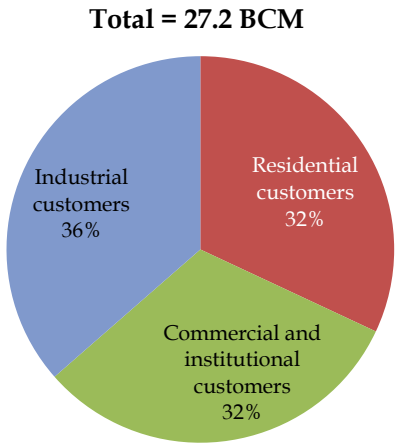
**Figure 30. Ontario electricity consumption by customer type**




Notes: Customer breakdowns based on 2020 (pre-pandemic) forecast, from the IESO's 2020 Annual Planning Outlook.

Source: IESO's 2020 *Annual Planning Outlook.* January 2020.

**Figure 31. Ontario natural gas deliveries by customer type**




Notes: Data shown is for 2019. 'Commercial and institutional customers' refers to natural gas sold to government institutions, public establishments, office buildings, as well as customers engaged in wholesale or retail trade.

Source: Statistics Canada. *Table 25-10-0059-01 Canadian monthly natural gas distribution, Canada, and provinces*.

To establish the potential impact of office workers opting to work from home, we referred to the results of the Statistics Canada business characteristics survey. As part of the survey, businesses were asked to report the proportion of their workforce expected to continue to telework or work remotely once the COVID-19 pandemic is over. We present the results of the survey for Ontario in Figure 32 below.

**Figure 32. Proportion of workers expected to work from home at the end of the pandemic**

| Workforce expected to continue to telework or work remotely once the COVID-19 pandemic is over | | | |
|---|---|---|---|
| *(%)* | **Canada (all provinces)** | **Ontario** | **Professional, scientific and technical services** |
| 0% to less than 1% | 66.5 | 66.2 | 37.1 |
| 1% to less than 10% | 4 | 2.7 | 3 |
| 10% to less than 20% | 3.6 | 2.4 | 3.7 |
| 20% to less than 30% | 3.5 | 2.6 | 4 |
| 30% to less than 40% | 0.9 | 0.4 | 1.3 |
| 40% to less than 50% | 1 | 0.8 | 1.5 |
| 50% to less than 60% | 3.2 | 2.4 | 7.7 |
| 60% to less than 70% | 0.6 | 0.7 | 0.1 |
| 70% to less than 80% | 1.6 | 2.9 | 6.8 |
| 80% to less than 90% | 0.6 | 0.3 | 1.3 |
| 90% to less than 100% | 1.3 | 2 | 1.6 |
| Percentage range, 100% | 6.2 | 7.5 | 16.5 |
| Unknown | 7.1 | 9.1 | 15.3 |

Source: Statistics Canada. *Table 33-10-0247-01 Percentage of workforce teleworking or working remotely, and percentage of workforce expected to continue teleworking or working remotely after the pandemic, by business characteristic.*

Within the commercial customer classes, we consider how changes in commercial space utilization might impact load in the long run. Natural Resources Canada ("NRCan") provides data on the total square footage and energy intensity for commercial and institutional buildings in Canada, as part of its Survey of Commercial and Institutional Energy Use ("SCIEU").[96] In the most recent survey completed in 2015, there are estimates for nine building types: office, medical office, nursing care facility, warehouse, elementary/secondary school, hotel/motel, hospital,

[96] Natural Resources Canada. *Survey of Commercial and Institutional Energy Use (SCIEU) - Buildings 2014.* December 2015.

food/beverage store and non-food retail. The study estimates that there are 803 million square metres of commercial and institutional floor space in Canada, whereby Ontario accounts for 42.9%, or 345 million square feet.

Using the SCIEU as our foundation, we see that, of the nine main building types, offices represent approximately 20% of all buildings, but 35% of all square footage and energy usage. The retail sector, comprising food and beverage stores, and non-food retail, account for 13.5% of the floor area and 15% of energy usage. We note that "energy usage" comprises both electricity and natural gas use, which the SCIEU identifies. This is summarized in Figure 33 below, with the retail, office, and hotel sectors highlighted, as we believe those will be the most affected sectors in the long run.

**Figure 33. Commercial and institutional building types and energy intensity**

| Primary activity | Number of buildings | Floor space (millions of $m^2$) | Energy use (PJ) | Energy intensity ($GJ/m^2$) | Electricity/ natural gas split |
|---|---|---|---|---|---|
| **Office buildings (non-medical)** | 97,029 | 281.2 | 317.6 | 1.13 | 63/37 |
| **Medical office buildings** | 15,928 | 15.6 | 20.1 | 1.28 | 58/42 |
| **Elementary and/or secondary schools** | 17,501 | 70.8 | 62.2 | 0.88 | 40/60 |
| **Assisted daily/residential care facilities** | 11,391 | 19.9 | 25.8 | 1.30 | 49/51 |
| **Warehouses** | 62,105 | 93.4 | 76.1 | 0.82 | 43/57 |
| **Hotels, motels or lodges** | 12,714 | 17.8 | 22.1 | 1.24 | 47/53 |
| **Hospitals** | 798 | 15.4 | 37.7 | 2.45 | 40/60 |
| **Food and beverage stores** | 19,386 | 22.5 | 42.1 | 1.87 | 72/28 |
| **Non-food retail stores** | 61,672 | 85.9 | 95.9 | 1.12 | 54/46 |
| **Other activity or function*** | 183,880 | 180.5 | 215.6 | 1.19 | 46/54 |
| **Total (Canada)** | **482,402** | **803.1** | **915.2** | **1.14** | **53/47** |
| ***Ontario*** | ***35.6%*** | ***42.9%*** | ***41.6%*** | | |

Notes: PJ refers to petajoules; GJ refers to gigajoules; NRCan describes "Other activity or function" as all other commercial/institutional buildings.

Source: Natural Resources Canada. *Survey of Commercial and Institutional Energy Use (SCIEU) - Buildings 2014.* December 2015.

With respect to the retail sector, we anticipate that COVID-19 will accelerate trends that had already been taking place in the sector prior to the pandemic's onset. Statistics Canada survey data shows that e-commerce sales have gradually risen as a proportion of total sales, from 2.4%

in 2016 to 4.0% in 2019.[97] The Canadian retail sector has also seen a number of high profile closures between 2019 and 2020 in a variety of segments, including large brands such as Forever 21, which closed 44 locations, Lowe's (34 locations), and smaller brands such as Frank and Oak, David's Tea, Aldo Shoes, Reitmans and Le Chateau.[98] Industry data also shows a decline in new supply in Canada, with a year-over-year decline of over 42% between 2018 and 2019. It is likely that supply in 2020 will fall below estimates. These declines in supply suggest that combined with an anticipated decline in retail sales growth of 18.9% at the height of the pandemic, a long-term decline in the gross leasable area ("GLA") per capita can be expected.[99] In addition, Canada ranks only below the United States in GLA per capita, suggesting that retail space could fall even further. In our scenario design, we use these international comparisons as inputs, as shown in Figure 34 below.

**Figure 34. Comparison of Gross Leasable Area per capita**

| Country | Gross Leasable Area ("GLA") per capita |
|---|---|
| United States | 23.14 |
| Canada | 16.79 |
| Australia | 11.41 |
| Singapore | 5.81 |
| United Kingdom | 4.63 |
| France | 4.31 |

Note: GLA is a standard measure used in retail to indicate the floor area exclusively used by a retail occupant/tenant.

Sources: Retail Council of Canada. Colliers International. ICSC Research.

As retail stores transition to e-commerce, warehouses and logistics may expand to serve additional e-commerce demand. However, as seen in Figure 33 above, given the relatively low energy intensity, growth in logistics may not have a significant impact on load, and load forecasts may already have factored in the potential growth from logistics.

Offices represent the other area where a transition may be observed. In particular, large office markets in Ontario have historically had among the lowest vacancy rates in the country. Recent data from CBRE shows regions like Toronto, Ottawa, and the Waterloo region with vacancy rates of 8.4%, 8.0%, and 6.9%, respectively compared to the national average of 12%.[100] In addition, offices may require retooling to enforce physical distancing requirements – it is estimated that in 2017, North American offices averaged approximately 150 square feet per worker, which is a

[97] Statistics Canada. *Retail e-commerce and COVID-19: How online shopping opened doors while many were closing*. July 2020.

[98] Retail Insider. *Wave of Store Closures to Hit Canada in the Summer of 2020.* July 8, 2020.

[99] CBRE Research. *Canada Retail Report.* Fall 2020.

[100] CBRE. *Canada Q3 2020. Quarterly Statistics. Canada Office and Industrial.* September 28, 2020.

reduction from 225 square feet per worker in 2010.[101] Recent research shows that at least an extra 20 to 40 square feet may need to be added to each open-plan desk to meet physical distancing requirements.[102] Given the expectation that COVID-19 may not be the last global pandemic, perceptions of required minimum space may not fall when the current pandemic ends. We note in our scenarios that any increase in office space may be offset by a transition of workers to permanently working from home.

The third sector that we focus on is the hospitality sector, which has been among the hardest hit by restrictions to movement. However, the long-term effect may be muted, as we anticipate that the tourism sector will rebound in the long run, driven by increased domestic travel, and as the population approaches higher levels of immunity. Industry analysis suggest that the short-term impact will not amount to a long-term permanent change, and by 2023, occupancy rates, average daily rates, and revenues per available room are anticipated to recover to 2019 rates.[103] This is shown in Figure 35 below.

**Figure 35. Historical and forecasted hotel occupancy rates**

| Year | Occupancy rate |
|---|---|
| 2019 | 65.1% |
| 2020 (forecast) | 38.2% |
| 2021 (forecast) | 57.0% |
| 2022 (forecast) | 63.5% |
| 2023 (forecast) | 65.1% |
| 2024 (forecast) | 65.1% |
| 2025 (forecast) | 65.1% |

Source: CBRE. *CBRE Hotels Canada. Q1 2020 update. The impacts of COVID-19*. May 2020.

However, physical distancing requirements may lead to a decline in the energy intensity of hotels as, among other amenities, demand for exercise facilities and conference/meeting spaces may decline. Analysis in the hospitality industry indicates that in the long run, hotel layouts and amenities may need to change to minimize contact, including implementing contactless check-in processes, removing buffet-style dining, replacing gyms with in-room exercise offerings, or creating conference/meeting spaces that open up to the outdoors.[104] There are also opportunities for energy efficiency investments, as managers seek opportunities for savings – researchers in the

[101] "*What is the average square footage of office space per person*?" The Mehigan Company, Inc. Web. March 2016.

[102] Baird-Remba, R. Designing Offices, Restaurants and Grocery Stores in the Age of Coronavirus. Commercial Observer website. April 18, 2020.

[103] CBRE. *CBRE Hotels Canada. Q1 2020 update. The impacts of COVID-19*. May 2020.

[104] "This is the future of hotel design after coronavirus, according to hospitality architects". Alesandra Dubin for Business Insider. Web. June 14, 2020.

US demonstrated that for medium-sized hotels, low-cost upgrades and no-cost behaviour changes can realize savings of between 8% to 25%.[105]

In summary, we anticipate that the impact of COVID-19 on commercial load will mostly accelerate existing trends in the commercial sector in Ontario, such as declining physical retail stores and a transition to e-commerce. However, the low vacancy rates observed in major office hubs and population centres are likely to be reversed, as more employees opt to permanently remain remote or relocate to suburban areas.

In the subsequent section, we demonstrate an approach to quantify the potential impact of these demand patterns on electricity and natural gas usage on an illustrative basis.

### 5.3.2 Estimating potential impact of shifting demand patterns

To quantify the potential demand impact, we have created a COVID-19 Load Reduction Model to show how Ontario's demand patterns may permanently change going forward. We explore two cases – a moderate and high impact case – based on permanent transitions to working from home and impacts to energy consumption in offices, retail, and hospitality.

#### 5.3.2.1 Moderate impact case

The following assumptions are used in this modeling exercise:

- 15.6% of office workers transition to working from home permanently;[106]
- According to the IESO, the observed increase in residential load during the first round of closures due to the pandemic in Ontario was between 1% to 8% compared to pre-COVID levels, and 1% to 14% compared to pre-COVID levels during the second closures. We assume an average increase of 8%, with the proportion of that increase which persists assumed to be consistent with the proportion of workers who remain working from home;[107]
- Demand for office space changes consistent with the proportion of workers remaining at home, as calculated above, adjusted for increases in the amount of space allocated per employee for social distancing. Office space per employee for those remaining in traditional office settings increases by 10%;[108]

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[105] Dong, Bing, et al. *Quantifying Behavior Driven Energy Savings for Hotels*. No. PNNL-SA-120385. Pacific Northwest National Lab.(PNNL), Richland, WA (United States), 2016.

[106] Based on the weighted average of the Ontario-specific results of the StatsCan survey to the question "Workforce expected to continue to telework or work remotely once the COVID-19 pandemic is over?" (Source: Statistics Canada. Table 33-10-0247-01 *Percentage of workforce teleworking or working remotely, and percentage of workforce expected to continue teleworking or working remotely after the pandemic, by business characteristics*).

[107] Based on IESO data. (Source: IESO. Forecasting and Planning Update. July 6, 2020).

[108] The calculation assumes 30 additional square feet per employee is added by some employers to enforce social distancing, somewhat less than designers recommend. This increase in space is assumed to apply to 50% of office spaces, as existing offices that are less concentrated may be reconfigured to accommodate social

- Retail space per capita falls 18.9%, based on expected long-term declines due to bankruptcies and declining new supply;[109]
- Little to no growth in warehousing and logistics space linked to COVID-19 takes place, as the stores that are assumed to close are already served by warehousing and logistics, which are reoriented to direct shipping;[110]
- Energy consumption per square foot by type of commercial space remains unchanged;
- Load from the industrial sector, as well as hospitality sector (hotels and restaurants), reverts to pre-pandemic levels; and
- 2019 consumption (according to the OEB Yearbook) is used as a baseline.

The long-term impact for electricity and natural gas consumption are then as follows:[111]

- Residential consumption can be expected to increase by 4.6% for electricity, and 1.8% for natural gas relative to pre-pandemic levels, or 1.8 TWh and 161 million cubic metres ("MCM"), driven by permanent changes in workforce habits;
- Load from office buildings is expected to decrease by 6.5% as reductions in employees working from offices is significant enough such that it is not offset by increases in square footage allotted to the remaining employees, leading to a decrease of 1.5 TWh and 86 MCM;
- Load from retail stores falls by 2.2 TWh and 118 MCM; and
- The combined impact of these changes is a reduction of 1.5 TWh, or the equivalent of 257 MW of capacity at a 65% capacity factor.[112] This is in addition to the impact of energy efficiency and other measures already incorporated into existing forecasts by the IESO. For natural gas, it translates to a reduction of 43 MCM.

#### 5.3.2.2 High impact case

The high impact case generally mirrors the moderate case, but with some additional assumptions applied as follows:

distancing without needing additional area. As such, the current average would increase from 150 square feet per employee to 165 square feet per employee, an increase of 10%. Source: *Baird-Remba, R. Designing Offices, Restaurants and Grocery Stores in the Age of Coronavirus*. Commercial Observer. April 18, 2020.

[109] CBRE Research. *Canada Retail Report. Fall 2020.* October 2020.

[110] It is estimated that for each additional $1 billion of annual incremental online sales, 1.25 million square feet of logistics space is needed. Source: Egan, D. CBRE Research. *How has e-commerce shaped industrial real estate demand?* 2018.

[111] Detailed calculations are illustrated in Appendix B.

[112] New combined cycle gas turbine plants built between 2015 and 2019 which reported data to the US Energy Information Administration averaged an annual capacity factor of 61% in 2019. (Source: S&P Global Market Intelligence). This is much higher than average capacity factors for gas-fired generation resources in Ontario.

- 31.5% of office workers transition to working from home permanently, derived from a weighted average of the "Professional, scientific and technical services" segment of the workforce who anticipate working from home. In this case employers do not make any adjustments to the amount of square footage allotted per remaining employee;
- As a result of a larger proportion of workers remaining at home, and assuming no physical distancing measures, office space needs and load fall consistent with the percent of office workers working from home;
- Retail space per capita falls by 32% from current levels, to the level of Australia, which is 11% lower than the level assumed in the moderate impact case;[113]
- In the hospitality sector, the energy intensity in hotels, motels, and lodges decreases by 15%, as operators seek efficiency gains to reduce their operating costs; and
- 2019 consumption is used as a baseline as well.

The long-term impact drivers are then as follows:

- Residential electric load is higher than the moderate impact case, increasing by 9.2%, or 3.7 TWh, with natural gas consumption increasing by 3.7%, or 326 MCM;
- Load from office buildings is expected to decrease by 7.3 TWh and 414 MCM, a significantly greater decline than the moderate impact case;
- Load from retail stores falls by 3 TWh and 200 MCM, driven by a 32% decline in retail space;
- Load from hotels, motels and lodges decreases by 200 GWh and 20 MCM; and
- The combined impact of these changes is a reduction in load of 6.8 TWh, or the equivalent of 1.2 GW of capacity at a 65% capacity factor. For natural gas, the reduction in consumption is 308 MCM, or equivalent to a reduction of 1.2% below 2019 consumption.

Regional differences are likely to be observed in the impact of these changes to load. It is likely that the variation will be driven by the contribution of commercial buildings to load within each service territory. Utilities with large retail and office square footage will see greater impacts than utilities with larger residential proportions of load.

A summary of the results for each case by segment is illustrated below, for electricity and natural gas consumption.

[113] Shopping Centre Council of Australia. *Key facts*. October 2019.

**Figure 36. Summary of long-term demand impact drivers – electricity**

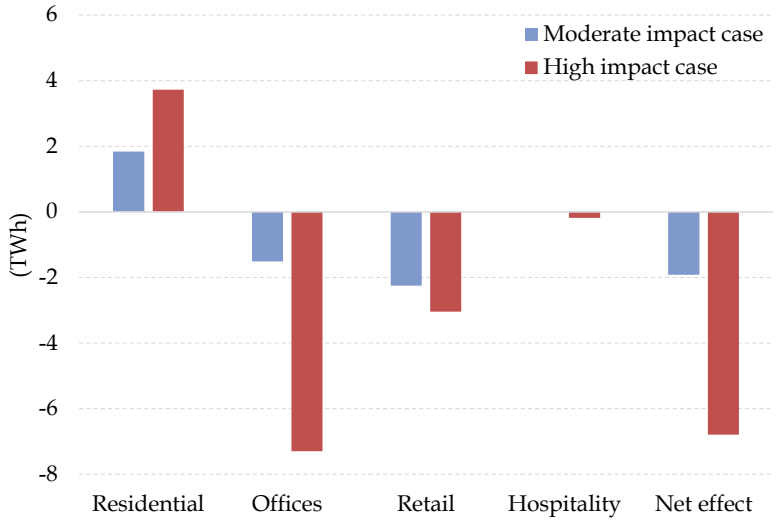
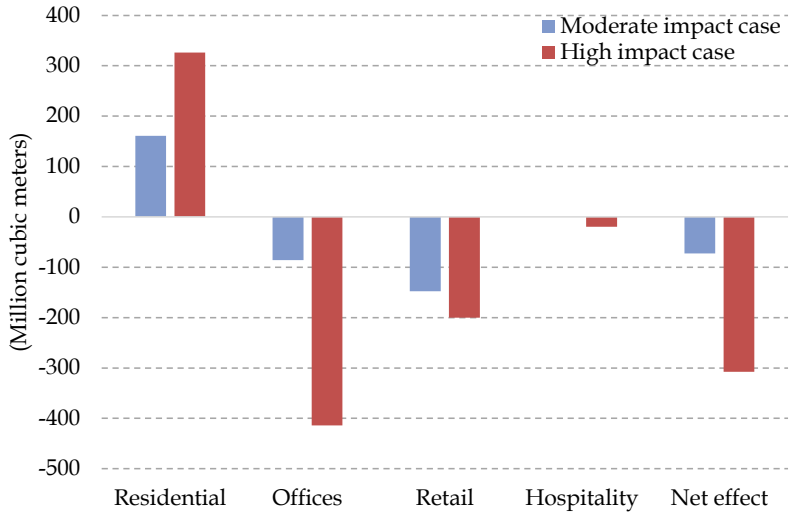



**Figure 37. Summary of long-term demand impact drivers – natural gas**




Source: LEI analysis

The results shown above can be compared to the surveyed medium-term demand impact as reported by electric and gas utilities in Section 5.1 above. Compared with 2019 delivered energy, the moderate case represents a 1.1% decline for electricity and a 0.2% decline for gas, while the high impact case is a 5% decline for electricity and 1.2% decline for gas. The moderate case is consistent with the expectations for the impact of COVID-19 in the medium-term, where electricity respondents expected an average decline of 1.7%, and median decline of 1%. The same is true for gas, where the sector anticipated little to no change in the medium term. The high impact case for electricity is consistent with the average decline anticipated among some non-residential customer groups, notably General Service <50 kW and General Service ≥50 kW of 5% and 4.7%, respectively. For gas, the high impact case is consistent with the expectation of a 1% decline in the medium term for commercial customers.

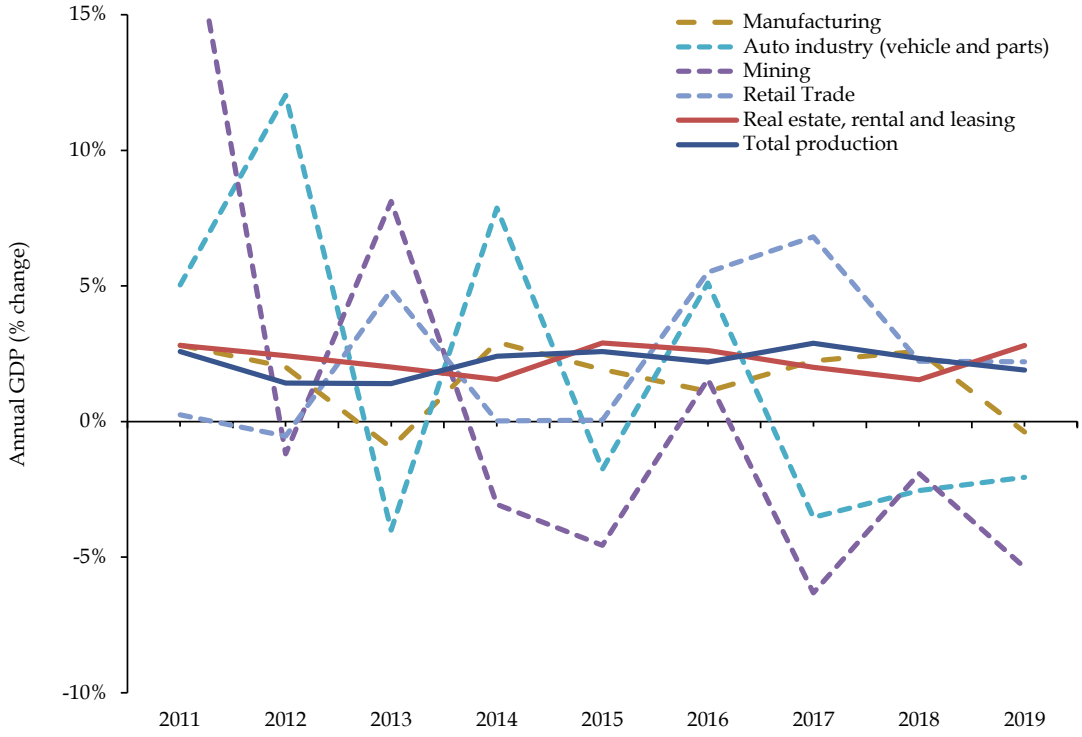
Next, we consider the demand impact on a subregional and industry-by-industry level.

## 5.4 Industry impact analysis

Ontario entered a recession in the second quarter of 2020, with output declining 12% compared to the previous quarter, but not all industries exhibited steep declines. The Province's economic accounts show that output in the electric power and finance and insurance industries declined by around 1% relative to the previous quarter, while output in the 'arts, entertainment and recreation', as well as the 'accommodation and food' industries both had quarterly declines of over 50%.[114]

Some industries were already lagging provincial growth prior to the pandemic, notably manufacturing and mining industries. Figure 38 below shows GDP growth in Ontario, and selected industries that were overperforming (real estate and retail trade) and underperforming (auto industry manufacturing, and mining) relative to provincial growth.

**Figure 38. GDP growth in Ontario and selected industries (2011-2019)**




Source: Ministry of Finance. Ontario economic accounts.

Assessing historical performance of an industry against the impact of economic restrictions and other lockdown measures taken to curb the spread of COVID-19 on output and load provides an indicative view of industries most sensitive to future lockdowns. For this analysis, we rely on the

[114] Ontario Ministry of Finance. *Ontario Economic Accounts: 2020 Q2.* Queen's Printer for Ontario, 2020.

IESO's industry demand data by sector, noting that not all sectors contained in the Economic Accounts are measured by IESO industry sectors.[115] Factoring in these limitations, we can estimate industries most sensitive to shutdowns, as per the following framework: an industry that experienced a decline in both load and output of over 10% is considered highly sensitive, a decline of 10% in at least one metric is moderately sensitive, and both metrics below 10% is least sensitive. This illustrative analysis is summarized in Figure 39 below.

**Figure 39. Industry shutdown sensitivity ranking**

| Industry | Load change (Q2 year-over-year) | GDP change (Q2 year-over-year) | Historical GDP change (5-Year CAGR) | Shutdown sensitivity ranking (1-3) |
|---|---|---|---|---|
| Iron & Steel Mills & Ferro - Alloy Manufacturing | -22.9% | -30.2% | 1.2% | 1 |
| Metal Ore Mining | -6.7% | -26.8% | -2.9% | 2 |
| Motor Vehicle Manufacturing | -49.6% | -65.7% | -0.7% | 1 |
| Petroleum & Coal Products Manufacturing | -17.2% | -8.3% | 2.4% | 2 |
| Pulp, Paper & Paperboard Mills | -13.6% | -18.3% | -0.5% | 1 |
| Manufacturing | -6.2% | -26.1% | 1.4% | 2 |
| Ontario-wide | - | -13.3% | 2.4% | |

Notes: 1 = highest sensitivity; 2 = moderate sensitivity; 3 = least sensitive; IESO classifications of NAICS code do not consider all types of activities at the site or facility, and the dataset is based on the general nature of the entity's business.

Source: IESO. *Industrial Load by Sector Report.* 2020; Ministry of Finance. *Ontario Economic Accounts: 2020 Q2.*

An evaluation of the rankings suggests that all industries for which the IESO provides load data have at least a moderate sensitivity to shutdowns, with 'motor vehicle manufacturing', 'iron and steel mills manufacturing', and 'pulp, paper and paperboard mills' ranked as most sensitive.

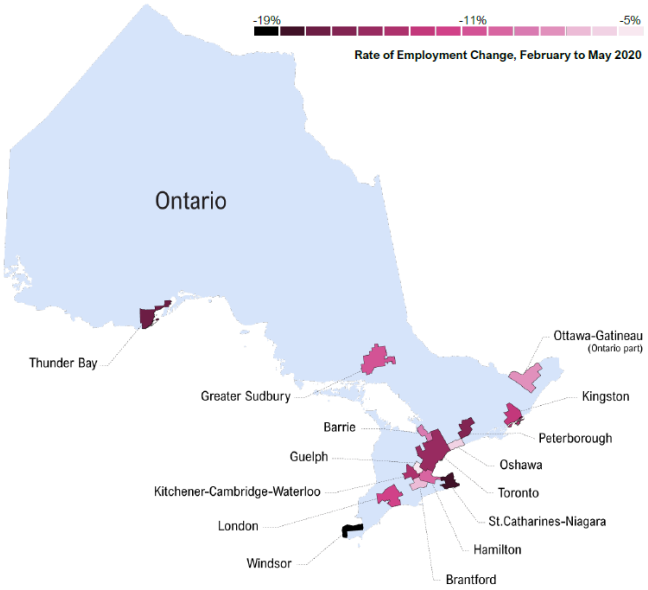
In addition to province-wide analysis, we also consider the potential demand impact on large population centres, or Census Metropolitan Areas ("CMAs").[116] Although GDP data is not available at the CMA-level, employment data can be used as a proxy to gauge the economic

[115] Specifically, the IESO indicates that the reporting is based on a "*general application of the North American Industry Classification System (NAICS)*". (Source: IESO. *Industrial Load by Sector Report.* 2020)

[116] Consistent with Statistics Canada definitions, a CMA is defined as a large population centre together with adjacent fringe and rural areas that have a high degree of social and economic integration with the centres. A CMA must have a population of at least 100,000. (Source: Statistics Canada. Labour Force Survey. June 2020).

impact of COVID-19 on local regions in Ontario. In May, following the peak of the lockdown measures, Ontario's unemployment rate rose to 10.8%, compared to 5.3% before the pandemic.[117] This unemployment rate was more severe in some regions, with Windsor and St. Catharines-Niagara experiencing large increases in unemployment rates, rising to 16.7% and 12.6%, respectively. Conversely, Ottawa-Gatineau was less affected, with unemployment rising to 7.7%. The largest CMA, Toronto, which includes the Greater Toronto Area, accounted for over half of the absolute job losses, and its unemployment rate rose to 11.2% during the survey period. Figure 40 below illustrates the regional impact.

**Figure 40. Regional impact of COVID-19 on unemployment rates**




Sources: Financial Accountability Office of Ontario. *Ontario's Regional Labour Markets During the COVID-19 Pandemic.* June 23, 2020.

Within each CMA, employment losses were unevenly distributed by industry, as regional concentration of industries more sensitive to lockdowns magnified the economic impact of the pandemic. For example, in Ottawa-Gatineau, the unemployment rate increased by the least amount, relative to the rest of the Province, rising from 4.2% before the pandemic, to 7.7% in May, buttressed by the prevalence of the public administration sector.[118] By contrast, Kitchener-Cambridge-Waterloo experienced a sharp rise from 5.5% to 10.3% unemployment, driven by declines in educational services, as well as transportation and logistics.[119]

[117] Source: Financial Accountability Office of Ontario. *Ontario's Regional Labour Markets During the COVID-19 Pandemic.* June 23, 2020. Note this data for Ontario is based on the three-month moving average over the March to May timeframe. Using Statistics Canada data on 'Labour force characteristics by province, monthly, seasonally adjusted', Ontario's unemployment rate in May was 13.6%.

[118] Financial Accountability Office of Ontario. *Ontario's Regional Labour Markets During COVID-19 Pandemic.* June 2020.

[119] Ibid. P.5

For local distribution utilities, the demand impact is closely tied to economic outcomes of the industries within its service territory. Ontario's LDCs vary widely in the composition of their load, split mainly between residential, commercial, and industrial load. To show the potential risk of an LDC's load to lockdown, we have created an illustrative COVID-19 sensitivity scorecard.

The scorecard considers the top 3 industries within the CMA, the utility(ies) that serve the region, and the proportion of non-residential load served by the utility to account for commercial real estate. Based on the observed impact to employment and industry shutdown sensitivity ranking from Figure 39 above, we can assess the regional economic risk of future shutdowns. In addition, utilities with a very high proportion of non-residential load are least likely to see large gains in load growth driven by increased work-from-home arrangements. These considerations form the basis of the rubric against which a score is assigned to utilities – the rubric is summarized in Figure 41 below. Note this scorecard is not intended to be prescriptive, but rather to provide a framework for utilities to assess lockdown risk using publicly available data.[120]

**Figure 41. Utility sensitivity scorecard rubric**

| Illustrative COVID-19 sensitivity score | Top 3 employing industries includes at least one of | Industry lockdown sensitivity | Unemployment rate (%) | Proportion of non-residential load (%) |
|---|---|---|---|---|
| A | ▪ Utilities<br>▪ Finance, insurance, real estate, rental and leasing<br>▪ Public administration | 3 | >8% ≤ 9% | >65% |
| B | ▪ Finance, insurance, real estate, rental and leasing<br>▪ Public administration<br>▪ Transportation and warehousing<br>▪ Professional, scientific and technical services | 2 | >9% ≤10% | >70% |
| C | ▪ Transportation and warehousing<br>▪ Educational services<br>▪ Health care and social assistance | 2 | >10% ≤11.5% | >70% |
| D | ▪ Wholesale and retail trade<br>▪ Accommodation and food services<br>▪ Manufacturing | 1 | >11.5% ≤15% | >75% |
| E | ▪ Wholesale and retail trade<br>▪ Accommodation and food services<br>▪ Manufacturing | 1 | >15% | >80% |

Sources: LEI analysis

[120] In addition, we acknowledge that CMAs as defined by Statistics Canada may not correspond precisely with the utility's service territory.

The results of the analysis are summarized in Figure 42 below. The scorecard shows a selection of 23 LDCs that are represented within the 15 CMAs.[121] Most score between B and C – high ranking utilities are in CMAs with few lockdown-sensitive industries, lower unemployment rates, and a lower proportion of non-residential load. Conversely, low scoring utilities are in CMAs with lockdown-sensitive industries, higher unemployment rates, and a high proportion of non-residential load.

A low score should be interpreted as an increased risk that severe economic restrictions from subsequent waves of COVID-19 will have an impact on demand, while a high score suggests a more resilient load profile. This does not mean that subsequent lockdowns will result in meaningful lost load, or bad debts, but provides a framework for utilities to assess whether those outcomes are more likely.

Although this is a high-level approach, additional metrics could be used to refine the scorecard for each utility and respective region. For instance, availability of GDP data for each CMA could be used to better calibrate the sensitivity of the region to lockdowns. This could also be cross-referenced against industrial-level GDP from the economic accounts to establish whether the industries' performance leads or lags the regional performance to predict the potential impact of a future lockdown. Another useful metric would be a breakdown of the utilities' non-residential load, which could provide a better understanding on the load at risk, depending on the economic activities of the region.

As the intention of the analysis is to provide a framework for thinking about load at risk, the results provide an indication of which regions or entities within certain regions may require increased attention should the pandemic continue longer, or if subsequent waves of infections warrant more severe restrictions to economic activity.

[121] LDCs included in the CMAs are a non-exhaustive selection. Hydro One's distribution service area is not included.

## Figure 42. COVID-19 sensitivity scorecard

| CMA | Top three industries by employment | Industry lockdown sensitivity | Unemployment rate (May 2020, %) | LDC service territory(ies) | Proportion of non-residential load | COVID-19 sensitivity score |
|---|---|---|---|---|---|---|
| Ottawa-Gatineau | ▪ Public administration<br>▪ Professional, scientific and technical services<br>▪ Wholesale and retail trade | 3 | 7.7% | Hydro Ottawa | 69% | A |
| Kingston | ▪ Health care and social assistance<br>▪ Wholesale and retail trade<br>▪ Educational service | 2 | 10.8% | Kingston Hydro | 73% | C |
| Peterborough | ▪ Health care and social assistance<br>▪ Wholesale and retail trade<br>▪ Construction | 2 | 9.5% | Peterborough Distribution | 62% | B |
| Oshawa | ▪ Wholesale and retail trade<br>▪ Health care and social assistance<br>▪ Construction | 2 | 10.1% | ▪ Oshawa PUC<br>▪ Elexicon | 54% | B |
| Toronto | ▪ Wholesale and retail trade<br>▪ Professional, scientific and technical services<br>▪ Finance, insurance, real estate | 2 | 11.2% | ▪ Alectra<br>▪ Burlington Hydro<br>▪ Oakville Hydro<br>▪ Milton Hydro<br>▪ Toronto Hydro<br>▪ Halton Hills Hydro | 79% | C |
| Hamilton | ▪ Wholesale and retail trade<br>▪ Health care and social assistance<br>▪ Manufacturing | 2 | 10.3% | Alectra | 72% | C |
| St. Catharines-Niagara | ▪ Wholesale and retail trade<br>▪ Health care and social assistance<br>▪ Accommodation and food services | 1 | 12.6% | ▪ Niagara-on-the-Lake<br>▪ Niagara Peninsula Energy<br>▪ Canadian Niagara Power<br>▪ Alectra | 64% | C |
| Kitchener-Cambridge-Waterloo | ▪ Manufacturing<br>▪ Wholesale and retail trade<br>▪ Health care and social assistance | 1 | 10.3% | ▪ Kitchener Wilmot<br>▪ Waterloo North<br>▪ Energy+ | ▪ 62%<br>▪ 71%<br>▪ 70% | C |
| Brantford | ▪ Manufacturing<br>▪ Health care and social assistance<br>▪ Wholesale and retail trade | 1 | 11.3% | Brantford Power | 69% | D |
| Guelph | ▪ Manufacturing<br>▪ Wholesale and retail trade<br>▪ Educational services | 2 | 12.9% | Alectra | 72% | C |
| London | ▪ Health care and social assistance<br>▪ Wholesale and retail trade<br>▪ Manufacturing | 2 | 11.7% | London Hydro | 65% | C |
| Windsor | ▪ Manufacturing<br>▪ Health care and social assistance<br>▪ Wholesale and retail trade | 1 | 16.7% | ▪ ENWIN Utilities<br>▪ Essex Powerlines | 74% | D |
| Barrie | ▪ Health care and social assistance<br>▪ Wholesale and retail trade<br>▪ Manufacturing | 2 | 11.6% | Alectra | 72% | C |
| Greater Sudbury | ▪ Health care and social assistance<br>▪ Wholesale and retail trade<br>▪ Forestry, fishing, mining, quarrying, oil and gas | 1 | 8.4% | Greater Sudbury Hydro | 57% | B |
| Thunder Bay | ▪ Health care and social assistance<br>▪ Wholesale and retail trade<br>▪ Educational services | 2 | 10.4% | Synergy North Corporation | 63% | C |

Sources: IESO; OEB; Ministry of Finance.

## 5.5 Conclusions and key takeaways

Ontario recorded a relatively high rate of COVID-19 cases in the first wave of the pandemic in the winter and spring of 2020, and has since maintained around a third of the case count in Canada. As a result, economic restrictions were enacted to slow the spread of the virus, and the first set of lockdown orders shut down all but essential services. Generally, the impact on electricity demand and natural gas demand has followed similar patterns as other provinces and US states (i.e. an increase in residential demand and declines among other customer classes). Based on the information contained in this section, the following observations can also be made:

- **Expectations of Ontario's distributors**: Most survey respondents on the electricity side indicated an expectation that total volumes delivered would be lower in the medium- to longer-term as a result of the consequences of the pandemic, and that there would be some change in class-specific consumption (i.e. increased residential consumption, decreased GS consumption). While most survey respondents noted that they expect weather-normalized load to return to 2019 levels in either 2021 or 2022, they also expressed difficulties in making their assessments due to uncertainty over the end of the pandemic, public health restrictions, and economic growth. Persistent uncertainty about long-term impacts of COVID-19 on load suggest that caution is warranted in considering large capital expenditures justified on the basis of continued load growth.

- **Vaccines and immunity could be more than a year away**: even with the promising accelerated timeline of vaccine development and plans for vaccine rollouts, achieving immunity levels of 60% to 70% of the population may take several months, if not at least a year. In the meantime, restrictions in movement and economic activity will likely serve as the main tool to limit the spread of the virus.

- **Estimating long-term demand impact**: shifting behavioural patterns that result in permanent or long-term effects are most likely to be observed in the residential and commercial segments. We focus on behaviour shifts that were already underway, and were accelerated by COVID-19, such as work-from-home arrangements, and the transition to e-commerce. Illustrative results from the scenarios modeled show net effects of a reduction of 1.5 TWh and 42.7 MCM in the moderate case, and 6.8 TWh and 308 MCM in the high impact case. While the results are illustrative, they demonstrate the potential for long-term declines in demand driven by permanent behaviour shifts.

- **Industry impact analysis**: using IESO industry demand and GDP data, we observe that the automotive, 'iron and steel mills manufacturing', and 'pulp, paper and paperboard mills' sectors exhibit acute sensitivity to economic restrictions. This suggests that Ontario's subregions, and utilities that serve those regions, with heavy concentrations of sensitive industries may have greater demand risk than others. Exploring available employment data for various CMAs shows that unemployment spiked sharply in regions with sensitive industries such as manufacturing and accommodation and food services. Utilities in these regions may have a higher risk profile for long-term demand destruction, relative to other utilities in Ontario.

# 6 Examination of the role of stimulus programs

Following restrictions to economic activity to curb the spread of COVID-19, several governments enacted expansionary fiscal measures to support their economies. According to the International Monetary Fund ("IMF"), as of September 2020, fiscal action in response to COVID-19 across the world amounted to close to US $11.7 trillion, or around 12% of total 2019 GDP. For advanced economies, the IMF estimated discretionary fiscal response in the form of additional spending and foregone revenues to be around 9.3% of GDP.[122] It is likely that these programs have supported customers, and demand to a certain extent. This section first describes the various stimulus programs in the US, Canada, and Ontario enacted in response to COVID-19. Next, consideration is given to programs enacted following the Great Recession, along with an evaluation of the extent to which they have impacted long-term electricity demand. Stimulus programs will directly influence the short- and long-term load reductions discussed in the previous sections.

## 6.1 Overview of COVID-19 related stimulus programs

Initial stimulus programs implemented in response to the pandemic have been substantial, with advanced economies moving swiftly to manage the extent of the economic impact. In the US, the government enacted the Coronavirus Aid, Relief and Economic Security ("CARES") Act, which includes a combination of direct transfers, loans, and tax deferrals. In Canada, the federal government established the COVID-19 Economic Response Plan, which also comprises elements of direct transfers to individuals, businesses, and tax deferrals. In Ontario, the COVID-19 Action Plan set aside $17 billion that included direct support to utility customers. Figure 43 provides a summary of these programs.

**Figure 43. Summary of initial North American fiscal policy responses to COVID-19**

| | US | Canada | Ontario |
|---|---|---|---|
| **Program** | CARES Act | COVID-19 Economic Response Plan | COVID-19 Action Plan |
| **Estimated fiscal program cost** | US$2.2 trillion (11.2% of 2019 US GDP) | CAD$403 billion (13.8% of 2019 Canadian GDP) | CAD$17 billion (2.0% of 2019 Ontario GDP) |
| **Direct payments to individuals?** | Yes | Yes | No |
| **Direct payments to businesses?** | Yes | Yes | No |
| **Tax deferrals** | Yes | Yes | Yes |
| **Provisions specific to electricity sector?** | No | No | Yes |
| **Current status** | Most programs have expired | Many programs ongoing or extended | Many programs ongoing or extended |

Sources: Bloomberg. *The US Set Up These Programs to Offset Covid Hardship. They're All About to Expire.* July 17, 2020; Government of Canada. *Overview of Canada's COVID-19 Economic Response Plan*; McCarthy Tetrault. *COVID-19: Economic relief measures announced to date*. August 28, 2020.

[122] International Monetary Fund. *Fiscal Monitor: October 2020.* October 14, 2020.

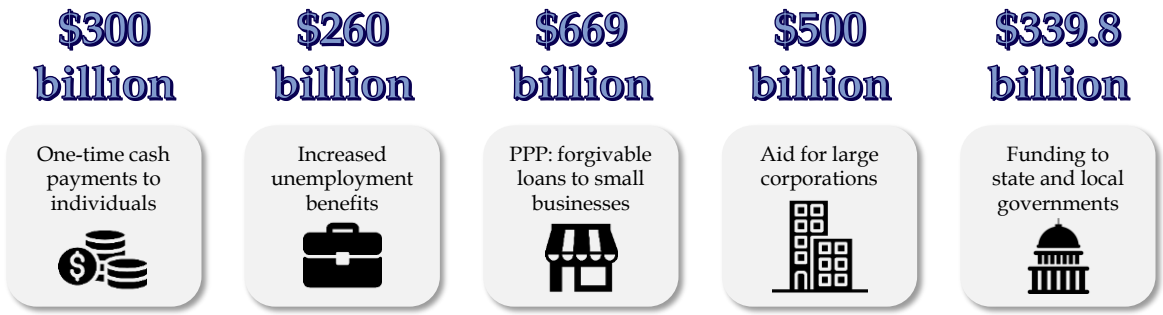
The following subsections present an overview of each of these programs, including an assessment of the extent to which they may have supported electric load to date, and the possible implications of them being unwound going forward.

### 6.1.1 United States: CARES Act[123]

The CARES Act is a $2.2 trillion economic stimulus bill passed by the US Congress and signed into law by President Trump on March 27, 2020. The main features of the CARES Act are summarized in Figure 44. The CARES Act is the largest economic stimulus package in US history, surpassing the $831 billion that comprised the American Recovery and Reinvestment Act ("ARRA") of 2009, passed in response to the Great Recession. The CARES Act amounts to about 11% of US GDP, and about 63% of the expected federal tax collection for 2020.[124] Certain provisions under the CARES Act provide relief that can be used to pay for utility bills, thus reducing the incidence of disconnection that otherwise may take place. These provisions are:

- stimulus payments to individuals;
- loans from the Paycheck Protection Program ("PPP"), which provide forgivable loans to small businesses that could be used to cover utility expenses; and
- supplemental appropriations for the Low-Income Home Energy Assistance Program ("LIHEAP"), a federal grant program for states, tribes, and territories to operate home energy assistance programs for low-income households.

**Figure 44. Main provisions of the US CARES Act**




Source: NPR. *What's inside the Senate's $2 trillion coronavirus aid package.* March 26, 2020.

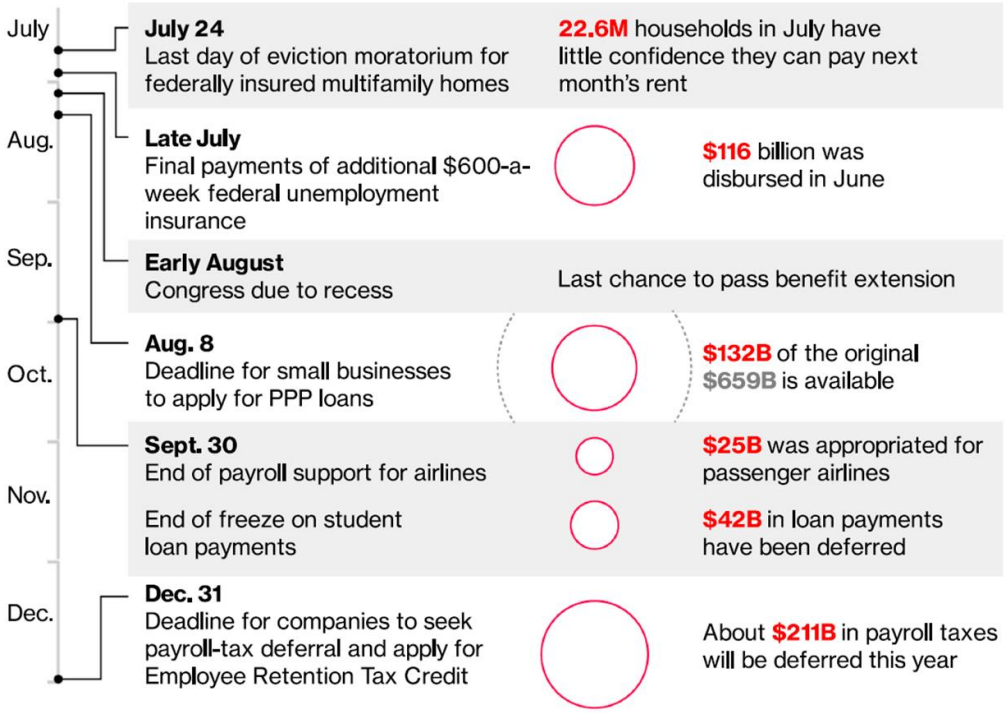
Over the second half of 2020, most stimulus payments and benefits were wound down, with the final program set to expire by the end of December 2020. Negotiations between the Executive and Legislative branches of the US federal government on a new stimulus package are currently at an impasse, where Republican Senate leaders recently rejected a $908 billion aid package proposed by bipartisan lawmakers. However, the US House of Representatives approved a one-week

[123] Unless otherwise noted, all dollar values are provided in US dollar terms when discussing US programs, and in Canadian dollar terms when discussing Canadian programs.

[124] Los Angeles Times. *The Coronavirus Stimulus Package versus the Recovery Act.* March 26, 2020.

extension for negotiations, with the next budget deadline set for December 18, 2020.[125] While bipartisan consensus exists on the need to support employees and businesses, the disagreement on the scope and extent of the support may be difficult to overcome, especially given the optimism regarding vaccine development. The status and expiration of various support measures under the CARES Act is illustrated in Figure 45, showing that by the end of 2020, all provisions will have expired unless a new agreement can be reached.

**Figure 45. Expiration of CARES support measures**




Taken directly from: Bloomberg. *The U.S. Set Up These Programs to Offset Covid Hardship. They're All About to Expire.* July 17, 2020.

The incoming Biden administration has promised sweeping measures to prop up businesses and employees, while protecting the health of the public. These targets may be challenging to implement without full Congressional support, and it may be too early to speculate on the scale and scope of a potential Biden administration fiscal stimulus. The proposed Green New Deal may provide an indication of the direction and potential scope of future stimulus programs if deficit concerns can be overcome (a summary of the proposal is provided in the textbox below).

Focusing on the power sector, it is apparent that the PPP has helped businesses pay utility bills and therefore supported load to some degree. In addition, the income support to individuals and households allowed for additional disposable income that could sustain daily consumption and, in turn, small businesses. A survey of US households by the Congressional Research Service found that 53% of respondents either did or intended to use their stimulus payment on "utilities

[125] CNBC. *Treasury yields fall as Congress remains deadlocked on stimulus.* December 11, 2020.

and telecommunications."[126] More recent commentary suggests that the provisions in the CARES Act have sustained consumption from businesses.[127]

Going forward, it remains to be seen whether this consumption can be sustained once the stimulus is lifted and behavioural shifts in consumption patterns become entrenched in the long run. Some of these potential behavioural shifts were explored previously in Section 5, as part of the model estimating long-term demand impact. This suggests that the brief increase in load driven by the stimulus could diminish somewhat.

**Green New Deal**

The Green New Deal ("GND") is a proposal by US Congress members Alexandria Ocasio-Cortez (House of Representatives) and Edward J. Markey (Senate) to achieve net zero emissions through a national mobilization effort over ten years. As it is a resolution, it calls for investments in infrastructure and industry, and seeks to create "millions of high-wage jobs" to ensure economic security. A summary of the resolution is described below.

***Main goal***: global net-zero emissions by 2050

***Complementary objectives***: create high-paying jobs, provide clean air, clean water and healthy food, and end all forms of oppression

***Paths*** to achieve the goals:

- 100% renewable and zero-emissions electricity in the US
- Digitize the power grid
- Energy efficiency upgrades in all buildings
- Invest in electric vehicles and high-speed rail
- Provide job training and new economic development

***Features***:

- Purposely does not endorse or reject any specific technologies
- GND is not a single project or piece of legislation, similar to President Roosevelt's New Deal for America
- Costs have not yet been estimated but, though expected to be substantial, it is believed that economic growth will cover the costs

***Likelihood of materializing***: despite an electoral victory for Democratic presidential nominee Joe Biden, the absence of a full endorsement from the Biden campaign and the potential for a split Congress between the House of Representatives and the Senate suggests it is unlikely to be fully implemented in its current form.

[126] Congressional Research Service. *CARES Act Payments Use and Recipient Characteristics: In Brief.* July 24, 2020.

[127] Walton, R. UtilityDive website. *Could COVID-19 provide a windfall to utilities from shifting demand? Report says yes, but it's complicated.* November 2020.

**Fiscal position of states**

By the end of 2019, all but six states had fully recovered their tax revenues from the Great Recession. The fiscal health of most states was generally in good shape - for the 2004-2018 period all but nine states had total revenues exceeding total expenses. However, as a result of the COVID-19 pandemic, going forward challenges remain and include:

- mounting unfunded retirement costs for some states;
- tax revenue volatility due to the COVID-precipitated economic downturn;
- mounting cost of state Medicaid programs;
- population change; and
- less certain availability of federal contribution to the state revenue (average of 32% in 2017).

Many states have taken executive action to reduce spending due to the expected reduction in revenues. Most US states start their fiscal year on July 1st, and given that the impact of COVID-19 restrictions were primarily felt at the start of the last quarter of the fiscal year (i.e. April to June), the spending cuts and freezes are not likely to compensate for the fall in revenues in fiscal 2020. A still greater drop in revenues is expected in fiscal 2021. During the Great Recession, the states experienced an 11.6% revenue decrease, while COVID-related state revenue losses are forecasted to exceed these levels (possibly exceeding 20%).[128] This may result in significant impacts to output – for instance, state and local budget expenditures comprised 11% of total US GDP in 2019.[129] As enhanced unemployment benefits expire, the drop in consumer spending (i.e. reduced commercial activity and reduced tax revenues) will spell greater trouble for state fiscal positions, which may be further exacerbated by lack of additional Federal spending.

### 6.1.2 Canada: COVID-19 Economic Response Plan

The Canadian government's response to COVID-19 focused on three broad areas:

- health care system;
- support to individuals; and
- support to businesses.

In these three areas, the response plan entailed a combination of direct support, tax deferrals, and liquidity support. Over 55% of the support is in the form of direct payments to individuals and businesses, while tax deferrals and liquidity comprise the remaining support mechanisms (see Figure 46).

[128] National Association of State Budget Officers. *State Fiscal Outlook: Pre- & Post-COVID-19.* June 25, 2020.

[129] US Bureau of Economic Analysis. *National Income and Product Accounts: Table 1.1.5. Gross Domestic Product.*

**Figure 46. Canadian response to COVID-19, ($ billion)**

| | Federal | Provincial |
|---|---|---|
| Direct | $231.9 | $24.1 |
| Tax, customs duty payments, and fee deferrals | $85.0 | $38.2 |
| Liquidity | $86.5 | $3.3 |
| **Total** | $403.4 | $65.6 |

Source: Government of Canada website. Economic Response Plan.

Major programs of the Canadian fiscal response were geared towards individual support, although programs also exist for small- and medium-sized businesses (defined as having revenues up to $20 million, and between $20 million to $50 million, respectively), as well as for mid-market and large enterprises (with revenues between $50 million and $300 million, and over $300 million, respectively).[130] Figure 47 provides a high-level summary of these programs.

**Figure 47. Programs established as part of Canada's fiscal response to COVID-19**

| Individuals | Small and medium businesses | Mid-market and large enterprises |
|---|---|---|
| • Canada Emergency Wage Subsidy ("CEWS") – a wage subsidy of up to 65% for qualifying employers, up to $734 per week per employee, which extends to June 2021;<br>• top-up payments for Goods and Services Tax Credit for low- and modest-income Canadians and families, and top-up payments for Canada Child Benefits;<br>• range of support programs for students, seniors, vulnerable Canadians and indigenous communities; and<br>• Canada Emergency Response Benefit ("CERB") – $2,000 monthly payments to unemployed Canadians. Originally intended for 16 weeks, it was later extended to 24 weeks. | • Income Tax, Sales Tax, and Customs Duty Payment Deferrals;<br>• Canada Emergency Business Account: interest-free partially forgivable loans up to $40,000, offered through financial institutions;<br>• Small to Medium-sized Enterprise Loan and Guarantee Program;<br>• Canada Emergency Commercial Rent Assistance for Small Businesses;<br>• Indigenous and Northern Business Supports;<br>• Women Entrepreneurship Strategy Funding;<br>• Fish Harvester Grant; and<br>• Enhancements to the Work-Sharing Program. | • Income Tax, Sales Tax and Customs Duty Payment Deferrals;<br>• Sector Supports (e.g., Transportation, Agriculture, Energy, Culture, Heritage and Sport, Fish and Seafood Processing);<br>• Financial sector liquidity and market functioning facilities;<br>• Business Credit Availability Program ("BCAP");<br>• Mid-market Guarantee and Financing Program;<br>• Large Employer Emergency Financing Facility; and<br>• Enhancements to the Work-Sharing Program. |

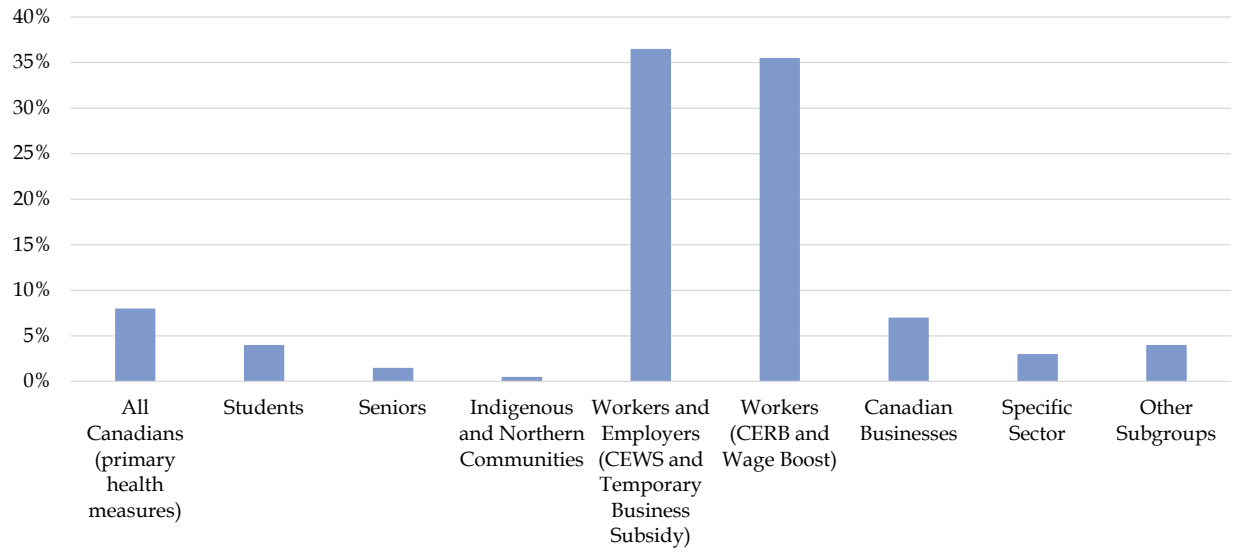
Source: Government of Canada. *Overview of Canada's COVID-19 Economic Response Plan*; Government of Canada. *Canada Emergency Wage Subsidy (CEWS).*

Many of the federal programs are administered in coordination with provincial governments, crown corporations, and financial institutions. The Canada Emergency Wage Subsidy ("CEWS") and Canada Emergency Response Benefit ("CERB") were part of the largest components of the Canadian federal response to COVID-19 (see Figure 48). CEWS was expected to be available until

[130] Government of Canada. *Overview of Canada's COVID-19 Economic Response Plan*.

December 2020 with an expected cumulative cost of $68.5 billion,[131] although the subsidy has since been extended to June 2021.[132]

**Figure 48. Value of direct COVID-19 economic response plan measures by target group**




Source: Department of Finance website.

CERB expired on October 3, 2020 with no plans for renewal. Financial support remains available through Employment Insurance, as well as new programs such as the Canada Recovery Sickness Benefit, the Canada Recovery Caregiving Benefit, and the Canada Recovery Benefit.

Sector-specific support is available for oil and gas industries, but no specific measures have been announced for the utility sector. Recently, Prime Minister Trudeau highlighted an initiative to invest in transmission infrastructure in Atlantic Canada to boost hydroelectric exports from Labrador, dubbed the Atlantic Loop. This initiative is being pitched as an effort to move away from coal and provide fiscal stimulus for Atlantic Canada; however, such a regional electric system proposal was outlined in a previous 2018 federal government report.[133]

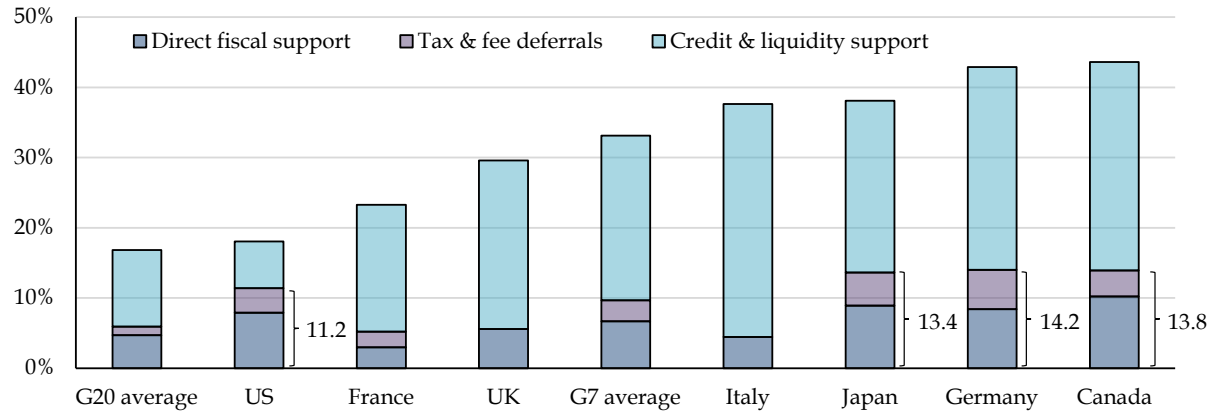
The scale of the Canadian federal response to COVID-19 is more extensive relative to the size of the economy than most of the Group of 7 economies (see Figure 49). Second only to Germany's fiscal response in terms of the portion of the GDP, Canada's fiscal response stands at 13.8% of GDP. One of the reasons why the Canadian response has been so extensive is the wider scope of programs when compared with other major economies (see Figure 50).

[131] Government of Canada, Department of Finance. *Extending the Canada Emergency Wage Subsidy*. October 14, 2020.

[132] Government of Canada. *Canada Emergency Wage Subsidy (CEWS) – What the Changes are*.

[133] Regional Electricity Cooperation and Strategic Infrastructure. *Atlantic Region Summary for Policy Makers.* 2018.

**Figure 49. Policy support announced across G7 countries (% of national GDP)**




Source: Finance Canada tracking of official announcements by G20 national authorities in response to the COVID-19 pandemic; includes measures up to July 3; Finance Canada estimates for German tax & fee deferrals.

**Figure 50. International comparison of economic response package to the COVID-19 outbreak**

| | Canada | United States | United Kingdom | Germany | France | Italy | Japan | Australia | New Zealand | Denmark | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Funding for PPE and medical research | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Support to households** | | | | | | | | | | | |
| Enhanced employment benefits | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |
| Wage subsidies for furloughed workers | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Wage subsidies for active workers | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Support for seniors | ✓ | ✓ | ✓ | ✓ | | | | ✓ | | | |
| Support for post-secondary students | ✓ | ✓ | | | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| Support for other vulnerable groups | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Support to businesses** | | | | | | | | | | | |
| Commercial rent support | ✓ | | | | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| Sectoral support | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Forgivable credit for SMEs | ✓ | ✓ | | | | | ✓ | | | ✓ | |
| Loan guarantee for SMEs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

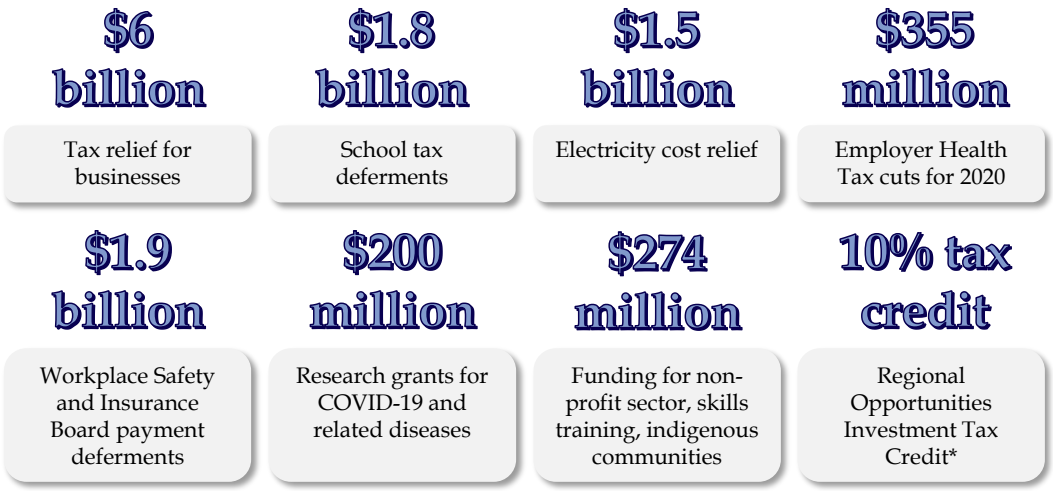
Source: Department of Finance. *Economic and Fiscal Snapshot. Chapter 1: Overview of Canada's COVID-19 Economic Response Plan*. July 2020.

### 6.1.3 Ontario: COVID-19 Action Plan

On March 25, 2020, Ontario released its COVID-19 Action Plan, amounting to some $17 billion in funding.[134] The major components of Ontario's measures are summarized in Figure 51.

[134] McCarthy Tetrault. *COVID-19: Economic relief measures announced to date*. August 28, 2020.

**Figure 51. Ontario's response to COVID-19**




* A 10% refundable corporate income tax credit for businesses involved in commercial and industrial real estate development.

Source: McCarthy Tetrault. *COVID-19: Economic relief measures announced to date*. August 28, 2020.

One of the earlier measures taken by the provincial government focused on the electricity sector:

- Between March 24 and May 31, residential, farm, and small business time-of-use ("TOU") customers were charged the off-peak price for 24 hours a day;
- COVID-19 Recovery Rate (i.e. 12.8¢/kWh) for TOU Regulated Price Plan customers was in effect between June 1 and October 31, 2020;
- Electricity assistance programs:
    - COVID-19 Electricity Assistance Program ("CEAP") – available for eligible residential customers from June 1, 2020, provides a one-time $115 credit for electricity bills ($230 for electrically heated houses or for users of certain medical devices), and an up to $80 credit toward gas bills ($160 for Northern Ontario);
    - COVID-19 Energy Assistance Program for Small Businesses ("CEAP-SB") – available from August 31, 2020 for eligible small businesses and registered charities as a one-time bill credit of up to $425 for electricity bills ($850 if premises are primarily heated with electricity) and $425 for natural gas bills;
- Eligible customers are also still able to apply for regular support programs:
    - Low-income Energy Assistance Program ("LEAP") – one-time support of up to $500 in emergency assistance for electricity bills ($600 if house is electrically heated) and $500 for natural gas bills for eligible customers;
    - Ontario Electricity Support Program ("OESP") – ongoing support in the form of monthly bill credit for eligible low-income residential customers;
- Moratorium for residential disconnections until July 31 (regular seasonal moratorium is from November 15 to April 30); and

- A portion of Global Adjustment ("GA") charges for customers not on the Regulated Price Plan ("RPP") were deferred in April through June.

In November 2020, the Ontario Government announced a three-year budget that included $15 billion in new pandemic-related supports,[135] broken down into three pillars: $7.5 billion in new funding for the government's urgent response to COVID-19; $2.4 billion in new funding "to support people and jobs"; and $4.8 billion in new funding "for recovery efforts that will be built on over time." Among the announced measures in the recovery pillar is the shifting of a portion of non-hydro renewable contract costs that were previously funded through the GA to the Province, commencing in January 2021. This move is expected to cut all-in electricity costs, on average, by 14% for Class A customers and by 16% for non-RPP Class B customers.[136]

## 6.2 Historical analysis of stimulus programs from the Great Recession

The Great Recession began at the end of 2007 and ended following Q2 2009, driven by a financial crisis that spread to the rest of the economy. In the US, real GDP fell 4.3% from its peak in 2007 to a trough in Q2 2009, while unemployment peaked at 10% in Q3 2009.[137] Around the world, the impact of the Great Recession was a financial crisis and collapsing cross-border trade. IMF data shows that GDP growth in advanced economies was 0.5% in 2008 and -3.2% in 2009; in Canada the impact was similar, with a decline of -0.4% in 2008 and -2.6% in 2009.[138] Figure 52 shows how employment and GDP growth declines in the Great Recession compare with the Great Lockdown due to COVID-19.

**Figure 52. Comparing economic indicators in the Great Recession versus the Great Lockdown**

| Indicator | Canada | US |
|---|---|---|
| **Great Recession (2008-2009)** | | |
| *Change in GDP (%)* | -2.6% | -3.2% |
| *Unemployment (%)* | 8.4% | 9.3% |
| **Great Lockdown (2020)*** | | |
| *Change in GDP (%)* | -7.1% | -4.2% |
| *Unemployment (%)* | 9.7% | 8.9% |

*GDP data is based on the IMF's World Economic Outlook published in October 2020.

Sources: IMF. *World Economic Outlook.* October 2020; Bureau of Labor Statistics; Statistics Canada.

[135] These amounts are in addition to the province's earlier supports, which totaled $30 billion (of which around $11.3 billion related tax and other deferrals, meant to provide temporary cash flow relief).

[136] Ontario Ministry of Finance. *Ontario's Action Plan: Protect, Support, Recover.* November 2020. Queen's Printer for Ontario.

[137] Rich, R. *The Great Recession. Federal Reserve Bank of Cleveland.* Federal Reserve History. November 2013.

[138] International Monetary Fund. *World Economic Outlook update: A Policy-Driven, Multispeed Recovery.* January 26, 2010.

In response to the economic crisis, in addition to monetary policy from the Federal Reserve, the US government passed the ARRA of 2009, which resulted in fiscal expansion the equivalent of 5.5% of total GDP. In Canada, the government passed an expansionary budget known as the Canada Economic Action Plan, for a total spend of 1.9% of GDP. In this section, we summarize the general provisions of these fiscal plans, and evaluate the extent to which these policies resulted in a long-term impact on the electricity sector.

### 6.2.1 American Recovery and Re-investment Act of 2009

The ARRA was passed by the US Congress in February 2009 and included a total of $350 billion in direct fiscal spending, and $260 billion in tax reductions – these took the form of various programs, direct spending loans, and grants.[139] In total, the ARRA over its lifetime had a cost of $840 billion, equivalent to about 5.7% of GDP in 2008.[140] In general, the various programs and provisions can be grouped into a number of categories, distinguished by their focus, as follows:

- ***funding for states and local governments:*** these include aid for education, funding for civil works projects, and increasing federal matching rates for health insurance programs such as Medicaid;
- ***increasing funding for social security programs:*** these included extending and expanding unemployment benefits and increasing benefits under the Supplemental Nutrition Assistance Program ("SNAP");
- ***investment in goods and services:*** this included funding construction and other investment activities over several years; and
- ***temporary tax relief for individuals and businesses:*** these took various forms, including raising exemption amounts for the alternative minimum tax, adding a new Making Work Pay tax credit, and creating enhanced deductions for depreciation of business equipment.

Provisions for the energy sector were primarily bundled under Title IV of the Act, and spending in the sector was directed towards the Department of Energy ("DOE") and other federal agencies such as the Environmental Protection Agency. Appropriation under Title IV totaled $50.8 billion between 2009 and 2019 (see Figure 53). The literature suggests that, coupled with provisions in other segments, around $90 billion of spending can be categorized as "clean energy" spending.[141]

[139] Aldy, J. *A Preliminary Assessment of the American Recovery and Reinvestment Act's Clean Energy Package.* Review of Environmental Economics and Policy, volume 7, issue 1, winter 2013, pp. 136–155.

[140] Dupor B. *The Recovery Act of 2009 vs. FDR's New Deal: Which Was Bigger?* Federal Reserve Bank of St Louis. February 2017.

[141] Aldy, J. *A Preliminary Assessment of the American Recovery and Reinvestment Act's Clean Energy Package.* Review of Environmental Economics and Policy, volume 7, issue 1, winter 2013, pp. 136–155.

**Figure 53. Energy sector spending in the ARRA**

| *Title IV (Energy and Water)* | Total ($ millions) |
|---|---|
| **Energy Efficiency and Renewable Energy** | $16,800 |
| **Innovative Technology Loan Guarantee Program** | $6,000 |
| **Other Energy Programs** | $22,425 |
| **Corps of Engineers** | $4,600 |
| **Other Title IV programs** | $1,000 |
| **Total** | $50,825 |
| **Proportion of total stimulus (%)** | 6.5% |

Source: Congressional Budget Office. *Cost estimate. H.R. 1, American Recovery and Reinvestment Act of 2009*. February 13, 2009.

The impact of the ARRA on the electricity sector is considered in two ways: first with an assessment of the literature on the impact on economic growth and illustrative downstream impacts on load growth; second with a consideration of a few specific programs directed at investment in the power sector.

Historically, electricity load growth and economic growth have been strongly correlated, as increased output and consumption are reflected in energy use. Although this relation has waned in the past decade[142] it is useful to consider the impact of the ARRA on various segments of the economy and the total economic growth estimated to be caused by the stimulus.

In general, analysis of the impact of the ARRA has focused on the employment multiplier effect, with well-cited analysis suggesting an impact of a $0.64 increase in wages for every $1 of spending,[143] or 8 jobs per $1 million spent.[144] Other work has shown that a $1 increase in county-level government spending increases consumer spending by $0.29.[145] We focus on analysis by the Council of Economic Advisors ("CEA") and the Congressional Budget Office ("CBO") that estimates the total GDP output impact of the stimulus. A summary of these estimates is shown in Figure 54.

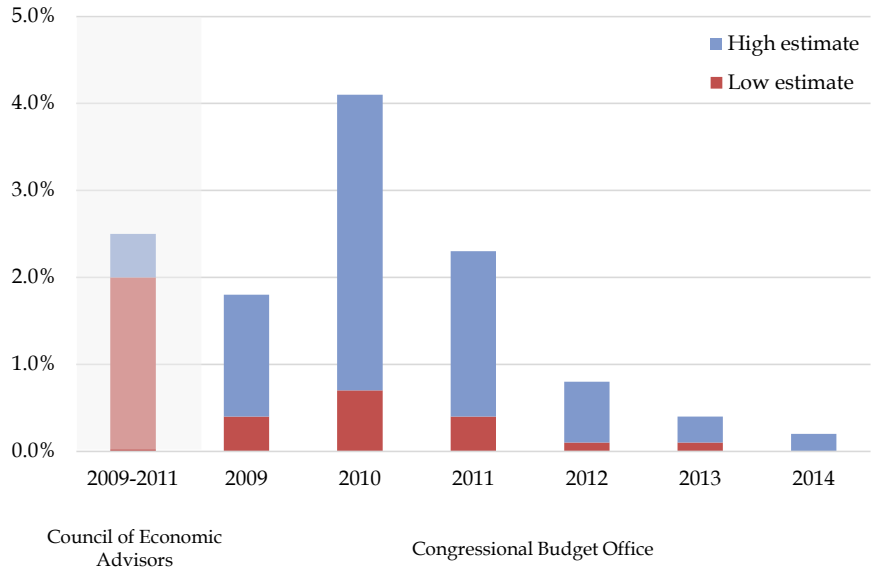
[142] Energy Information Administration. *Link between growth in economic activity and electricity use is changing around the world*. November 2017.

[143] Dupor & McRory. *Fiscal Policy Spillovers: Points of Employment to Places of Residence*. Federal Reserve Bank of St Louis. Working Paper 2014-029D. September 2016.

[144] Wilson, D. *Fiscal Spending Jobs Multipliers: Evidence from the 2009 American Recovery and Reinvestment Act*. American Economic Journal: Economic Policy 2012, 4(3): 251–282.

[145] Dupor et al. *Regional Consumption Responses and the Aggregate Fiscal Multiplier*. Federal Reserve Bank of St Louis. January 2019.

**Figure 54. Estimated GDP impact of the ARRA**




Sources: Council of Economic Advisors; Congressional Budget Office. *Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output in 2014.* February 2015.

On the supply-side, the ARRA allocated funding to several initiatives in the power sector through a combination of investments, loan guarantees, and tax credit programs. In total, it is estimated that the stimulus package included $90 billion for "clean energy" initiatives, including $32 billion for the Department of Energy; some of these programs that had a direct impact on the sector are profiled below.

**Grid Modernization**

The ARRA allocated $4.5 billion for "modernizing the power grid," which was matched by smart grid award recipients through a cost share of close to $5 billion, resulting in close to $10 billion in advanced grid technologies. Under the Smart Grid Investment Grant ("SGIG"), which comprised the largest share of the grid modernization funding at $3.4 billion, industry participants were supported in their deployment of existing advanced smart grid technologies and tools to improve grid performance and reduce costs. These took the form of 99 cost shared projects delivered by 200 participating entities including utilities and other industry participants.[146]

Another program was the Smart Grid Demonstration Program ("SGDP"), which sought to demonstrate novel and cost-effective smart grid technologies, tools, techniques, and system configurations – 32 projects and $600 million was invested, matched by $900 million by participants. In addition, other programs provided funding for smart grid workforce development projects, capacity building for long-term analysis and planning, allowed states to hire new staff and retrain existing employees, supported the development of interoperability

[146] US Department of Energy website. *Office of Electricity Delivery and Energy Reliability. 2009 American Recovery and Reinvestment Act.*

standards, and funded development of energy assurance plans for natural disasters. A summary of the $4.5 billion for grid modernization is shown in Figure 55 below.

**Figure 55. Funding overview of grid modernization programs under the ARRA**

| Program | Federal funding under ARRA ($ millions) |
|---|---|
| **Smart Grid Investment Grant** | $3,482.8 |
| **Smart Grid Regional and Energy Storage Demonstration Projects** | $684.8 |
| **Workforce development program** | $100.0 |
| **Interconnection transmission planning** | $80.0 |
| **State Assistance for Recovery Act related electricity policies** | $48.6 |
| **Enhancing State Energy Assurance** | $43.5 |
| **Enhancing Local Government Energy Assurance** | $8.0 |
| **Interoperability Standards and Framework** | $12 |
| **Program direction*** | $27.8 |

*Refers to administration and management of funds

Source: US Department of Energy website. *Office of Electricity Delivery and Energy Reliability. 2009 American Recovery and Reinvestment Act*.

### Energy efficiency

The ARRA provided for a few energy efficiency expenditures, including the expansion of the Weatherization Assistance Program ("WAP"), and the Energy and Environmental Block Grant program. The WAP supports measures to increase residential energy efficiency investments, and the ARRA expansion allocated nearly $5 billion in additional funding. This supported over 800,000 sites between 2009 and 2013, and studies suggest a resulting 97 million MMBtu saved.[147,148]

The Energy and Environmental Block Grant program sought to assist local governments in developing and implementing strategies to help eligible entities reduce fossil fuel emissions, reduce the total energy use of eligible entities, and improve energy efficiency in the transportation, building, and other sectors.

### Renewable energy generation

The ARRA extended the Production Tax Credit ("PTC") and the Investment Tax Credit ("ITC"), the former by three years, and expanded eligibility for the latter for renewable projects. In

[147] Although the DOE does not indicate the split between electricity savings and heating savings, 97 million MMBtu is approximately 28 TWh.

[148] Council of Economic Advisors. *A Retrospective Assessment of Clean Energy Investments in The Recovery Act*. February 2016.

addition to these, the ARRA also created new programs to support renewable development, the Payments for Specified Energy Property (or 1603 Program) and the 1705 Program. The 1603 and 1705 programs are expanded upon in the textbox below.

**Support for renewable energy developers**

**1603 Program:** The Payments for Specified Energy Property in Lieu of Tax Credits (referred to as "Section 1603") program allowed eligible participants to receive payments in lieu of investment tax credits from the Department of Treasury. Its purpose was to reimburse eligible applicants for a portion of the cost of installing the specified energy property, which were defined as solar, wind, geothermal, biomass, fuel cells, hydropower, combined heat and power, landfill gas, municipal solid waste, and microturbine property. In most cases, the value of an award was equivalent to 30% of the project's total eligible cost basis. By the end of the program, over 34 GW of projects had been funded, including over 21.6 GW of wind projects and 9.1 GW of utility-scale solar.

**1705 Program**: The Section 1705 Loan Program authorized loan guarantees for US-based projects whereby construction had begun no later than September 30, 2011 and involved certain renewable energy technologies, electric power transmission systems, and some biofuels. The program allowed developers to access low-cost financing and in general, the program was mostly used to support solar projects. Of the $16 billion in guarantees, 74% was utilized for solar generation projects, and 8% for manufacturing. In total, around 1,500 MW of new solar capacity is attributable to the 1705 Program.

Source: Department of Treasury. *Final Overview of the §1603 Program*. March 1, 2018; Department of Energy. *Loan Programs Office: Section 1705 Loan Program*.

### 6.2.2 Canada's Economic Action Plan of 2009

Canada's fiscal program in response to the Great Recession was more modest, totaling $30 billion, or 1.9% of total GDP in the first year, and around $50 billion over two years. The Economic Action Plan of 2009 (or the 2009 Budget) was tabled in the House of Commons on January 27, 2009.[149] The programs and provisions of the plan were broadly categorized into five main 'elements' as follows:

- **financing support**: providing up to $200 billion through the Extraordinary Financing Framework to improve access to financing for both businesses and consumers;
- **enhanced unemployment support**: $8.3 billion for the Canadian Skills and Transition Strategy, and $20 billion in personal income tax relief over five years;
- **housing construction support**: $7.8 billion to build quality housing, to stimulate construction and enhance energy efficiency through renovation tax credits, support for retrofits and investments in social housing;

[149] Department of Finance. *Canada's Economic Action Plan. Budget 2009*. Tabled in the House of Commons by the Honorable James Flaherty, MP, Minister of Finance. January 27, 2009.

- **expansion to infrastructure spending**: $12 billion in new infrastructure funding over two years for the construction and repair of projects such as roads, bridges, broadband internet access, electronic health records, laboratories, and border crossings; and
- **targeted support to businesses and communities**: direct support to specific sectors, regions, and communities affected by the recession.

Provisions in the budget for the energy sector were limited to energy efficiency spending, and spending on research on clean energy technologies. A summary of these provisions is provided in Figure 56.

**Figure 56. Summary of energy programs in Canada's Economic Action Plan**

| Program or provision | Funding ($) | Description |
|---|---|---|
| **Transformation to a Green Energy Economy** | $1 billion over 5 years | ▪ $150 million for research, and $850 million for the development and demonstration of "promising technologies", including large-scale carbon capture and storage projects |
| **Support for Home Ownership and the Housing Sector** | $1,350 Tax Credit | ▪ Home Renovation Tax Credit that provides up to $1,350 in tax relief |
| | $300 million over 2 years | ▪ ecoENERGY Retrofit program to support additional home retrofits |
| **Investments in Housing for Canadians** | $1 billion over 2 years | ▪ a one-time federal investment of $1 billion over two years for renovations and energy retrofits for social housing units<br>▪ Funding provision to be on a 50–50 cost-shared basis with provinces |
| **Investments in Provincial, Territorial and Municipal Infrastructure Projects** | Undisclosed | ▪ Summerside Wind Energy in Prince Edward Island |
| **Green Infrastructure Fund** | $1 billion over 5 years | ▪ Green infrastructure includes infrastructure that supports a focus on the creation of sustainable energy<br>▪ Includes transmission investments |

Source: Department of Finance. *Canada's Economic Action Plan. Budget 2009.* January 2009.

Most of the programs associated with the Economic Action Plan ended in March 2011, and studies on the overall impact of the budget suggest the plan generally achieved its spending and employment goals. The Department of Finance estimated a jobs impact of 220,000 jobs that were "maintained or created" and a GDP "impact" of 2% in 2009.[150] The Auditor General audit

[150] Department of Finance. *Budget 2010. Leading the Way on Jobs and Growth. Annex 1: Job Impact of The Economic Action Plan to Date.*

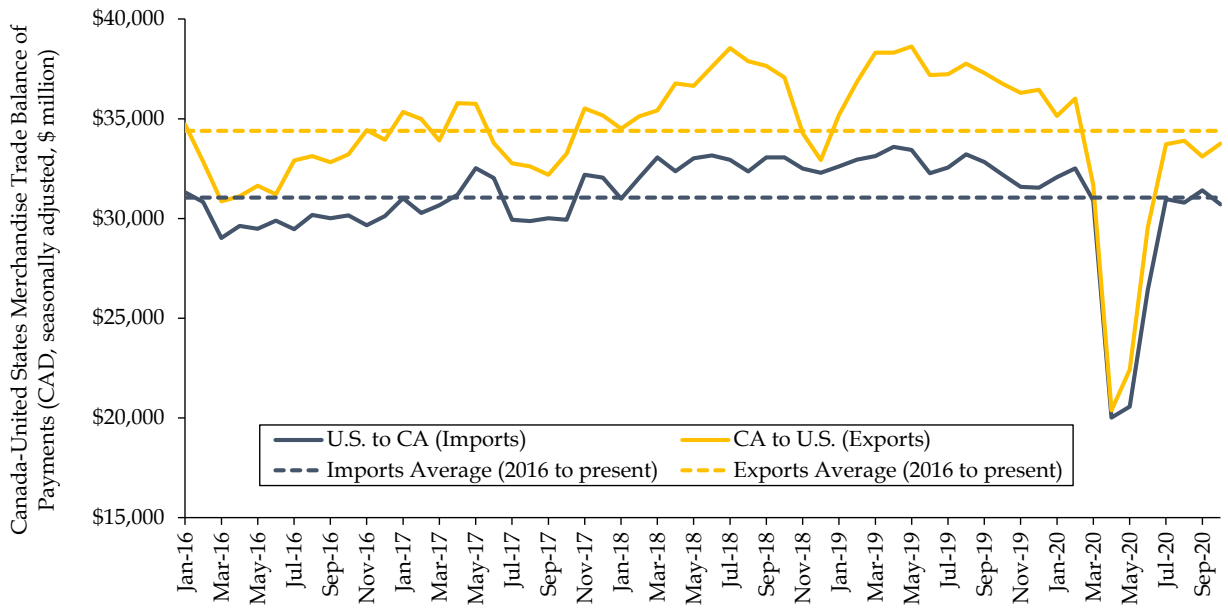
indicated that the program had broadly met its objective to spend federal resources within a two-year timeframe, but performance reporting was not standardized across departments and agencies, which made it difficult to perform general comparisons across objectives.[151]

### 6.2.3 Considering the link between the US and Canadian economies

Given the significant linkage between the Canadian and US economies, stimulus packages in one country may impact outcomes in another. Historically, the Canadian and US economies have enjoyed a comprehensive trading relationship, estimated at $1.4 trillion in bilateral trade and investments. There are 120 land ports of entry and the US State Department estimates that in 2019 the two countries traded $725 billion in goods and services.[152] An analysis from 2017 shows that Canada's exports to the US and imports from the US accounted for 76% and 52% of Canada's total exports and imports, respectively.[153]

In addition, 14 of Canada's top 20 trading partners are US states, with the top states being Michigan, Illinois, California, New York, and Texas. The integration of Michigan and Ontario's auto industries has historically driven the strong trading relationship. In 2020, the economic restrictions from COVID-19 have disrupted the trading relationship, as illustrated in Figure 57.

**Figure 57. Monthly US-Canada trade flows (January 2016 - October 2020)**




Source: Statistics Canada. *Table 12-10-0011-01 International merchandise trade for all countries and by Principal Trading Partners, monthly.*

[151] Office of the Auditor General. *2011 Fall Report of the Auditor General of Canada. Chapter 1 – Canada's Economic Action Plan.* 2011.

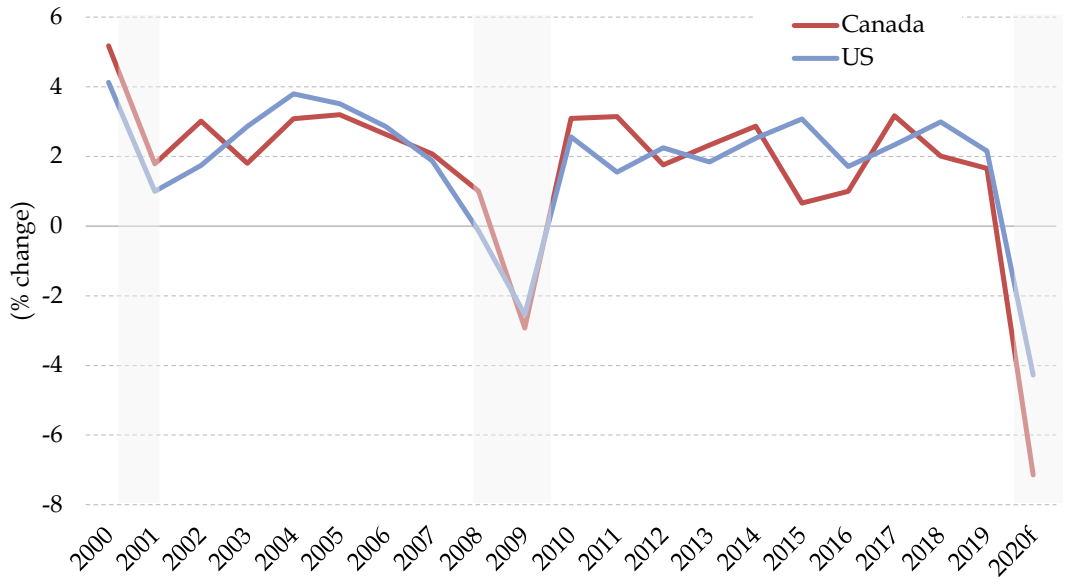
[152] US Department of State. *US Relations with Canada.* July 16, 2020.

[153] Statistics Canada. *Canada's merchandise trade with the US by state.* June 2017.

Notably, in April 2020, trade flows declined to nearly 90% below the historical 5-year average, driven by shutdowns at manufacturing facilities, including automotive sector shutdowns, as well as declines in trade in energy products. Trade declines with the US accounted for 90% of the decrease in Canada's trade activity in April, underlining the level of integration in the two economies.[154]

The literature shows that for countries with a high trade-to-GDP ratio, there may be a causal link between growth in trade (through imports and exports) on GDP.[155] Historically, the Canadian economy has been more trade-dependent than the US economy – World Bank data shows that as of 2019, the trade-to-GDP ratio of Canada was 65%, compared to 26% for the US. This suggests that a decline in trade flows between the two countries will have a greater impact on Canada, as the US is its largest trading partner. Since 2007, however, growth in Canada has not always followed US growth, as evidenced by growth trends since the Great Recession. This is contrasted with GDP growth in Mexico, the other partner in the North American trading bloc. In the Great Recession, as the US and Canadian GDP declined by 3.2% and 2.4% respectively, GDP in Mexico contracted by 6.6%.[156] Figure 58 below illustrates annual US and Canadian GDP growth since 2001, showing in particular the impact of the Great Recession on the two economies.

**Figure 58. GDP growth in the US and Canada (2000-2020f)**




Note: Shaded areas represent recessions. 2020 values are latest IMF forecasts (f).

Source: Bureau of Economic Analysis; International Monetary Fund; Statistics Canada.

[154] Statistics Canada. *The Daily: Canadian international merchandise trade, April 2020*. June 2020.

[155] Zestos, George K., and Xiangnan Tao. "Trade and GDP growth: causal relations in the United States and Canada." *Southern Economic Journal* (2002): 859-874.

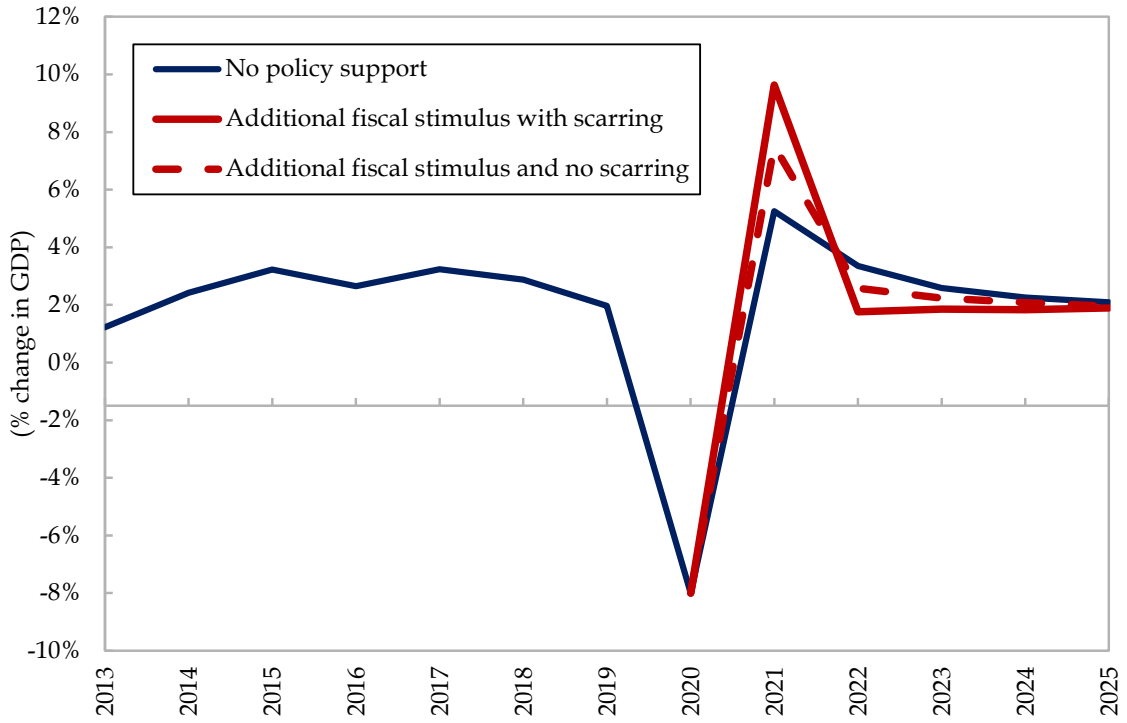
[156] Congressional Research Service. *The Mexican Economy After the Global Financial Crisis*. September 2010.

## 6.3 Conclusions and key takeaways

Relative to the Great Recession, advanced economies have moved swiftly to implement large stimulus programs in response to the economic crisis resulting from COVID-19. Advanced economies are estimated to have responded with discretionary fiscal responses of around 9.3% of GDP.[157] In the US, the CARES Act represented 11.2% of GDP, while in Canada the response was closer to 14% of GDP. This contrasts with the paradigm that existed in the Great Recession, where the IMF established a target of 2% of GDP for fiscal response, recommending the "3T" approach (i.e. Timely, Targeted, and Temporary).[158] At the time, the US and Canada took divergent approaches to meeting this target, with the ARRA proving to be a far larger program as a proportion of GDP when compared to Canada's Economic Action Plan.

The legacies of the stimulus programs from the Great Recession may have driven the aggressive approaches taken with regards to COVID-19. Research from the IMF suggests that stimulus programs may allow for an economic growth path that limits long-term economic damage, as illustrated by Figure 59 below.

**Figure 59. Illustrative GDP growth pathways with fiscal stimulus**




"Scarring" reflects a permanent negative effect of a large negative output gap on the level of potential output.

Source: International Monetary Fund. *Fiscal Monitor: October 2020.* October 14, 2020.

[157] International Monetary Fund. *Fiscal Monitor: October 2020.* October 14, 2020.

[158] Department of Finance. *Canada's Economic Action Plan. Budget 2009.* January 2009.

The impact of stimulus programs on the electricity sector vary widely and can be categorized by impact area as follows:

- **Consumption**: to the extent that stimulus programs support consumer incomes and allow for customers to keep paying their bills, the impact on consumption is higher-than-expected in the absence of the stimulus. Estimating the precise amount of consumption is dependent on the customer class and form of income support. For example, expansion of the SNAP program or CERB, programs that supplement residential incomes, may allow for continued residential consumption.

  Looking at the historical stimulus programs, we anticipate that spending provisions for energy efficiency and retrofits likely resulted in lower-than-expected residential electricity consumption. Under the current programs, income support in both the US and Canada likely helped to sustain electricity demand in both countries, in particular by enabling continued consumer spending which in turn allowed for the survival of a greater number of small businesses.

- **Supply**: stimulus programs may be designed such that they are aligned with the government priorities and provide targeted support to certain generation technologies (e.g. the 1603 Program in the ARRA supported renewable technologies), while in Canada, the Economic Action Plan promoted carbon capture and storage technologies. Conversely, some stimulus programs that are directed at grid modernization can be considered to be technology-neutral and may promote more efficient use of existing supply through upgrades to the transmission network.

- **Technology development**: stimulus that is designed with research and development objectives may promote the development of technologies that are not yet commercially viable. For instance, demonstration projects for distributed energy technologies or other advanced grid solutions allow for proponents to access funding for technologies that have yet to be proven.

  Extension of tax credits, and possible revival of cash grants, may continue to bolster the economics of renewables projects in the US relative to Canada, with demand for some components potentially increasing costs for Canadian projects.

Under the current stimulus programs, to date neither country has targeted a significant amount of funding directly to the energy sector, and concerns about deficit spending in both countries may prevent substantial new infrastructure initiatives.

With the future US administration likely to attempt to implement stimulus programs that align with the more progressive policy objectives in the Democratic platform, DERs may become a focus. Under a large stimulus program targeting DERs in the US, the impact for Canadian jurisdictions may be that the scale and scope of the US program may drive up the cost of DER technologies, making them more expensive.

In Ontario, recently announced government measures would serve to shift certain components of electricity costs from ratepayers to taxpayers, which may diminish the economics of DER projects (covered in greater detail in LEI's separate DER-focused report);[159] these changes appear to be permanent. Overall, the impact of stimulus programs in Canada is likely to defer demand destruction for longer in Canada than in the US, but the nature of expected actions in the US in 2021 is likely to result in a more favorable environment for DERs in the US than in Canada.

[159] Report titled "COVID-19 impact on distributed energy resources." Note this report is different from the 'DER Impact Study' that the OEB has commissioned from ICF.

# 7 Concluding remarks

The COVID-19 pandemic has had severe and wide-reaching impacts on individuals and businesses in all sectors across Ontario, and resulted in a high degree of uncertainty with respect to future outlooks, as the extent of these impacts is not yet fully known. To enhance understanding of the pandemic's implications on electricity and natural gas utilities, this report assessed the following topics:

- **Historical and short-term impact on demand:** Electricity demand was particularly hard-hit as a result of lockdown restrictions and physical distancing measures. Class-specific consumption levels and patterns also changed, including increases in residential load, and decreases in commercial and industrial loads. These demand-side issues are expected to persist in the short-term, with the scale of their impact dependent on the severity of restrictions going forward.
- **Impact on utility financial health:** Many electricity distributors in particular have seen negative cost and revenue impacts as a result of the pandemic, with this issue generally being more pronounced for those distributors that serve larger proportions of commercial and industrial loads. Based on publicly available information, these negative cost and revenue impacts have not translated into acute financial issues for utilities thus far, and data available to date suggests the sector as a whole has maintained its financial integrity.
- **Impact of bad debt on utilities:** One area of potential concern relates to future scenarios where bad debt levels increase (for example, in the event of prolonged pandemic-related constraints and economic stress). Although a high bad-debt scenario (and/or large increases in arrears) could increase liquidity risk for all distributors, smaller distribution utilities may be more concerned in the event that they have lower potential revenue offsets and limited committed credit facilities relative to larger utilities in the province.
- **Longer-term impact on demand:** Even with a "return to normal" following a successful vaccination campaign, it is still likely that more permanent behavioural and consumption changes will emerge, particularly in relation to residential and commercial loads. As with the short-term demand impacts and the cost and revenue impacts, these longer-term demand impacts could affect some distribution utilities more so than others depending on their breakdowns of customer class and type.
- **Role of stimulus programs:** Stimulus programs in response to the economic impact of the COVID-19 pandemic have been substantial ($11.7 trillion globally as of September 2020), with advanced economies moving much more swiftly relative to the Great Recession. These stimulus programs likely played an important role in reducing the negative impact of the pandemic on consumption (by supporting economic activity and allowing customers to continue paying their bills). These programs may also directly influence the short- and long-term load trajectories and financial impacts of the pandemic on utilities. Targeted stimulus programs may promote development of innovative technologies, although current stimulus programs targeted to the energy sector have not been significant.

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# 9 Appendix B: COVID-19 demand reduction model assumptions

## 9.1 Moderate impact case

### 9.1.1 Electricity

Figure 60 illustrates the moderate impact case for electricity as described in Section 5.3.2.1.

**Figure 60. COVID-19 Impact Model – Moderate Impact Case Calculations (Electricity)**

| Item | Unit | Formula | Outcome | Source(s) and explanation |
|---|---|---|---|---|
| Percentage of office workers assumed to be permanently working from home post-COVID | % | A | 15.6% | Response to StatsCan survey: "Workforce expected to continue to telework or work remotely once the COVID-19 pandemic is over?" (Ontario); weighted average Source: Statistics Canada. Table 33-10-0247-01 Percentage of workforce teleworking or working remotely, and percentage of workforce expected to continue teleworking or working remotely after the pandemic, by business characteristics |
| Current average square footage per employee in office environments | Sqft | B | 140 | *"Capitalizing on the Changing Office Landscape in Canada"* Starlight Investments. March 2018. Accessed at: https://bpmmagazine.com/wp-content/uploads/2018/03/Commercial-White-Paper-Mar-7-2018-FINAL.pdf |
| COVID-adjusted average square footage per employee in office spaces | Sqft | $B_{covid} = B + (30*50\%)$ | 155 | Estimates from office designers and architects anticipate that an additional 20-40 sqft is needed per employee to enforce physical distancing requirements. It is assumed that half of existing office areas would need to allocate an extra 30 sqft, while 50% of office areas may already be allocating enough space per employee to enforce social distancing without the need for additional space *Source: Baird-Remba, R. Designing Offices, Restaurants and Grocery Stores in the Age of Coronavirus. Commercial Observer website. April 18, 2020.* |
| Percentage increase in office space per employee | % | $C = (B_{covid}/B)-1$ | 10.7% | - |
| Observed change in residential load during COVID-19 | % | E | 8.0% | IESO report: Residential Demand Impacts - Closures Source: IESO. *Forecasting and Planning Update.* July 6, 2020 |
| Percentage of office workers that have transitioned to work from home between February and April 2020 due to COVID-19 | % | F | 27.3% | Response to StatsCan survey: "Workforce teleworking or working remotely on May 29th, 2020" (Ontario); weighted average Source: Statistics Canada. Table 33-10-0247-01 Percentage of workforce teleworking or working remotely, and percentage of workforce expected to continue teleworking or working remotely after the pandemic, by business characteristics |
| Ratio of office workers relocating to work from home, to change in residential load | - | G = E/F | 0.29 | This means that for each 1% of the workforce switching to work from home, residential load is anticipated to increase by 0.29% |
| Current gross leasable area per capita in Canada | Sqft/capita | GLA | 16.8 | *Source: Retail Council of Canada. Canadian Shopping Centre Study 2018* |
| Anticipated gross leasable area per capita in Canada post-COVID | Sqft/capita | $GLA * (1-0.189) = GLA_{covid}$ | 13.6 | Gross leasable area per capita is anticipated to decline in the long run following path of decline in retail output in the pandemic |
| Total current retail area in Ontario | million Sqft | $AREA_{retail}$ | 501 | Source: Natural Resources Canada. *Survey of Commercial and Institutional Energy Use.* 2016 |
| Total office area in Ontario | million Sqft | $AREA_{office}$ | 1,299 | *Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |
| Retail energy intensity | kWh-yr/sqft | $EI_{retail}$ | 18.95 | Average energy intensity for food & beverage stores and non-food retail stores *Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |
| Office energy intensity | kWh-yr/sqft | $EI_{office}$ | 17.81 | Average energy intensity for office buildings (non-medical) *Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |

Results of the calculations are shown in Figure 61.

**Figure 61. COVID-19 Impact Model – Moderate Impact Case Results (Electricity)**

| Item | Unit | Formula | Outcome | Source(s) and explanation |
|---|---|---|---|---|
| **Anticipated post-COVID permanent change in residential electricity demand** | % | **H = G*A** | **4.6%** | Multiplying the ratio of observed change in residential load as a result of work from home orders, by the anticipated percentage of office workers assumed to be permanently from home once offices are re-opened |
| | **TWh** | **J** | **40.4** | Total residential electricity consumption, 2019<br>*Source:* Ontario Energy Board. *Yearbook of Electricity Distributors 2019* |
| | **TWh** | **$X_{res}$= H*J** | **1.8** | - |
| **Anticipated change in electricity demand from offices** | % | **D = (1-A)*(1+C)-1** | **-6.5%** | This is equivalent to the anticipated change in total demand for office space |
| | **TWh** | **$X_{office}$ = $EI_{office}$*D*$AREA_{office}$ * ($10^{-3}$)** | **-1.5** | - |
| **Anticipated change in electricity demand from retail activities** | % | **I = ($GLA_{covid}$/GLA)-1** | **-18.9%** | This is equivalent to the anticipated change in total demand for retail space |
| | **TWh** | **$X_{retail}$ = $EI_{retail}$*I*$AREA_{retail}$ *($10^{-3}$)** | **-1.8** | - |
| **Total demand effect** | **TWh** | **ΣX = $X_{retail}$ + $X_{office}$ + $X_{res}$** | **-1.5** | - |

### 9.1.2 Natural gas

Figure 62 illustrates the moderate impact case for gas as described in Section 5.3.2.1, for those items that changed as compared to Figure 60. For remaining assumptions that are not detailed in the items below, please refer to Figure 60.

**Figure 62. COVID-19 Impact Model – Moderate Impact Case Calculations (Gas)**

| Item | Unit | Formula | Outcome | Source(s) and explanation |
|---|---|---|---|---|
| Observed change in residential load during COVID-19 | % | **E** | **3.2%** | Average of % change between March-May residential gas consumption (2016-2020)<br>Source: EIA. *Short-term Energy Outlook* |
| Ratio of office workers relocating to work from home, to change in residential load | **-** | **G = E/F** | **0.12** | This means that for each 1% of the workforce switching to work from home, residential consumption is anticipated to increase by 0.12% |
| Retail energy intensity | **MMcf/sqft** | **$EI_{retail}$** | **44.03** | Average energy intensity for food & beverage stores and non-food retail stores<br>*Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |
| Office energy intensity | **MMcf/sqft** | **$EI_{office}$** | **35.68** | Average energy intensity for office buildings (non-medical)<br>*Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |

Results of the calculations are shown in Figure 63.

**Figure 63. COVID-19 Impact Model – Moderate Impact Case Results (Gas)**

| Item | Unit | Formula | Outcome | Source(s) and explanation |
|---|---|---|---|---|
| **Anticipated post-COVID permanent change in residential electricity demand** | % | **H = G*A** | **1.8%** | Multiplying the ratio of observed change in residential load as a result of work from home orders, by the anticipated percentage of office workers assumed to be permanently from home once offices are re-opened |
| | **Bcf** | **J** | **307.9** | Total residential natural gas consumption, 2019 *Source:* Ontario Energy Board. *Yearbook of Electricity Distributors 2019* |
| | **Bcf** | **$X_{res}$= H*J** | **5.7** | - |
| **Anticipated change in electricity demand from offices** | % | **D = (1-A)*(1+C)-1** | **-6.5%** | This is equivalent to the anticipated change in total demand for office space |
| | **Bcf** | **$X_{office}$ = $EI_{office}$*D*$AREA_{office}$ * ($10^{-3}$)** | **-3.0** | - |
| **Anticipated change in electricity demand from retail activities** | % | **I = ($GLA_{covid}$/GLA)-1** | **-18.9%** | This is equivalent to the anticipated change in total demand for retail space |
| | **Bcf** | **$X_{retail}$ = $EI_{retail}$*I*$AREA_{retail}$ *($10^{-3}$)** | **-4.2** | - |
| **Total demand effect** | **Bcf** | **ΣX = $X_{retail}$ + $X_{office}$ + $X_{res}$** | **-1.5** | - |

Note: 1 billion cubic feet ("Bfc") is equal to approximately 28.3 MCM.

## 9.2 High impact case

### 9.2.1 Electricity

Figure 64 and Figure 65 illustrate the high impact case for electricity as described in Section 5.3.2.2

**Figure 64. COVID-19 Impact Model – High Impact Case Calculations (Electricity)**

| Item | Unit | Formula | Outcome | Source(s) and explanation |
|---|---|---|---|---|
| Percentage of office workers assumed to be permanently working from home post-COVID | % | **A** | **31.5%** | Response to StatsCan survey: "Workforce expected to continue to telework or work remotely once the COVID-19 pandemic is over?" (**Professional services**); weighted average Source: Statistics Canada. Table 33-10-0247-01 Percentage of workforce teleworking or working remotely, and percentage of workforce expected to continue teleworking or working remotely after the pandemic, by business characteristics |
| Current average square footage per employee in office environments | **Sqft** | **B** | **140** | *"Capitalizing on the Changing Office Landscape in Canada"* Starlight Investments. March 2018. Accessed at: https://bpmmagazine.com/wp-content/uploads/2018/03/Commercial-White-Paper-Mar-7-2018-FINAL.pdf |
| COVID-adjusted average square footage per employee in office spaces | **Sqft** | **$B_{covid}$ = B** | **140** | In this case, a higher proportion of workers remaining at home means no additional space is needed in offices to maintain social distancing |
| Percentage increase in office space per employee | % | **C = ($B_{covid}$/B)-1** | **0.0%** | - |
| Observed change in residential load during COVID-19 | % | **E** | **8.0%** | IESO report: "Peak demand has increased by 2%, Energy consumption has increased by 4%" Source: IESO. *An overview of COVID-19 impacts on electricity system operations.* April 23, 2020 |
| Percentage of office workers that have transitioned to work from home by May 2020 due to COVID-19 | % | **F** | **27.3%** | Response to StatsCan survey: "Workforce teleworking or working remotely on May 29th, 2020" (Ontario); weighted average Source: Statistics Canada. Table 33-10-0247-01 Percentage of workforce teleworking or working remotely, and percentage of workforce expected to continue teleworking or working remotely after the pandemic, by business characteristics |

## Figure 65. COVID-19 Impact Model – High Impact Case Calculations (Electricity) - continued

| Item | Unit | Formula | Outcome | Source(s) and explanation |
|---|---|---|---|---|
| Ratio of office workers relocating to work from home, to change in residential load | - | **G = E/F** | **0.29** | This means that for each 1% of the workforce switching to work from home, residential load is anticipated to increase by 0.15% |
| Current gross leasable area per capita in Canada | **Sqft/capita** | **GLA** | **16.8** | *Source: Retail Council of Canada. Canadian Shopping Centre Study 2018* |
| Anticipated gross leasable area per capita in Canada post-COVID | **Sqft/capita** | **$GLA_{covid}$** | **11.4** | Gross leasable area per capita is anticipated to decline to a level that is equivalent to that of Australia<br>*Source: Shopping Centre Council of Australia. Key Facts. October 2019* |
| Total current retail area in Ontario | **million Sqft** | **$AREA_{retail}$** | **501** | Source: Natural Resources Canada. *Survey of Commercial and Institutional Energy Use.* 2016 |
| Total office area in Ontario | **million Sqft** | **$AREA_{office}$** | **1,299** | *Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |
| Total area of hotels, motels and lodges in Ontario | **million Sqft** | **$AREA_{LargeHotel}$** | **82** | *Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |
| Retail energy intensity | **kWh-yr/sqft** | **$EI_{retail}$** | **18.95** | Average energy intensity for food & beverage stores and non-food retail stores<br>*Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |
| Hotel energy intensity | **kWh-yr/sqft** | **$EI_{Hotel}$** | **14.6** | Average energy intensity for hotels, motels and lodges<br>*Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |
| Hotel energy intensity improvement potential | % | **% improvement** | **0.2** | *Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2012* |
| Anticipated change in hotel energy intensity | **kWh-yr/sqft** | **$\Delta EI_{Hotel}$ = - ($EI_{Hotel}$ *%improvement)** | **-2.2** | Hotels are anticipated to reduce their energy intensity by ~3kWh-yr/sqft, as their energy intensity declines following energy efficiency improvements implemented as building managers find ways to cut costs |
| Office energy Intensity | **kWh-yr/sqft** | **$EI_{office}$** | **17.81** | Average energy intensity for office buildings (non-medical)<br>*Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |

Results of the calculations are shown in Figure 66.

## Figure 66. COVID-19 Impact Model – High Impact Case Results (Electricity)

| Item | Unit | Formula | Outcome | Source(s) and explanation |
|---|---|---|---|---|
| **Anticipated post-COVID permanent change in residential electricity demand** | % | **H = G*A** | **9.2%** | Multiplying the ratio of observed change in residential load as a result of work from home orders, by the anticipated percentage of office workers assumed to be permanently from home once offices are re-opened |
| | **TWh** | **J** | **40.4** | Total residential electricity consumption, 2019<br>*Source:* Ontario Energy Board. *Yearbook of Electricity Distributors 2019.* |
| | **TWh** | **$X_{res}$= H*J** | **3.7** | - |
| **Anticipated change in electricity demand from offices** | % | **D = (1-A)*(1+C)-1** | **-31.5%** | This is equivalent to the anticipated change in total demand for office space |
| | **TWh** | **$X_{office}$ = $EI_{office}$*D*$AREA_{office}$ * ($10^{-3}$)** | **-7.3** | - |
| **Anticipated change in electricity demand from retail activities** | % | **I = ($GLA_{covid}$/GLA)-1** | **-32.1%** | This is equivalent to the anticipated change in total demand for retail space |
| | **TWh** | **$X_{retail}$ = $EI_{retail}$*I*$AREA_{retail}$*($10^{-3}$)** | **-3.0** | - |
| **Anticipated change in electricity demand from hotels** | **TWh** | **$X_{Hotel}$ = $\Delta EI_{LargeHotel}$ * $AREA_{LargeHotel}$*($10^{-3}$)** | **-0.2** | - |
| **Total demand effect** | **TWh** | **$\Sigma X$ = $X_{retail}$ + $X_{office}$ + $X_{res}$** | **-6.8** | - |

### 9.2.2 Natural gas

Figure 67 illustrates the high impact case for gas as described in Section 5.3.2.2, for those items that changed as compared to Figure 64 and Figure 65. For remaining assumptions that are not detailed in the items below, please refer to Figure 64 and Figure 65.

**Figure 67. COVID-19 Impact Model – High Impact Case Calculations (Gas)**

| Item | Unit | Formula | Outcome | Source(s) and explanation |
|---|---|---|---|---|
| Observed change in residential load during COVID-19 | % | **E** | **3.2%** | Average of % change between March-May residential gas consumption (2016-2020)<br>Source: EIA. *Short-term Energy Outlook* |
| Ratio of office workers relocating to work from home, to change in residential load | - | **G = E/F** | **0.12** | This means that for each 1% of the workforce switching to work from home, residential load is anticipated to increase by 0.15% |
| Retail energy intensity | **MMcf/sqft** | **$EI_{retail}$** | **44.03** | Average energy intensity for food & beverage stores and non-food retail stores<br>*Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |
| Hotel energy intensity | **MMcf/sqft** | **$EI_{Hotel}$** | **56.2** | Average energy intensity for hotels, motels and lodges<br>*Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |
| Anticipated change in hotel energy intensity | **MMcf/sqft** | **$\Delta EI_{Hotel}$ = - ($EI_{Hotel}$ *%improvement)** | **-8.4** | Hotels are anticipated to reduce their energy intensity by ~3kWh-yr/sqft, as their energy intensity declines following energy efficiency improvements implemented as building managers find ways to cut costs |
| Office energy Intensity | **MMcf/sqft** | **$EI_{office}$** | **35.68** | Average energy intensity for office buildings (non-medical)<br>*Source: Natural Resources Canada. Survey of Commercial and Institutional Energy Use. 2016* |

Results of the calculations are shown in Figure 68.

**Figure 68. COVID-19 Impact Model – High Impact Case Results (Gas)**

| Item | Unit | Formula | Outcome | Source(s) and explanation |
|---|---|---|---|---|
| **Anticipated post-COVID permanent change in residential electricity demand** | % | **H = G*A** | **3.7%** | Multiplying the ratio of observed change in residential load as a result of work from home orders, by the anticipated percentage of office workers assumed to be permanently from home once offices are re-opened |
| | **Bcf** | **J** | **307.9** | Total residential electricity consumption, 2019<br>*Source:* Ontario Energy Board. *Yearbook of Electricity Distributors 2019.* |
| | **Bcf** | **$X_{res}$= H*J** | **11.5** | - |
| **Anticipated change in electricity demand from offices** | % | **D = (1-A)*(1+C)-1** | **-31.5%** | This is equivalent to the anticipated change in total demand for office space |
| | **Bcf** | **$X_{office}$ = $EI_{office}$*D*$AREA_{office}$ * ($10^{-3}$)** | **-14.6** | - |
| **Anticipated change in electricity demand from retail activities** | % | **I = ($GLA_{covid}$/GLA)-1** | **-32.1%** | This is equivalent to the anticipated change in total demand for retail space |
| | **Bcf** | **$X_{retail}$ = $EI_{retail}$*I*$AREA_{retail}$ *($10^{-3}$)** | **-7.1** | - |
| **Anticipated change in electricity demand from hotels** | **Bcf** | **$X_{Hotel}$ = $\Delta EI_{LargeHotel}$ * $AREA_{LargeHotel}$*($10^{-3}$)** | **-0.7** | - |
| **Total demand effect** | **Bcf** | **$\Sigma X$ = $X_{retail}$ + $X_{office}$ + $X_{res}$** | **-10.9** | - |

# 10 Appendix C: LEI survey questions on selected implications of COVID-19

A list of LEI's survey questions sent to Ontario electricity distributors is shown below. Similar survey questions were sent to gas distributors, although customer classes were defined as residential, commercial, and industrial (rather than the residential, GS, and Large Use/Sub-Transmission classes that were used for electricity distributors).

## 10.1 Historical period (between March and October 2020)

1. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on total volumes delivered over the historical period has been:

2. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on Residential customer volumes delivered over the historical period has been:

3. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on General Service <50 kW customer volumes delivered over the historical period has been:

4. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on General Service ≥50 kW customer volumes delivered over the historical period has been:

5. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on Large Use/Sub-Transmission customer volumes delivered over the historical period has been:

6. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on total revenues over the historical period has been:

7. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on Residential customer revenues over the historical period has been:

8. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on General Service <50 kW customer revenues over the historical period has been:

9. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on General Service ≥50 kW customer revenues over the historical period has been:

10. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on Large Use/Sub-Transmission customer revenues over the historical period has been:

11. Please provide any additional context to your historical period responses if you wish

### 10.2 Short-term (18-month forward period from November 2020 to April 2022)

12. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on total volumes delivered over the short-term is expected to be:

13. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on Residential customer volumes delivered over the short-term is expected to be:

14. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on General Service <50 kW customer volumes delivered over the short-term is expected to be:

15. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on General Service ≥50 kW customer volumes delivered over the short-term is expected to be:

16. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on Large Use/Sub-Transmission customer volumes delivered over the short-term is expected to be:

17. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on total revenues over the short-term is expected to be:

18. Please provide any additional context to your short-term forward period responses if you wish

### 10.3 Medium-term (From May 2022 to December 2025)

19. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on total volumes delivered over the medium-term is expected to be:

20. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on Residential customer volumes delivered over the medium-term is expected to be:

21. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on General Service <50 kW customer volumes delivered over the medium-term is expected to be:

22. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on General Service ≥50 kW customer volumes delivered over the medium-term is expected to be:

23. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on Large Use/Sub-Transmission customer volumes delivered over the medium-term is expected to be:

24. Relative to weather normalized expectations or alternative internal baselines prior to the COVID-19 pandemic, the impact of COVID-19 on total revenues over the medium-term is expected to be:

25. Please provide any additional context to your medium-term forward period responses if you wish

### 10.4 Medium to longer term impact on number of customers

26. As a result of the COVID-19 pandemic, do you anticipate a change in the total number of Residential customers over the medium to longer term? If so, by what percentage?

27. As a result of the COVID-19 pandemic, do you anticipate a change in the total number of General Service <50 kW customers over the medium to longer term? If so, by what percentage?

28. As a result of the COVID-19 pandemic, do you anticipate a change in the total number of General Service ≥50 kW customers over the medium to longer term? If so, by what percentage?

29. As a result of the COVID-19 pandemic, do you anticipate a change in the total number of on Large Use/Sub-Transmission customers over the medium to longer term? If so, by what percentage?

30. Please provide any additional context to your customer impact responses if you wish

### 10.5 Bad debt and late payments

31. Relative to internal baselines or expectations prior to the COVID-19 pandemic, have you seen a material increase in bad debt or late payments?

32. If your response to question 31 was Yes, among what customer classes was the material increase in bad debt or late payments witnessed (please select all that apply)?

33. If the Residential customer class was selected in question 32, how many days on average are payments late by, when compared to the baseline or usual collection cycle for this customer class?

34. If the General Service <50 kW customer class was selected in question 32, how many days on average are payments late by, when compared to the baseline or usual collection cycle for this customer class?

35. If the General Service ≥50 kW customer class was selected in question 32, how many days on average are payments late by, when compared to the baseline or usual collection cycle for this customer class?

36. If the Large Use/Sub-Transmission customer class was selected in question 32, how many days on average are payments late by, when compared to the baseline or usual collection cycle for this customer class?

37. Please provide any additional context to your bad debt/late payment responses if you wish

### 10.6 Additional respondent information

38. In what year do you expect weather-normalized load to reach 2019 levels?

39. Would you like to receive a collated version of responses?

40. Respondent company name

41. In 2019, the amount of electricity your company distributed was:

42. In 2019, the percentage of your company's distributed electricity that went to residential customers was within ±5% of:

43. In 2019, the percentage of your company's distributed electricity that went to General Service <50kW customers was within ±5% of:

44. In 2019, the percentage of your company's distributed electricity that went to General Service ≥50 kW customers was within ±5% of:

45. Please provide any additional comments should you have any