

2021 Annual Report on Commodity Price Hedging
Energy Initiatives, EFFM, Public Works

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Introduction

The City of Hamilton’s 2021 Annual Report on Commodity Price Hedging deals exclusively with the City’s energy commodity price hedging agreements and utility rate transactions for natural gas, electricity and fuel.

As defined in the Corporate Energy and Sustainability Policy, “Energy Commodities” means electricity, green power, natural gas, methane and all other petroleum based fuel products such as, diesel, bio-diesel, gasoline, fuel oil, propane and any other bulk commodity primarily used by the City for the purpose of heating and cooling of buildings and other structures, electricity generation, cogeneration demand response programs, smart grid programs and the fuelling of City fleets, as determined by the Manager of Energy Initiatives.

Utility Rates and Commodity Strategies Results

The utility rates and commodity strategies results include Global Adjustment (GA) rate changes and natural gas hedging programs. For the 2021 calendar year, there was a \$3.86 M cost benefit; \$3.64 M as a result of Class A* and \$0.23 M Cost benefit from hedging of natural gas.

Figure 1: 2021 Utility Rates and Commodity Strategies Results

2021 Results	\$M	% Levy	% Rate
Global Adjustment	\$ 3.64	31%	69%
Natural Gas Hedging	\$ 0.23	65%	35%
Total ¹	\$ 3.86	33%	67%

* Class A refers to optional electricity rates available only to larger customers, that are based on contribution to Ontario’s five demand peak hours the previous year.

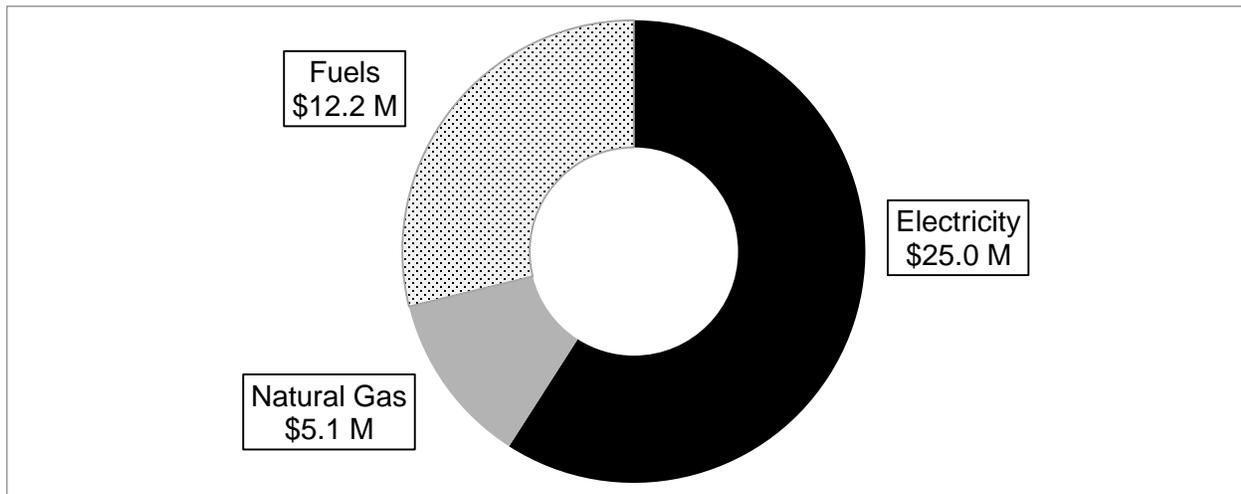
Further breakdown of these results can be found in the Global Adjustment and Natural Gas Risk Management sections in the report.

Overall Costs

In the City’s 2021 Annual Energy Report (PW21049(a)), the total actual energy costs for electricity, natural gas and fuels were reported at \$42.4 M. Overall, this is a 12% increase over 2020 energy costs. As outlined in the Annual Energy Report, the results in 2021 continue to be representative of an atypical year due to the lasting impacts of COVID-19. Although consumption increased, it was still lower from various building closures and changes to operational and staffing activities throughout the year. Costs were higher due to increased usage, higher rates from deferred provincial recovery programs from 2020 and increased costs on some commodity markets. The breakdown is shown in Figure 2.

¹ Totals differ due to rounding to the millions. Actual GA results shown on page 6, Actual Natural Gas on page 10.

Figure 2: 2021 Total Energy Costs (Electricity, Natural Gas and Fuel) in Millions (M)²



The electricity and natural gas costs, including those from district heating and cooling are incurred by City-owned buildings / facilities, Hamilton Water, Public Works Operations and Street and Traffic lighting. It excludes CityHousing Hamilton. Utilities include Alectra Utilities, Hydro One and Enbridge Gas Inc. Sites with only partial data may be excluded.

Fuel includes diesel, unleaded gasoline and compressed natural gas (CNG) for all Fleet, Operations and Transit vehicles but does not include Hamilton Police Services or Darts.

Electricity

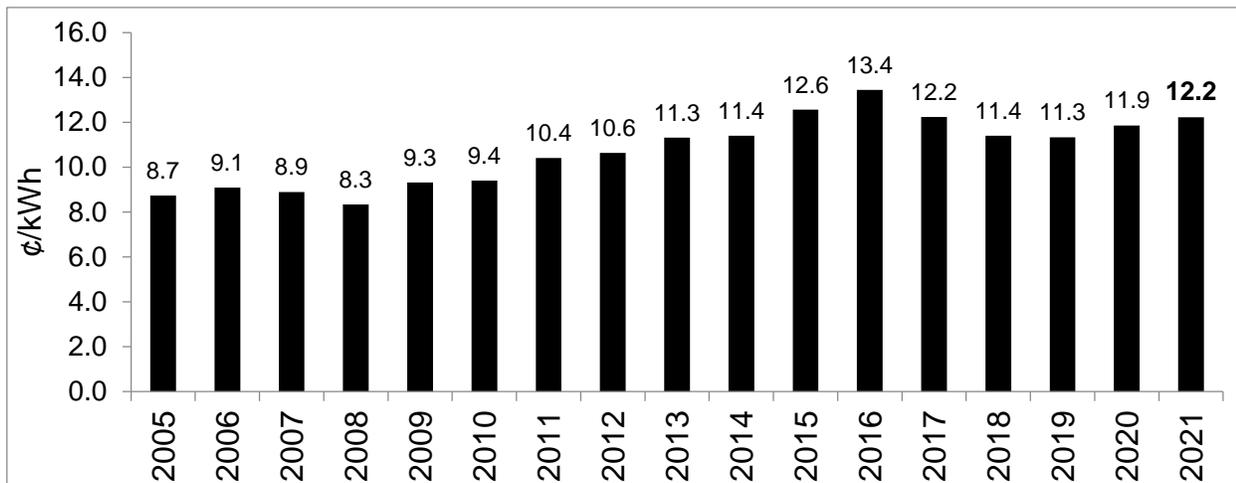
The electricity price comprises commodity, costs for distribution, transmission, regulatory and delivery. Hamilton is served by two local distribution companies (Alectra Utilities and Hydro One). Both Alectra Utilities and Hydro One are regulated by the Ontario Energy Board (OEB) and must get approval for any rate changes.

In 2021, the City’s overall expenditure for electricity was \$25.0 M. Electricity costs in 2021 increased by 6% compared to 2020. There was an increase of 3% in overall electrical consumption when compared to 2020. The City’s overall average price of electricity per kilowatt-hour (kWh) increased by 3% from 11.9 cents per kWh (¢/kWh) in 2020 to 12.2 ¢/kWh in 2021.

The average price for electricity, year over year, from 2005 to 2021 is outlined in Figure 3.

² Totals differ due to rounding. Actual total energy costs = \$42,375,909.

Figure 3: City of Hamilton Annual Average Electricity Price (¢/kWh) 2005-2021



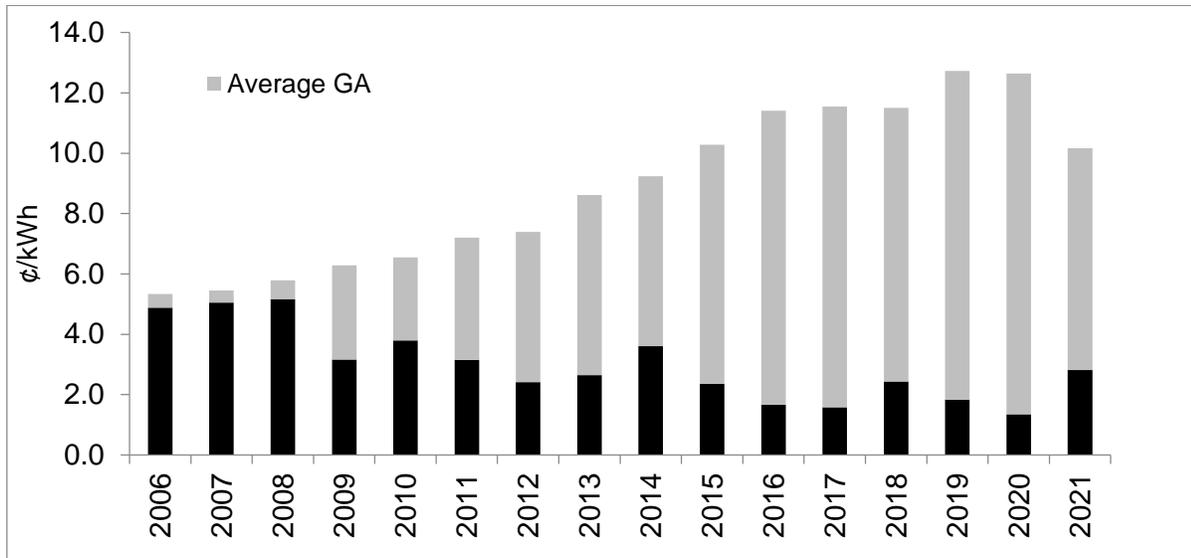
There are a variety of factors that impact electricity cost, some of which are consumption, process changes, regulatory changes, market activity and weather. In 2021, consumption had increased by 3% over 2020. Although some recovery occurred in 2021, the continued impacts of COVID-19 resulted in operational changes and shuttering of facilities at various periods throughout the year. Some facilities were re-purposed for use in vaccine roll-out programs, while others opened for limited public use, and still others were closed throughout. Average summer temperatures in 2021 were just slightly lower than 2020. Warmer temperatures will typically increase cooling demand, but as there continued to be limited capacity in most facilities, the impacts from weather were likely lower, though cannot be dismissed completely. The cooling degree days overall in Hamilton were 15% lower in 2021 compared to 2020 and on par with the five-year average.

Overall costs were 6% higher compared to 2020 due in part to the higher consumption (3%), Additionally, some provincial rate relief programs related to COVID-19 response did continue in 2021 to temporarily offer relief to residential and commercial rates. However, other costs that had been deferred in 2020 were recovered throughout 2021 which increased regulated costs (i.e. recovery of costs from Global Adjustment (GA) price caps for the April – June 2020 period).

The electricity market in Ontario itself is complex and volatile. Ontario’s electricity commodity includes the Hourly Ontario Electricity Price (HOEP) and the Global Adjustment (GA). When the HOEP is low, the GA increases to cover the costs of generation. The monthly costs vary depending on consumer demand, the generation mix, weather conditions and how often each type of generation is offered into the market.

It is possible to fix the price on forward terms for the HOEP. However, doing so does little to protect against the greater fluctuations of the GA, which makes up the larger portion of commodity costs. Staff recommendations have been to not hedge against the HOEP due to unfavourable market conditions. While the HOEP has declined over recent years, this has been offset by increases to the price of the Global Adjustment, as illustrated in Figure 4. In 2021, the HOEP did increase compared to recent years.

Figure 4: Electricity - Annual Average Price of HOEP and Global Adjustment 2006-2021



The commodity portion of the electricity price includes HOEP and GA. The annual average HOEP in 2021 was 2.8 ¢/kWh, which was a 108% increase over 2020. The average GA price component in 2021 was 7.4 ¢/kWh. This represents a 35% decrease from 2020, but also doesn't include any 2020 recovery cost. The overall combined average commodity price for electricity (10.2 ¢/kWh) was a 20% decrease from 2020.

Global Adjustment

The Global Adjustment (GA) is a market mechanism to account for differences between the market price and the rates paid to regulated and contracted generators and for conservation and demand management programs. Most of the GA costs arise from contracts that the Independent Electricity System Operator (IESO) has with generators, many of which are fixed price or guaranteed revenue agreements. There is no market mechanism to hedge specifically against the GA rate.

When spot prices (HOEP) are lower, the generator does not earn enough revenue from power sales to meet its revenue guarantees. In that case, the IESO pays the generator to make up this difference and the costs are recovered from consumers through the GA. Therefore, in a month when the market price of electricity is low, the GA will be higher and conversely when market prices are high, the GA will be lower.

As part of pandemic response initiatives in 2020, GA amounts were capped to reduce price impacts and further adjustments were made to long-term generation contracts which deferred some costs. In 2021, amendments to GA regulations directed the recovery of those 2020 deferred costs to be completed throughout 2021 as part of the monthly GA settlements.

For billing of the GA costs, most commercial consumers are on a Class B rate. Class B consumers pay a regulated GA rate set monthly and posted by the IESO. Eligible, high electrical demand customers can opt for a Class A rate. Class A rate customers pay the GA costs based on their percentage contribution to the total monthly provincial GA costs, calculated on the top five peaks during a peak setting period. This is called the peak demand factor (PDF). Class A customers can impact their GA costs by reducing demand during peak periods, resulting in lower costs.

For the July 2020-June 2021 period, the IESO initiated a peak hiatus for Class A customers to allow large customers to focus on economic recovery from the impacts of COVID-19. During that period, Class A customers did not need to anticipate and reduce demand during peak events and instead would keep the existing PDF into the 2021-2022 period if other eligibility requirements were met. But demand response was required starting May 2021 in order to minimize the PDF for the term starting July 2022.

Class A sites within the City include 900 Woodward Avenue, 850 Greenhill Avenue, 78 Kenilworth North and CUP Operations. In July 2021, 700 Woodward Avenue was added and 1579 Burlington Street East was removed. The results for 2021 was a cost benefit of \$3.64 M as shown in Figure 5.

Figure 5: 2021 Global Adjustment Class A Results

Global Adjustment Class A Results	2021 Results	Cumulative Results*
Levy (Tax) Supported Budget	\$ 1,125,127	\$ 11,215,026
Rate Supported Budget	\$ 2,511,526	\$ 35,560,913
Total Cost Benefits:	\$ 3,636,653	\$ 46,775,939

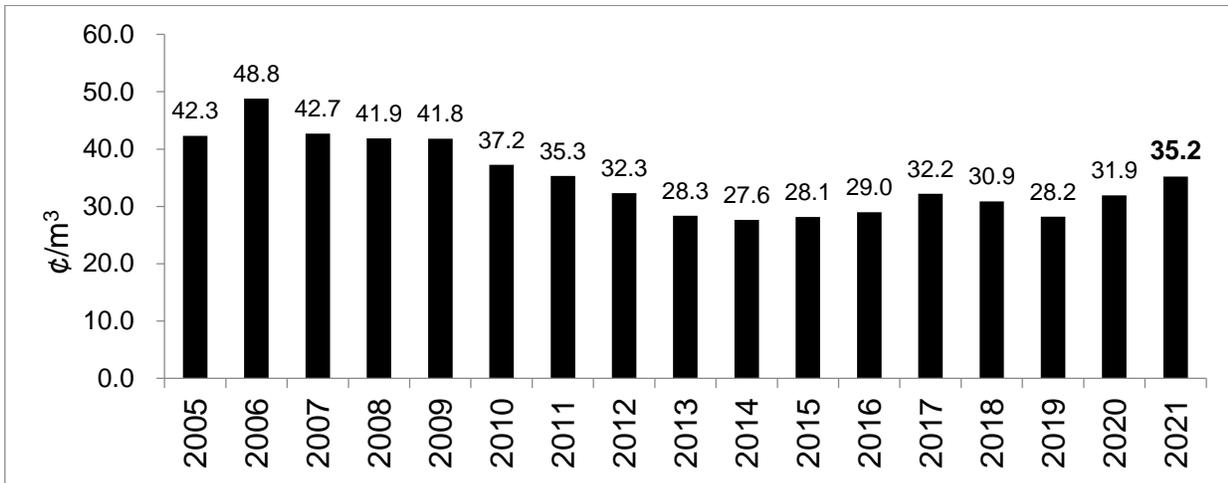
*Annual cumulative benefits 2011-2021

Natural Gas

The natural gas price includes commodity, transportation, regulatory and delivery. Hamilton is served by one local distribution company, Enbridge Gas Inc.

The City’s overall expenditure for 2021 natural gas, including the commodity costs and utility charges for delivery, transportation and storage was \$5.1 M. This is an increase of 14% over 2020 costs. There was an increase of 3% in natural gas consumption compared to 2020 totals. The overall average unit price was 35.2 cents per cubic metre ($\text{¢}/\text{m}^3$), which was a 10% increase compared to 2020’s price of 31.9 $\text{¢}/\text{m}^3$. The average price for natural gas, year over year, from 2005 to 2021 is outlined in Figure 6.

Figure 6: City of Hamilton Annual Average Natural Gas Cost ($\text{¢}/\text{m}^3$)



The higher consumption in 2021 is primarily a result of the additional volume required for the biosolids production activity with Hamilton Water. Most facilities saw their natural gas consumption drop or remain on par with 2020, but the biosolids was a steady user of natural gas. Weather was of less of an impact to costs and consumption in 2021. Although Hamilton experienced some cold weather in the winter months, the heating degree days overall were on par with 2020 and 7% lower than the five-year average. Commodity costs themselves started to trend upward in 2021. Ongoing hedging activity, described below in the Natural Gas Risk Management section, helped to mitigate market fluctuations.

The largest impact to costs was the annual increase to the Federal Carbon Charge (FCC). The FCC, mandatory for provinces without a designated carbon reduction plan, was implemented in Ontario starting August 2019. The FCC is charged per cubic meter of consumption and is included on Enbridge Gas bills. The FCC is set to increase annually every April and does increase costs as a result. The charge for the January to March 2021 period was 5.87 cents per cubic meter and increased to 7.83 cents per cubic meter as of April 2021.

Natural Gas Risk Management

Natural gas can be a volatile commodity. There are many factors that can influence prices in natural gas markets including weather, supply, demand, geo-political events and changes to refining and extraction technologies. To maintain control of costs and minimize the degree of price volatility, the City has purchased its natural gas directly from the wholesale market (since June 2006). The City has supply agreements with multiple parties to allow for competitive purchasing.

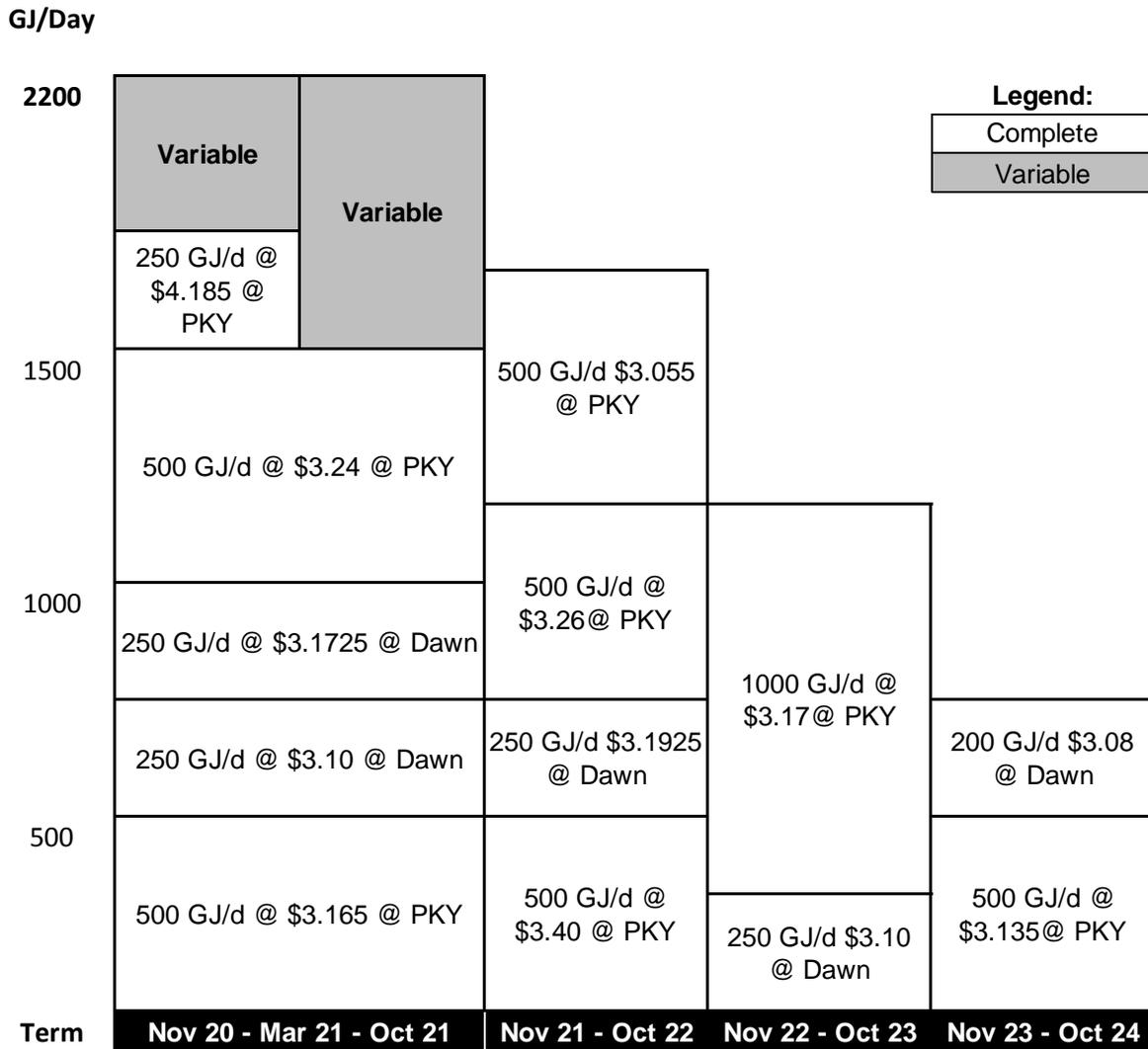
Overall, the procurement strategy is dynamic as staff, in conjunction with industry experts and the retained consultancy firm, make purchasing decisions based on market conditions. A portion of natural gas supply may be purchased as much as two to three years in advance to protect against market volatility while other portions are purchased just a month or two in advance. Fixing the price on a portion of the City’s natural gas volumes results in better budget predictability and protection against spot market fluctuations, particularly during extreme weather conditions or unforeseen market events.

The City purchases natural gas for City-owned facilities (excluding CityHousing Hamilton) and for compressed natural gas (CNG) for the Transit natural gas bus fleet. The average 2021 price for the natural gas (commodity only) was \$3.37 per gigajoule (GJ) (\$0.136/m³) including a blend of hedged and unhedged volumes. This does not include any Enbridge Gas charges such as delivery, storage or federal carbon charge which make up the total price.

For the majority of 2021, an average of 80% of natural gas supply was fully hedged. This was based on 2021 volume requirements across all contracts. At the end of 2021, volumes were hedged for the periods starting November 1, 2021, November 1, 2022 and a small volume for period starting November 1, 2023. Figure 7 provides a profile of the completed hedges of the end of December 2021.

The natural gas market began to trend higher in mid to late 2021 for daily and forward term markets as increased demand both domestically and abroad put upward pressure on prices. Staff monitors the market and continues to develop strategies for purchasing into the forward terms to capture agreeable market opportunities and help mitigate volatile and uncertain periods.

Figure 7: Natural Gas Hedge Profile (as of December 2021)

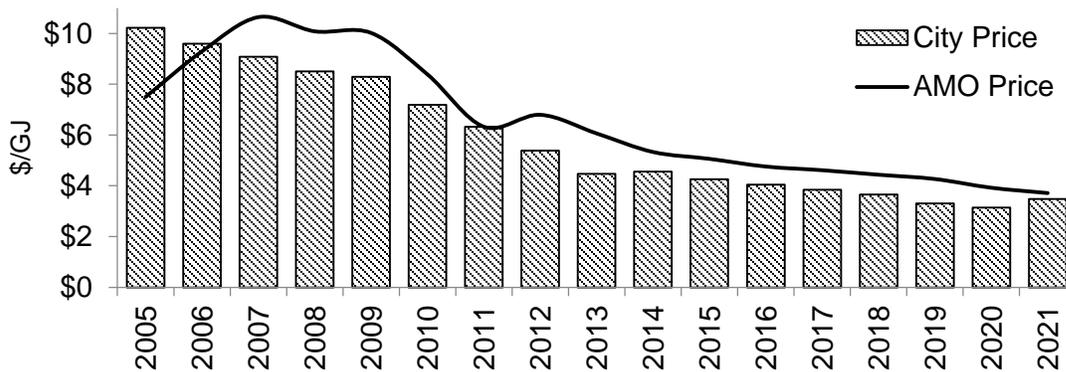


Notes on Figure 7:

- GJ/Day = Gigajoule per day
- PKY = Parkway Ontario delivery point
- Dawn = Dawn Ontario delivery point

To evaluate the performance of the hedging program, the City benchmarks its natural gas hedging activities against the procurement program offered by the Association of Municipalities of Ontario / Local Authority Services (AMO / LAS). Although the City has enough volume to allow for wholesale purchase from market suppliers, smaller municipalities may not have the volume or expertise to manage their own programs and may benefit from and highly value the AMO / LAS purchasing program. The City and AMO / LAS program comparison is shown in Figure 8 with overall results shown in Figure 9.

Figure 8: Average Price Comparison of City to AMO/LAS Natural Gas Program*



*As posted on LAS program website - <https://www.las.on.ca/>

Figure 9: Performance of Natural Gas Hedging Activity Compared to AMO / LAS Program

Natural Gas Hedging Performance Results	2021 Results	Cumulative Results*
Levy (Tax) Supported Budget	\$ 146,558	\$7,821,182
Rate Supported Budget	\$ 79,586	\$1,422,416
Total Cost Benefits:	\$ 226,143	\$9,243,598

*Performance relative to AMO/LAS Natural Gas Hedging Program since 2007

Although hedging activities do serve to effectively manage the commodity portion of natural gas prices, controlling consumption plays a role in managing the overall costs of natural gas. Consumption reduction helps to mitigate the potential for increased costs of natural gas due to changes in utility or regulated rates (i.e. delivery, carbon programs), while further reducing the footprint of the City’s facilities by reducing carbon emissions.

Natural Gas Agreements for Supply, Transportation, Storage and Delivery

In 2021, the City had master agreements for natural gas supply in place with Shell Energy North America (Canada) Inc., Tidal Energy Marketing Inc., Royal Bank of Canada and Twin Eagle Resource Management Canada LLC. All current supply counterparties have credit ratings that are compliant with the Corporate Energy Policy.³

In addition, the City has contracts in place with Enbridge Gas that are required to facilitate the transportation, delivery and storage of the City’s natural gas supply. The utility agreements include a direct purchase agreement for City sites, two T1 rate storage contracts for managing Transit CNG and Hamilton Water biosolids and an M13 rate production contract for renewable natural gas.

³ In July 2020, EDF Trading North America sold its Canadian natural gas portfolio and existing forward hedges to Twin Eagle Resource Management Canada LLC. Twin Eagle Resource Management Canada LLC is a private company and ratings are not publicly posted, however their financial statements are available for review. The City is in the process of determining requirements for a financial review.

Direct Purchase Agreements (DPA) with Enbridge Gas

DPAs outline the terms of service for delivery of natural gas, including designated delivery points, contract volumes and storage. The parameters are shown below in gigajoules (GJ) which is the unit in which gas is purchased to meet the requirements. Prices and consumption data on Enbridge Gas bills are reported in cubic metres (1 GJ = ~26 cubic metres). In 2021, the agreements and parameters on contract renewal were:

- SA7020 for 1,090 GJ/day – 250 miscellaneous City natural gas accounts which run from November 1 to October 31 each year.
- T1 for 692 GJ/day (increased from 651 GJ/day as of September 2020) - For Transit’s CNG bus fleet and transit site. The contract runs September 1 to August 31 each year.
- T1 for 437 GJ/d (as of May 1, 2021) – For Hamilton Water biosolids production operation. The contract runs from May 1 to April 30 each year.

Each DPA has its own specific delivery requirements, at different points along the variety of pipelines within North America and are reviewed and renewed annually. DPAs may also be amended throughout the year or adjusted to meet specific parameters. Specifically, for the T1 contracts, volumes are reviewed regularly to accommodate more frequent changes to requirements, such as changes to fleet size, weather impacts or operational adjustments. Incremental volumes over DCQ or lower volumes (less than DCQ) are commonly delivered to accommodate for these changes.

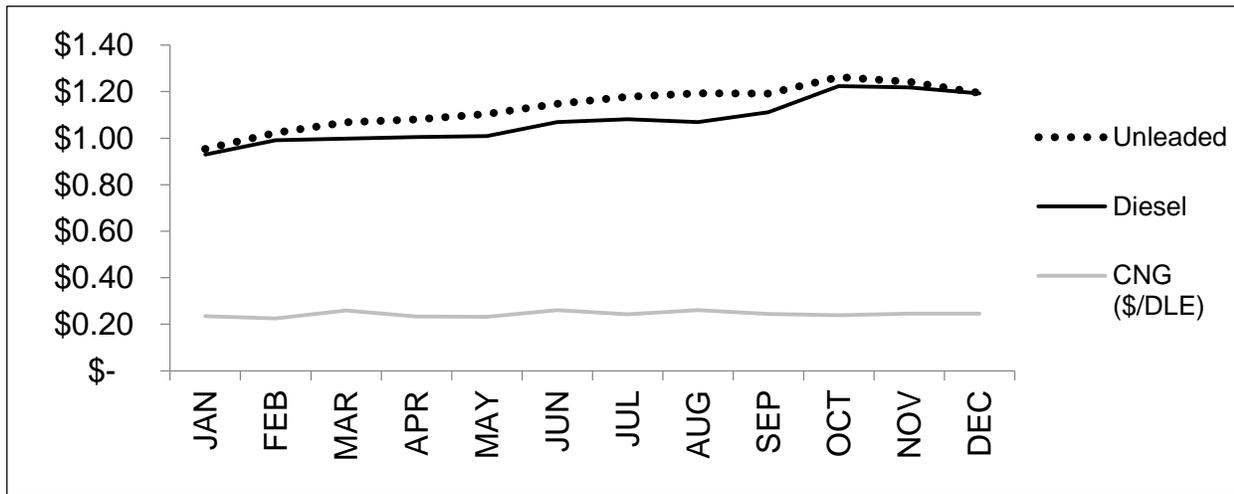
Compressed Natural Gas (CNG)

Natural gas is also purchased for Transit’s fleet of natural gas buses. The CNG station at the Mountain Transit Centre services the fleet of existing and growing number of natural gas buses for the City.

The CNG station operates under a natural gas storage contract (T1). The T1 contract is a daily-balanced contract with storage availability. The amount of storage volume is contracted annually and for the 2020-2021 contract term (September 2020 to August 2021), the T1 was allotted 15,309 GJs of storage. The difference between the daily volumes purchased and consumed are injected or withdrawn from the storage account. The contract allows for greater flexibility in managing the supply but must be reviewed daily to adhere to specific storage parameters.

The Transit fleet of natural gas buses totalled around 140 by the end of 2021 and is expected to increase with a series of replacements from diesel to CNG beginning in 2022. Natural Gas has a lower cost compared to diesel, however, it does operate at approximately 75% efficiency per diesel litre equivalent when compared to diesel bus usage. Despite its lower efficiency, the lower cost and lower GHG emissions is of benefit to the City. In 2021, the total cost of natural gas for the buses was \$1.44 M. Figure 10 shows the City’s monthly fuel prices with CNG price converted to diesel equivalent (DLE).

Figure 10: 2021 Monthly Average Fuel Prices for Diesel, Unleaded Gasoline and CNG



*Prices include Fleet charge of 3.5 cents per litre for diesel and gasoline.

When converted to diesel equivalent dollars and adjusting for efficiency, as shown in Figure 11 below, Transit spent \$3.2 M less in fuel costs using CNG buses than they would have using only diesel buses.

Figure 11: 2021 Cost Benefit of CNG as Compared to Diesel

Diesel Litre Equivalent (DLE)		5,902,159
Number of DLE Litres of Diesel Required*		4,367,597
Diesel cost at \$1.07/L (Average Fuel Price)	\$	4,694,304.26
2021 CNG Cost	\$	1,441,879.76
Avoided fuel cost by using CNG	\$	3,252,424.50

* Average of CNG buses run at ~75% of DLE compared to average DSL bus.

Traditional Fuel Supply

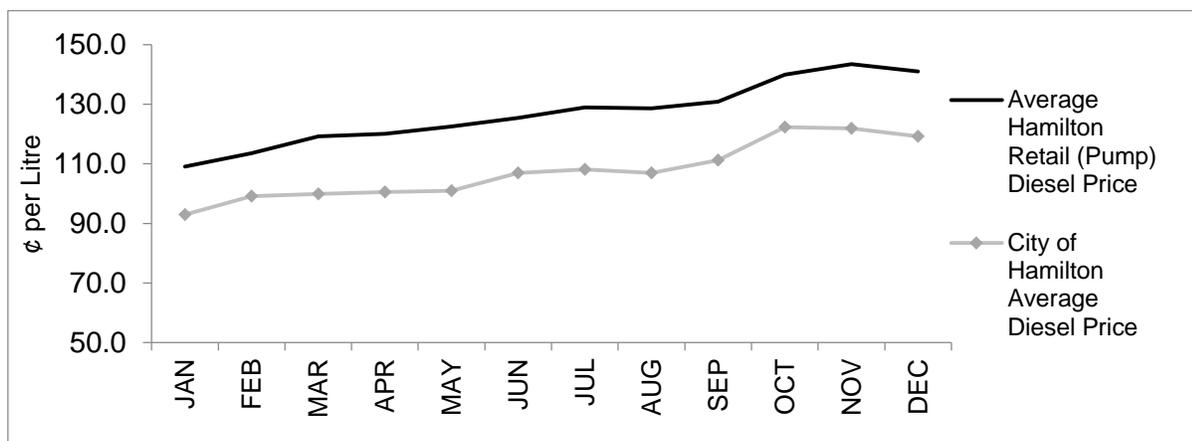
The City of Hamilton purchases diesel and gasoline fuel for its fleet of vehicles including buses, waste collection vehicles, snow removal trucks, street sweepers, forestry and parks vehicles, as well as, Fire and Emergency Services vehicles. In addition, the City purchases fuel for Hamilton Police Services.

In 2021, the City’s fuel procurement strategy involved utilizing a contractual bulk supply agreement with Suncor Energy Products Partnership. Fuel contracts are reviewed annually and based on pricing, deliverability and fuel types, the strategy can be adjusted accordingly.

The pricing arrangement for 2021 was based on the daily “rack” price of each required fuel type (diesel and gasoline) from a designated source terminal with negotiated discounts, delivery charges and taxes. Paying daily rack pricing for fuel assures customers are getting the lowest available price on the market for that day. Suncor Energy Products Partnership has a credit rating that is compliant with the Corporate Energy Policy.

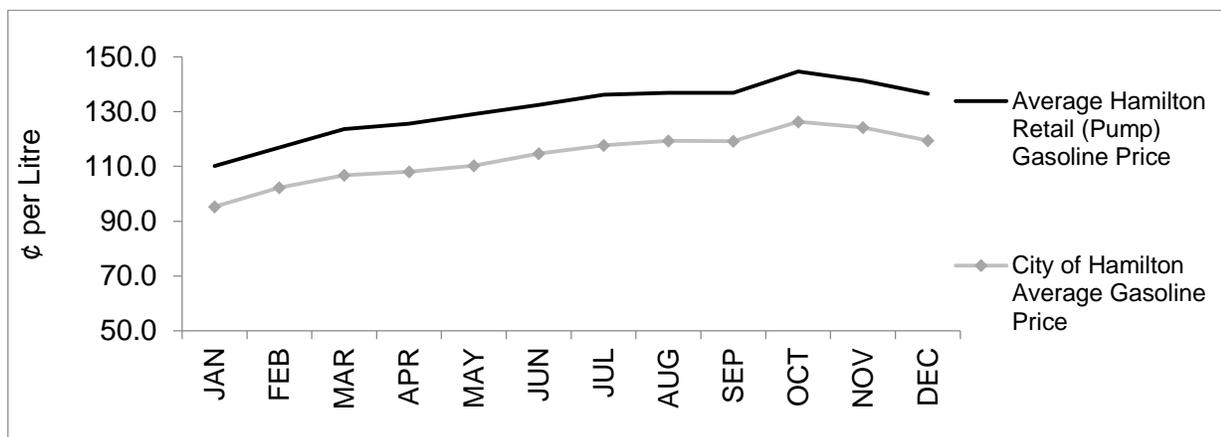
Wholesale purchase of diesel and gasoline offer lower prices than those at public fuel stations across the City. With data collected from reliable industry sources on average fuel pump prices in Hamilton, Figures 12 and 13 show the comparison between the average prices paid for diesel and gasoline purchased under City wholesale contracts versus the average retail prices paid at the pump (“Pump”) by the public at fuel stations throughout Hamilton.

Figure 12: 2021 Monthly Average Price of Diesel Paid by City versus at the Pump*



*Average Canadian Diesel retail pump prices for Hamilton from data available by Kalibrate Group (weekly)

Figure 13: 2021 Monthly Average Price of Gasoline Paid by City versus at the Pump*



*Average Canadian gasoline retail pump prices for Hamilton from data available by Kalibrate Group (weekly)

Fuel purchases for diesel and gasoline, as reported in the 2021 Annual Energy Report (PW21049(a)), excludes Hamilton Police Services. City departments used approximately 7.4 million litres of diesel, a 2% decrease from 2020. City departments used approximately 2.5 million litres of gasoline, an 8% increase over 2020.

The 2021 budget prices for diesel and gasoline were both set at \$1.00 per litre. For 2021, the average diesel and gasoline unit prices ended over budget and overall costs were just over the set budget. Prices for diesel and gasoline increased steadily in 2021 as economic recovery and resulting provincial and global demand for fuels increased driving up prices. With lower consumption but increased prices, the variance of actual to budget was \$0.12 M. Figure 14 shows the 2021 results as compared to budget.

Figure 14: 2021 Actual Fuel Consumption and Costs Compared to Budget (Diesel and Gasoline)

Fuel Type	2021 Budget	2021 Actual	2021 Variance (Actual - Budget)
Diesel Consumption (L)	8,262,180	7,410,520	- 851,660
Diesel Cost (\$)	\$ 8,262,180	\$ 7,964,845	-\$ 297,335
Diesel Unit Price (\$)	\$ 1.00	\$ 1.07	\$ 0.07
Gasoline Consumption (L)	2,387,330	2,465,253	77,923
Gasoline Cost (\$)	\$ 2,387,330	\$ 2,808,382	\$ 421,052
Gasoline Unit Price (\$)	\$ 1.00	\$ 1.14	\$ 0.14
Total Consumption (L)	10,649,510	9,875,773	- 773,737
Total Costs (\$)	\$ 10,649,510	\$ 10,773,227	\$ 123,717

Purchasing wholesale fuel does help insulate the City from some of the costs associated with pump prices, largely the marketing fees. However, City prices do include Fleet’s fee of 3.5 cents per litre.

Fuel Risk Management

Like other commodities, diesel and gasoline markets are volatile and are impacted by many localized and global geopolitical factors. One method to manage volatility is to hedge volumes for a forward term at a set price. This is typically achieved by utilizing a financial hedge to manage fluctuations in the market. Although the City has hedged in the past and staff continues to monitor related markets for favorable opportunities, no volumes were hedged in 2021 or are currently hedged.

Contract Agents

Managing the annual energy cost of over \$42 M requires continuous attention within an ever-changing energy industry. To maximize available expertise, the City uses outside consultants (Contract Agents) to assist staff in negotiating the unstable and complex energy commodity markets and associated regulatory frameworks. The use of these Contract Agents has proven valuable in that they are immersed daily in the energy commodity markets and have specialized expertise with respect to monitoring and responding to market changes. In 2021, the City had a professional services agreement with Jupiter Energy Advisors Inc. to assist with the day-to-day management of the City’s natural gas portfolio.

Additionally, the City reviews several market-based publications and engages with outside parties to further gather information on factors influencing pricing both domestically and globally.

Consistency with City Energy Commodity Hedging Policy and Goals

The agreements executed during the reporting period are consistent with the City’s Commodity Price Hedging Policy and Goals:

- The agreements have provided for a price of natural gas that was more stable and therefore, less risky than it would have been omitting the agreements;
- The actions taken through the authority of the Energy Commodity Policy have reduced uncertainty about energy costs, which have a direct impact on the City’s financial position. It has also enabled staff to respond to favourable market conditions;
- Credit ratings for the City’s primary commodity suppliers remain above the minimum threshold outlined in the policy;
- Commodity hedging provides municipalities with added flexibility to potentially mitigate or manage potential price fluctuations.