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September 29, 2022

Activity and Program-based Benchmarking (APB) – Unit Cost Report

EB-2018-0278

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1. Introduction

The Ontario Energy Board (OEB) launched an initiative in 2018 ([EB-2018-0278](#)) to develop Activity and Program-based Benchmarking (APB) to encourage continuous improvement by rate-regulated electricity distributors (distributors). Following discussions with a working group made up of stakeholders representing consumers and utilities, and consultation with Pacific Economics Group LLC (PEG), the OEB published the [APB Staff Discussion Paper](#) in February 2019 (the Discussion Paper). The discussion paper identified 10 programs that were selected for program-level benchmarking; six of these programs fall under operation and maintenance expenditure (“O&M”) and four under capital expenditure (“capex”) categories, as follows:

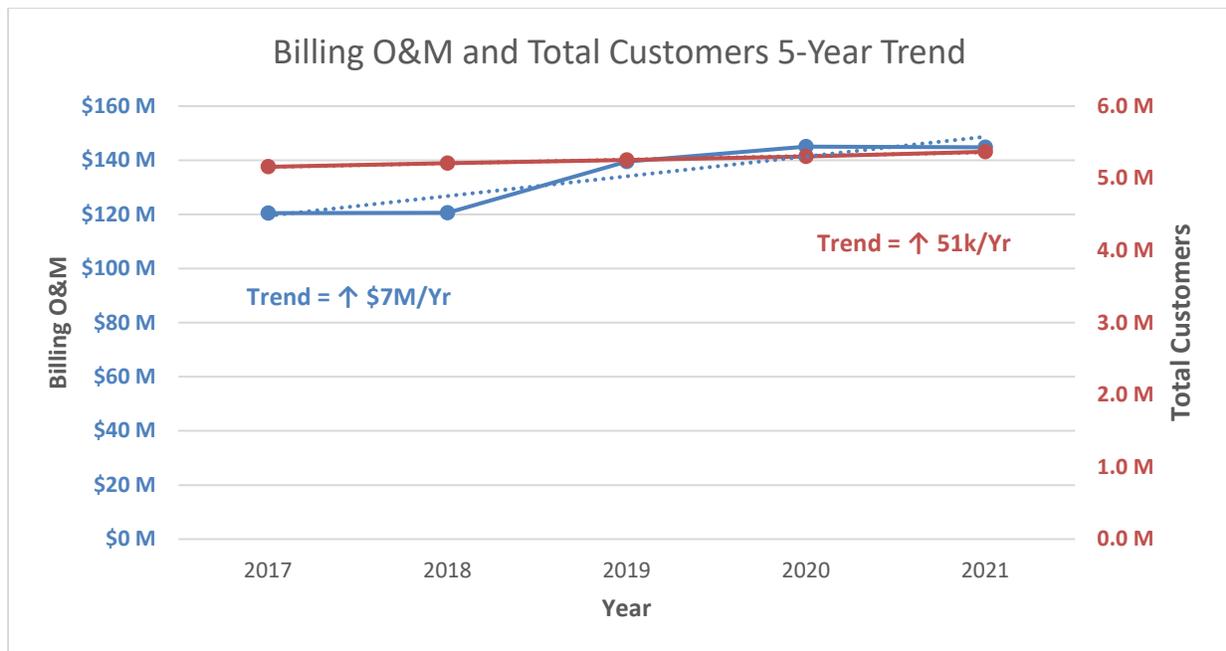
1. Billing O&M
2. Meters O&M
3. Vegetation management O&M
4. Lines O&M
5. Distribution station equipment O&M
6. Poles, towers and fixtures O&M
7. Distribution station equipment capex
8. Pole, towers and fixtures capex
9. Line transformers capex
10. Meter capex

Some of the historical data required to calculate the unit costs of the above ten programs was collected through limited data surveys. From the 2021 fiscal year onwards, all the required data points are available through the annual Reporting and Record keeping Requirements (RRR) filing submitted by distributors. This report provides the 2021 unit costs along with a snapshot of 2017 to 2021 trends for the 10 programs.

2. Unit Cost Benchmarking Results

2.1 Billing O&M

For the five-year period of 2017-2021, the overall industry trend¹ of billing costs² as measured by the line of best fit increased by approximately \$7 million per year. For the same period, the overall total number of customers³ as measured by the line of best fit also increased by approximately 51,000 customers per year. The chart below shows the five-year trend.



The unit cost for this metric is calculated by dividing the billing cost incurred by the total number of customers.

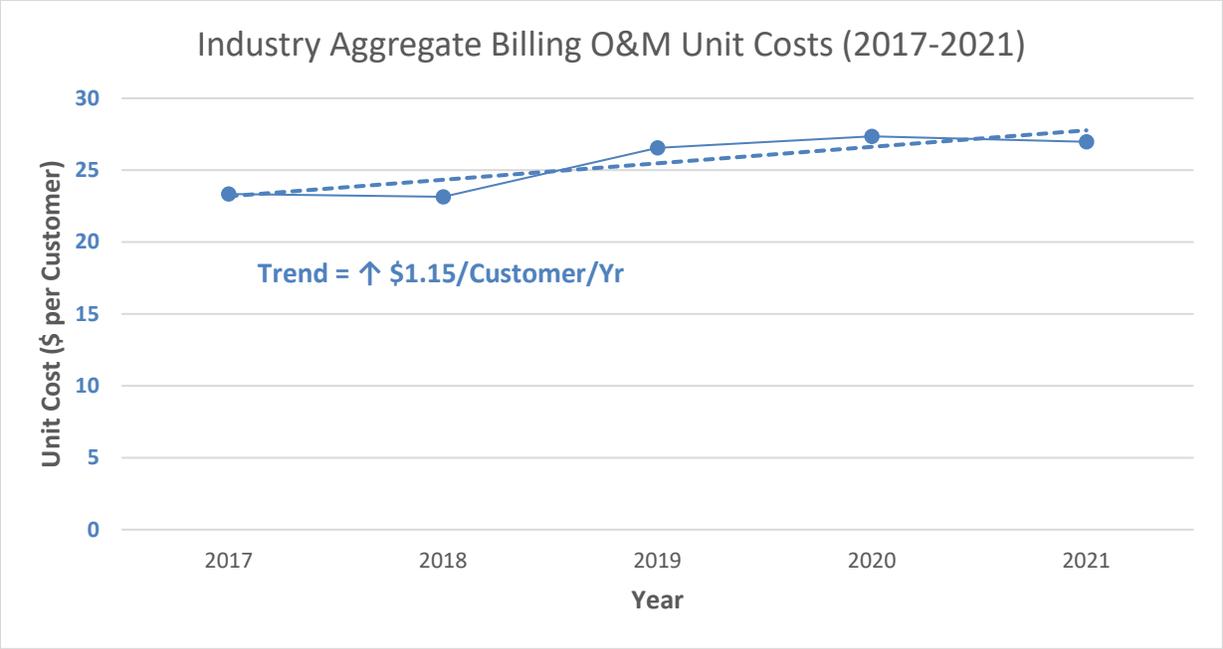
$$\text{Unit Cost (\$/Customer)} = \frac{\text{USoA 5315 (\$)}}{\text{Total Number of Customers}}$$

The industry aggregate unit cost derived by dividing the total billing cost of all 57 distributors by the total number of customers is shown in the chart below. Aggregated at the industry level, the unit cost increased by \$1.15/customer per year.

¹ Combined for all 57 distributors.

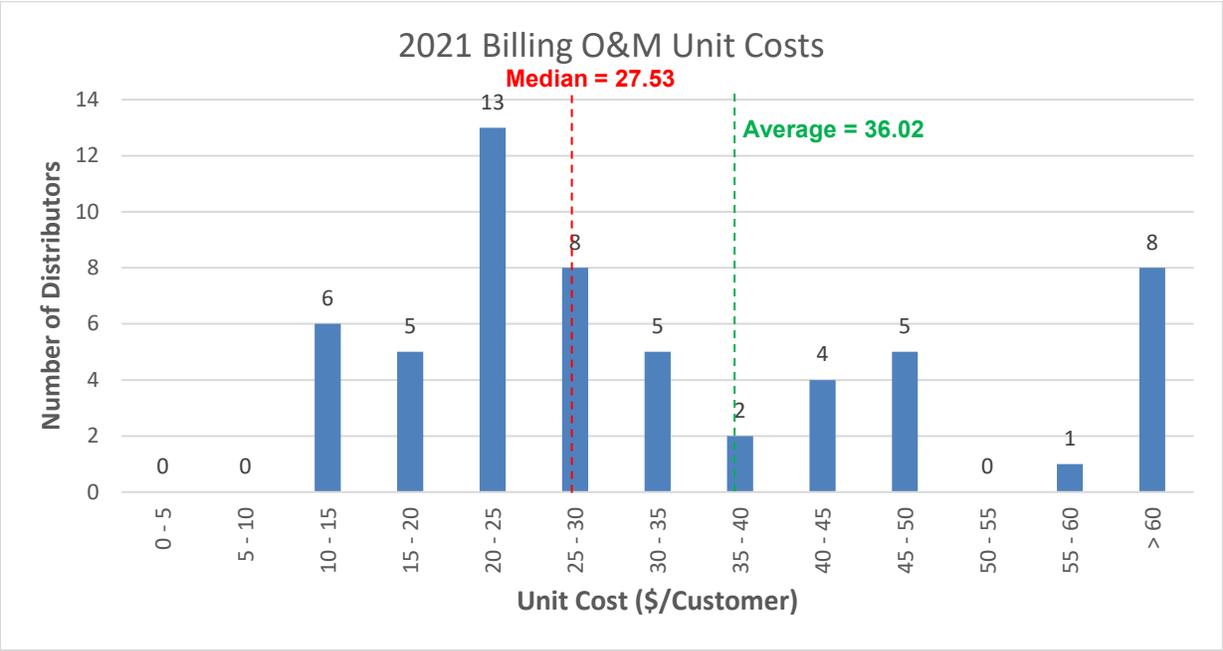
² Account 5315 as per Accounting Procedures Handbook for Electricity Distributors.

³ Excludes street lighting, sentinel lighting, and unmetered scattered load (USL) connections.



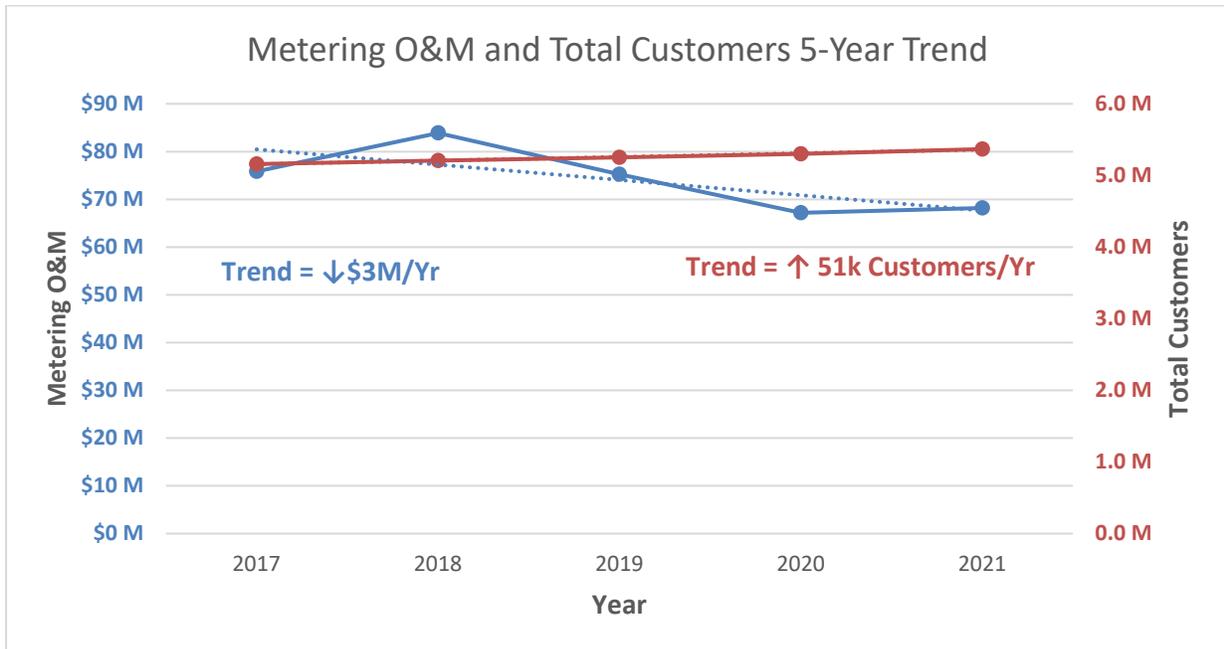
The total billing cost combined for all 57 distributors decreased by 0.18% from 2020 to 2021, contrary to the five-year uptrend, whereas the total number of customers increased by 1.22% for the same period, in line with the five-year uptrend.

The histogram below summarizes the 2021 unit cost results. The median unit cost for 2021 is \$27.53/customer and the average unit cost is \$36.02/customer.



2.2 Metering O&M

For the five-year period of 2017-2021, the overall industry trend⁴ of metering costs⁵ as measured by the line of best fit decreased by approximately \$3 million per year. For the same period, the overall total number of customers⁶ as measured by the line of best fit also increased by approximately 51,000 customers per year. The chart below shows the five-year trend.



The unit cost for this metric is calculated by dividing the metering cost by the total number of customers.

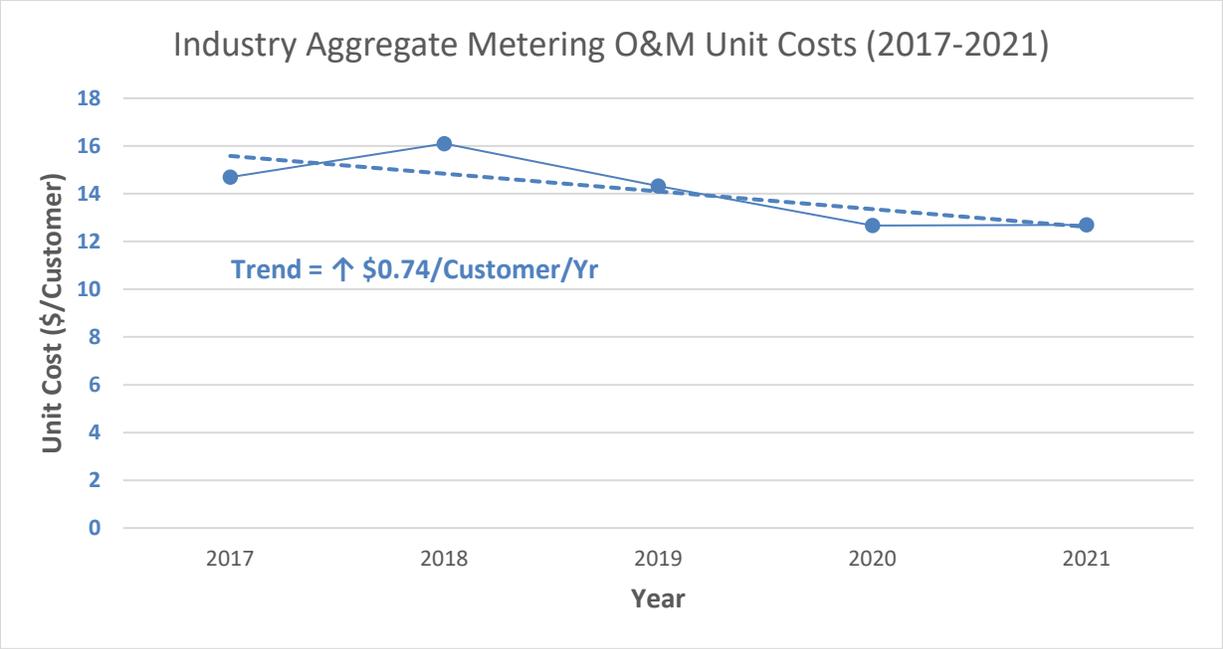
$$\text{Unit Cost (\$/Customer)} = \frac{\text{USoA [5065+5175+5310] (\$)}}{\text{Total Number of Customers}}$$

The industry aggregate unit cost derived by dividing the total billing cost of all 57 distributors by the total number of customers is shown in the chart below. Aggregated at the industry level, the unit cost declined by \$0.74/customer per year.

⁴ Combined for all 57 distributors.

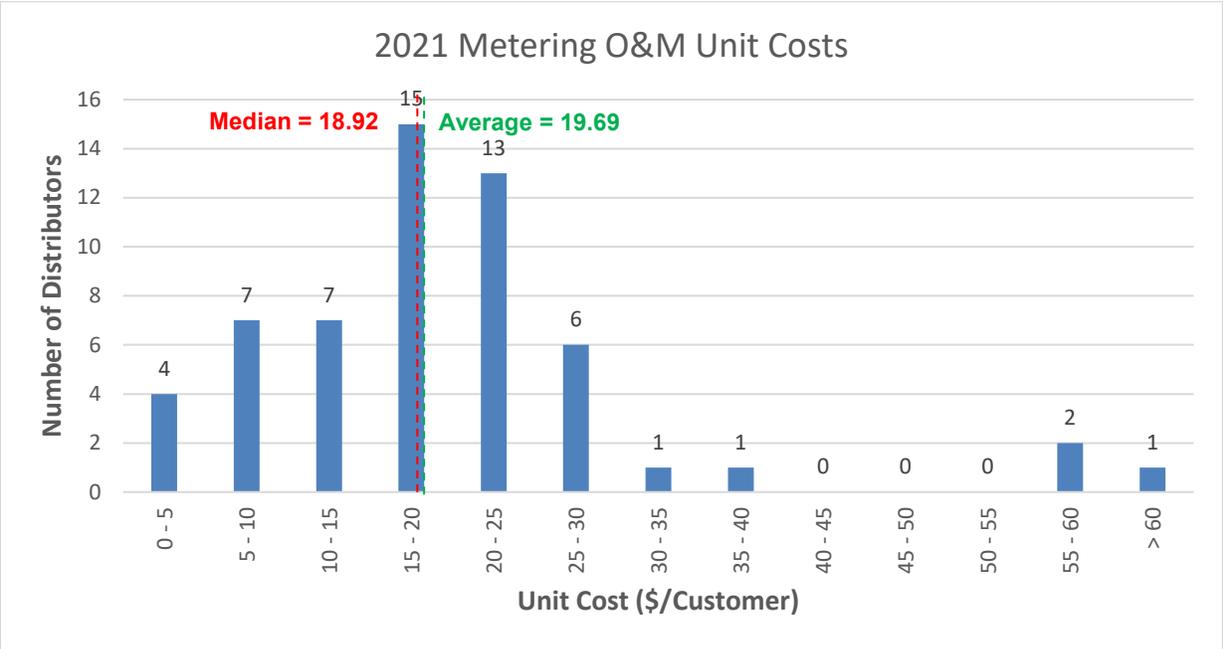
⁵ Accounts 5065, 5175, 5310 as per Accounting Procedures Handbook for Electricity Distributors.

⁶ Excludes street lighting, sentinel lighting, and USL connections.



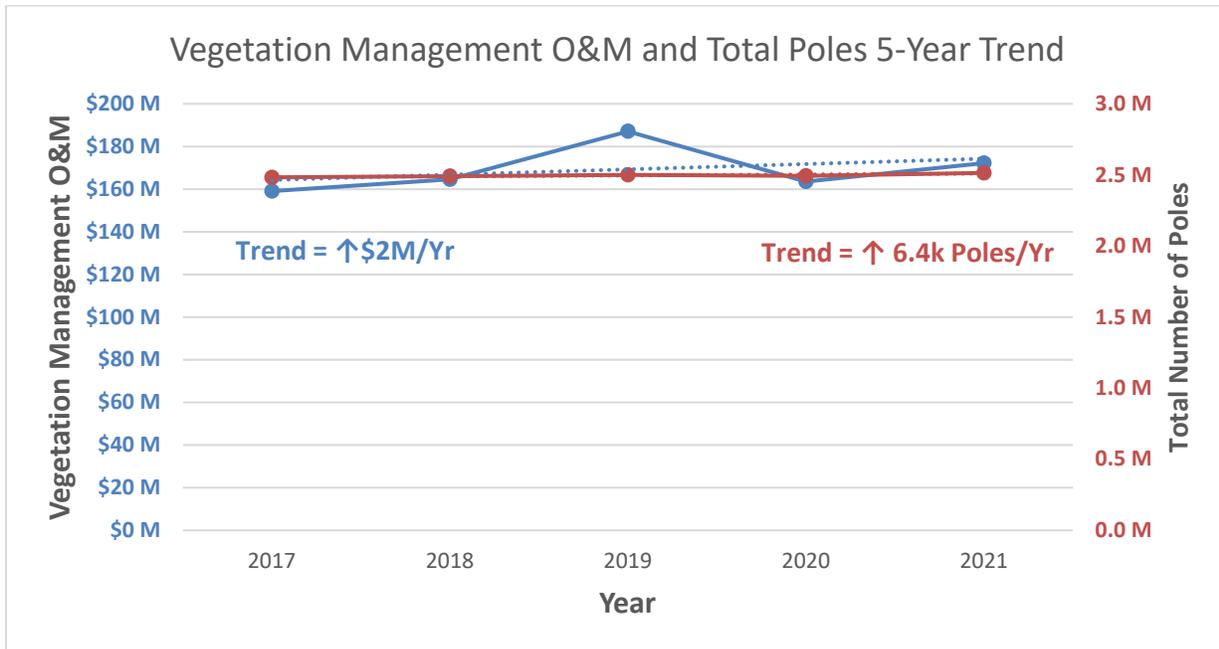
The total cost for metering combined for all 57 distributors increased by 1.49% from 2020 to 2021, contrary to the five-year downtrend, whereas the total number of customers increased by 1.22% for the same period, in line with the five-year uptrend.

The histogram below summarizes the 2021 unit cost results for metering O&M. The median unit cost for 2021 is \$18.92 per customer and the average unit cost is \$19.69 per customer.



2.3 Vegetation Management O&M

For the five-year period of 2017-2021, the overall industry trend⁷ of vegetation management costs⁸ as measured by the line of best fit increased by approximately \$2 million per year. For the same period, the overall total number of poles also increased by approximately 6,400 poles per year. The chart below shows the five-year trend.



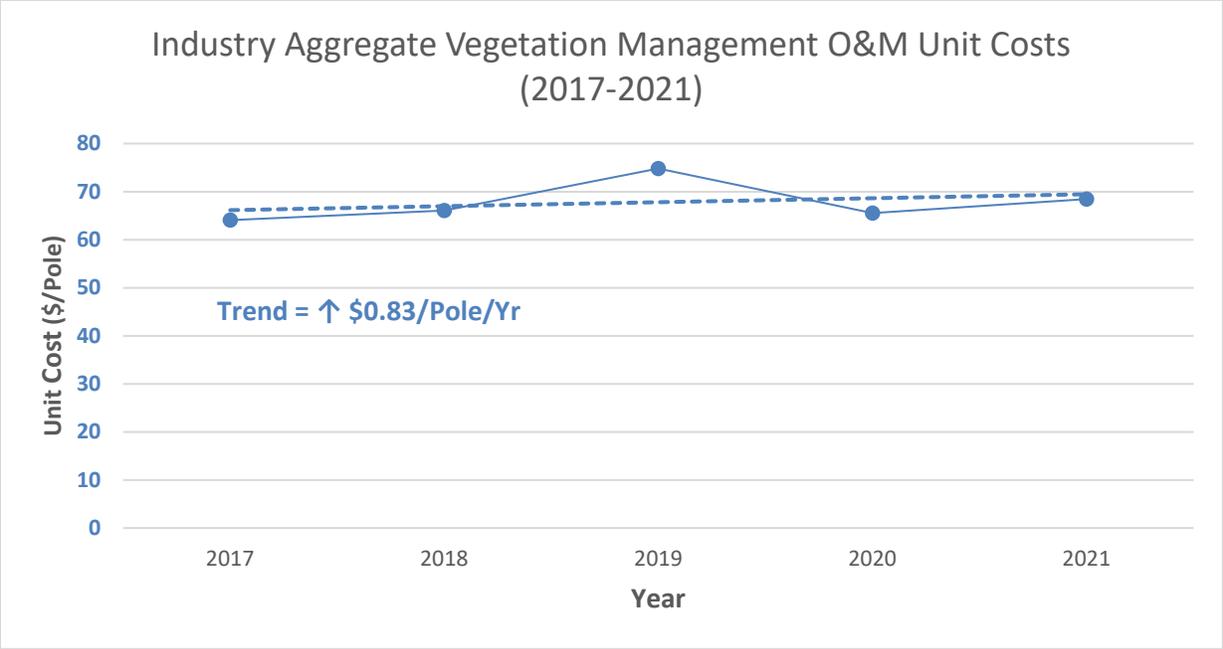
The unit cost for this metric is calculated by dividing the vegetation management cost by the total number of poles.

$$\text{Unit Cost (\$/Pole)} = \frac{\text{USoA 5135 (\$)}}{\text{Total Number of Poles}}$$

The industry aggregate unit cost derived by dividing the total vegetation management cost of all 57 distributors by the total number of poles in the system is shown in the chart below. Aggregated at the industry level, the unit cost increased by \$0.83/customer per year.

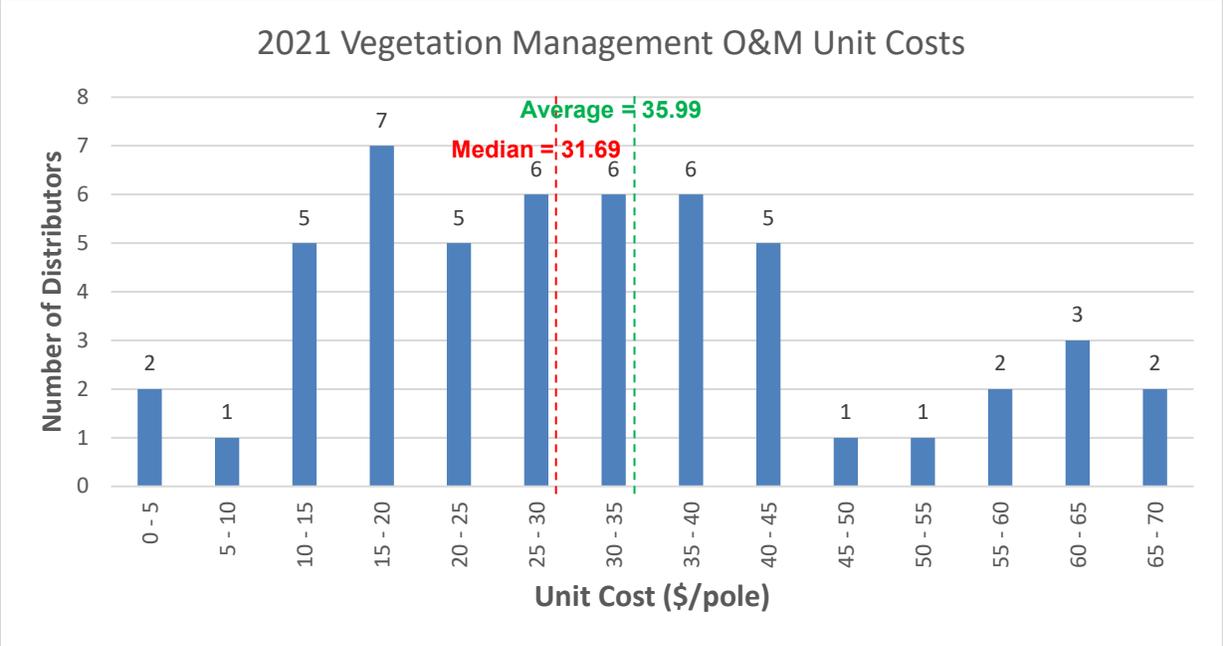
⁷ Combined for all 57 distributors.

⁸ Account 5135 as per Accounting Procedures Handbook for Electricity Distributors.



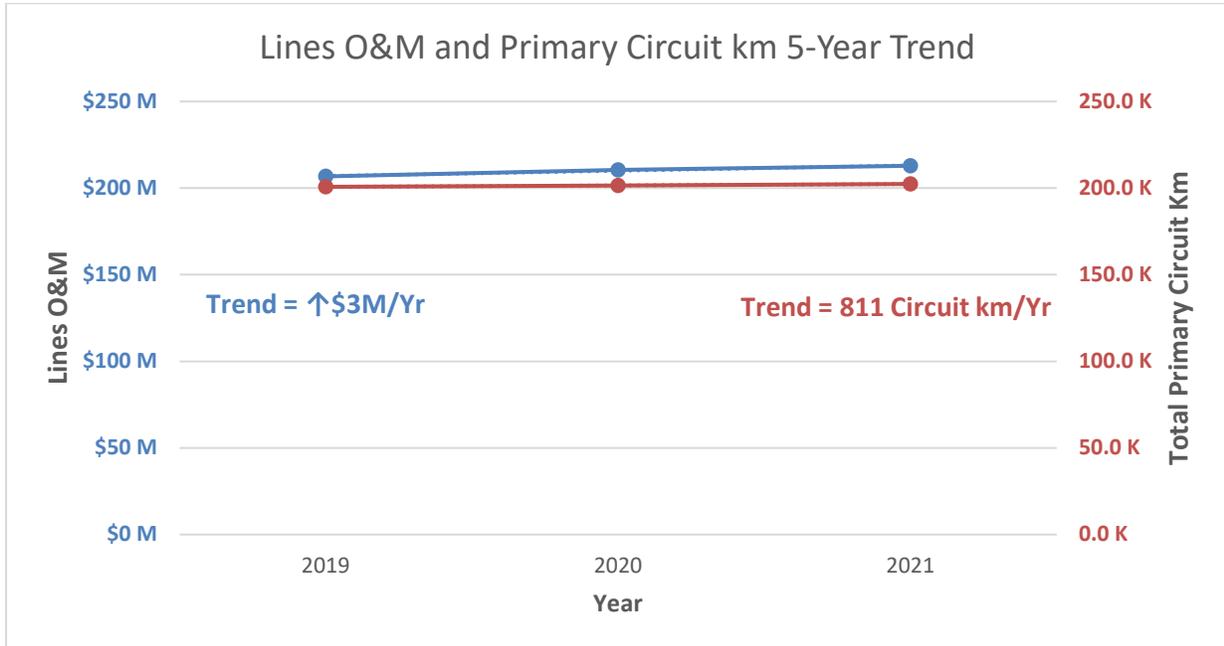
The total cost for vegetation management combined for all 57 distributors increased by 5.28% from 2020 to 2021, in line with the five-year trend, whereas the total number of poles in the system increased by 0.83% for the same period, also in line with the five-year trend.

The histogram below summarizes the 2021 unit cost results for vegetation management O&M. The median unit cost for 2021 is \$31.69 per pole and the average unit cost is \$35.99 per pole.



2.4 Lines O&M

For the three-year⁹ period of 2019-2021, the overall industry trend¹⁰ of the lines cost¹¹ as measured by the line of best fit increased by approximately \$3 million per year. For the same period, the overall trend of the total number of primary circuit kilometres as measured by the line of best fit also increased by approximately 811 circuit kilometres per year. The chart below shows the three-year trend.



The unit cost for this metric is calculated by dividing the lines cost by the total number of primary circuit kilometres.

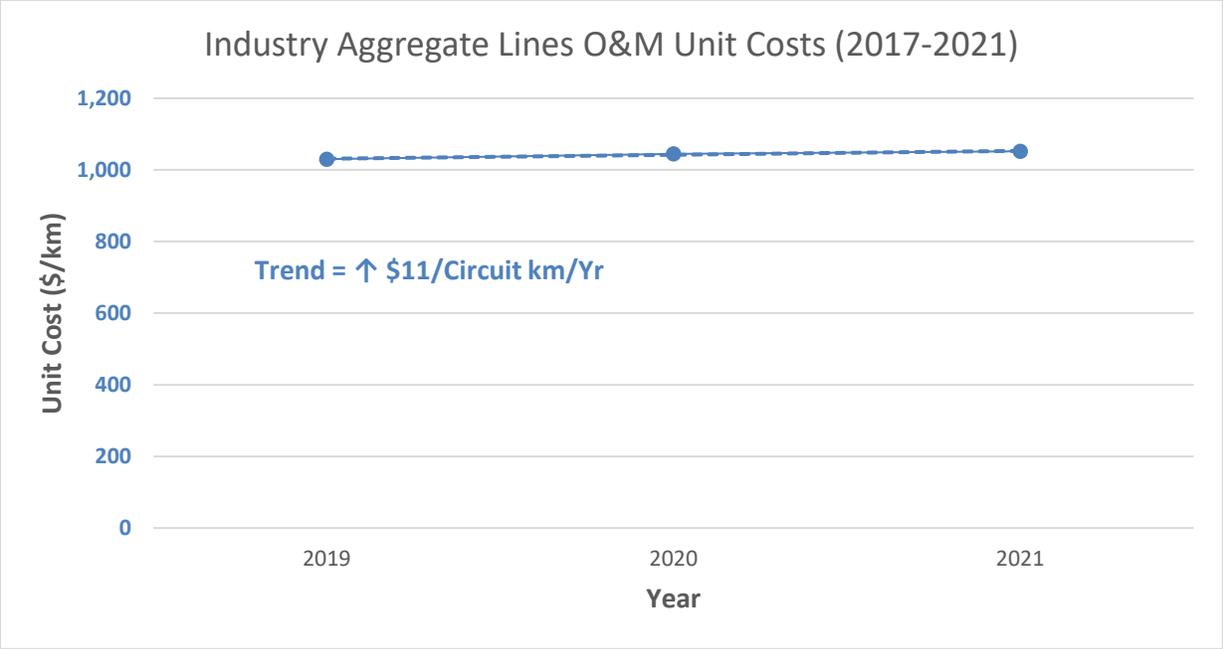
$$\text{Unit Cost (\$/Primary Circuit km)} = \frac{\text{USoA [5020 + 5025 + 5040 + 5045 + 5090 + 5095 + 5125 + 5130 + 5145 + 5150 + 5155]} (\$)}{\text{Total Primary Circuit Kilometres}}$$

The industry aggregate unit cost derived by dividing the total vegetation management costs of all 57 distributors by the total number of poles in the system is shown in the chart below. Aggregated at the industry level, the unit cost increased by \$11/circuit km per year.

⁹ Primary circuit kilometres data is unavailable for years 2017-2018.

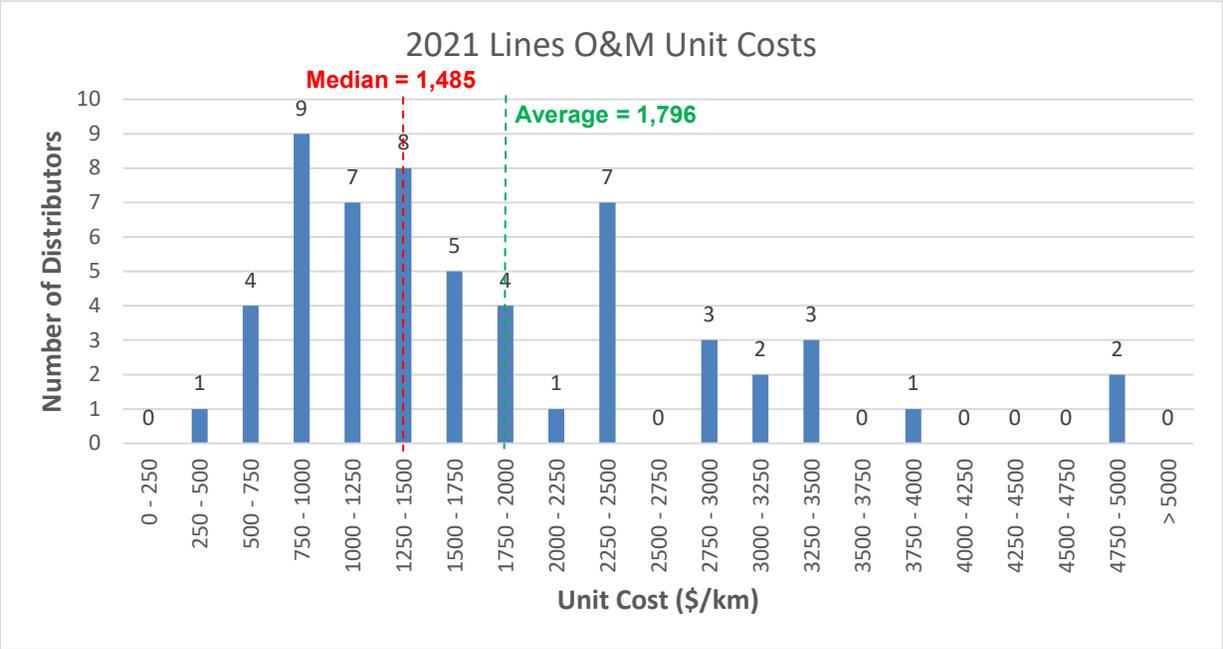
¹⁰ Combined for all 57 distributors.

¹¹ Accounts 5020, 5025, 5040, 5045, 5090, 5125, 5130, 5145, 5150, and 5155 as per Accounting Procedures Handbook for Electricity Distributors.



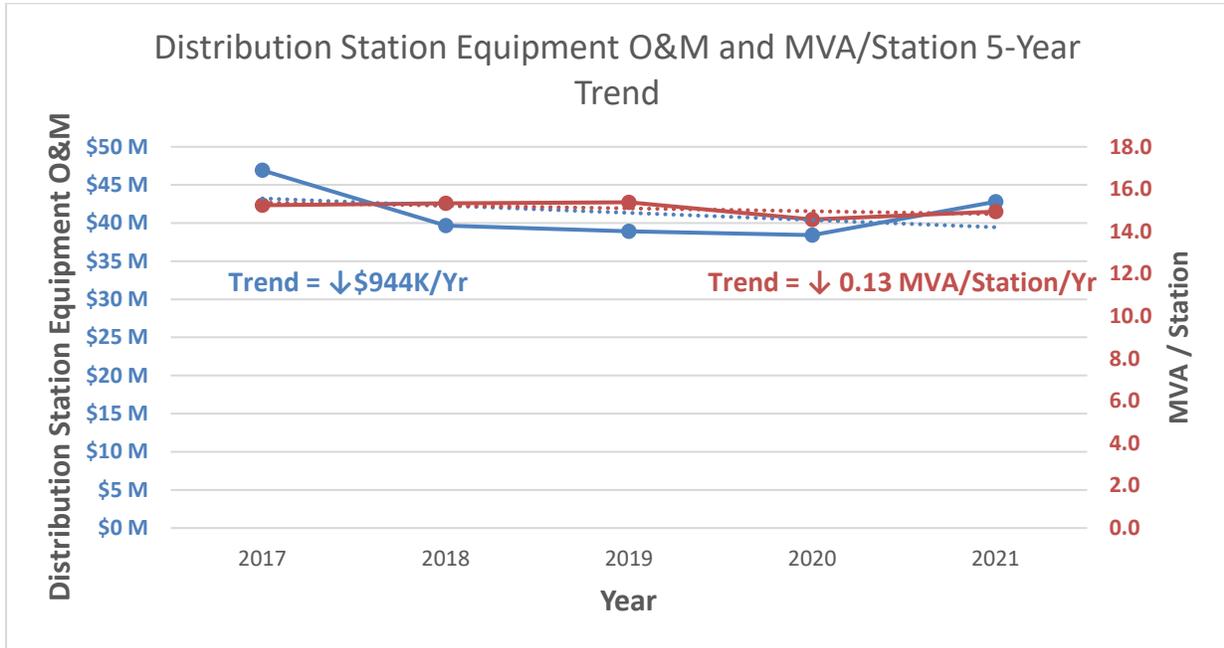
The total cost for lines O&M combined for all 57 distributors increased by 5.28% from 2020 to 2021 in-line with the three-year trend, whereas the total number of primary circuit kilometres increased by 0.44% for the same period, also in line with the three-year trend.

The histogram below summarizes the 2021 unit cost results for lines O&M. The median unit cost for 2021 is \$1,485 per km and the average unit cost is \$1,796 per km.



2.5 Distribution Station Equipment O&M

For the five-year period of 2017-2021, the overall industry trend¹² of distribution station equipment costs¹³ as measured by the line of best fit decreased by approximately \$944K per year. For the same period, the overall trend of the Mega Volt-Ampere (MVA) per station also decreased by approximately 0.13 MVA/stations per year. The chart below shows the five-year trend.



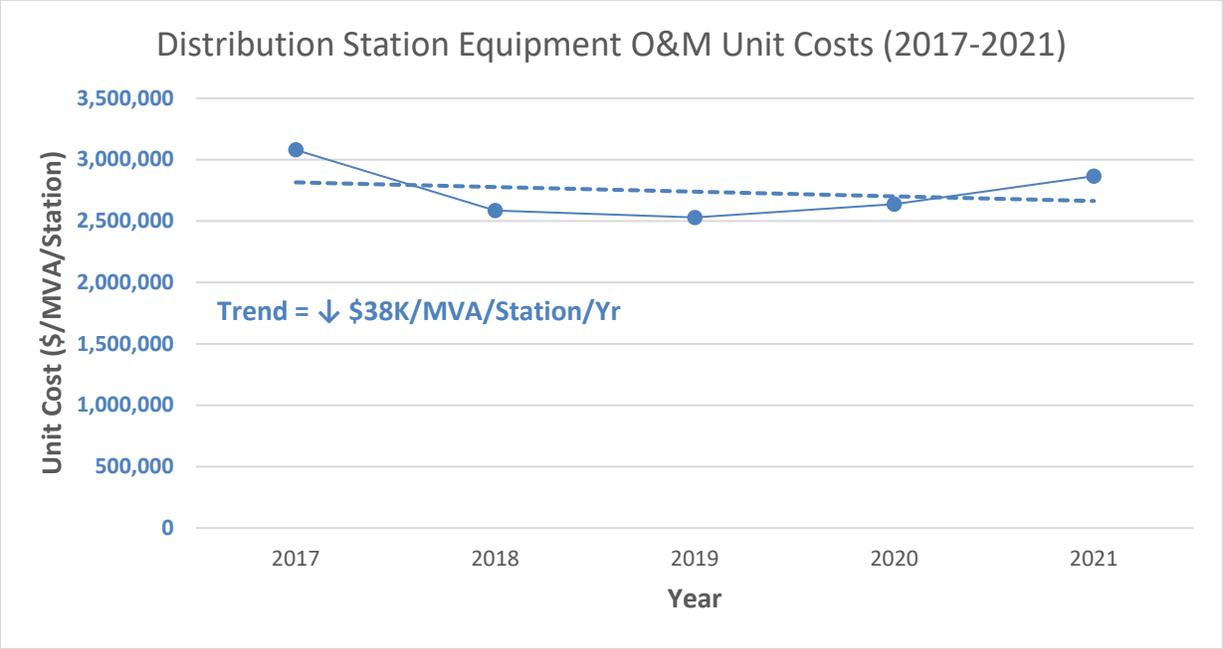
The unit cost for this metric is calculated by dividing the distribution station equipment cost by the MVA per station.

$$\text{Unit Cost} \left(\frac{\$}{\frac{\text{MVA}}{\text{Station}}} \right) = \frac{\text{USoA [5016+5017+5114]} (\$)}{\text{MV/Station}}$$

The industry aggregate unit cost derived by dividing the total distribution system equipment costs of the 45 distributors by MVA per station combined for all those distributors is shown in the chart below. Aggregated at the industry level, the unit cost decreased by \$38K/MVA/station per year.

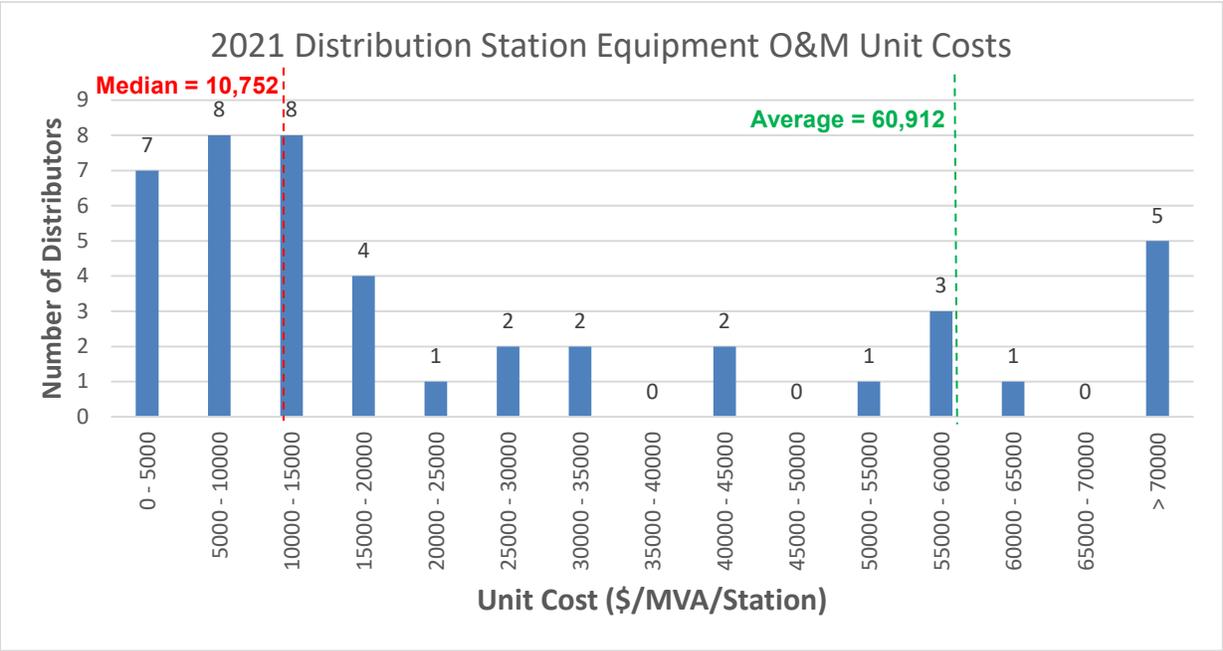
¹² Combined for 45 distributors. Excludes 12 of the 57 distributors that do not own any distribution stations.

¹³ Accounts 5016, 5017, 5114 as per Accounting Procedures Handbook for Electricity Distributors.



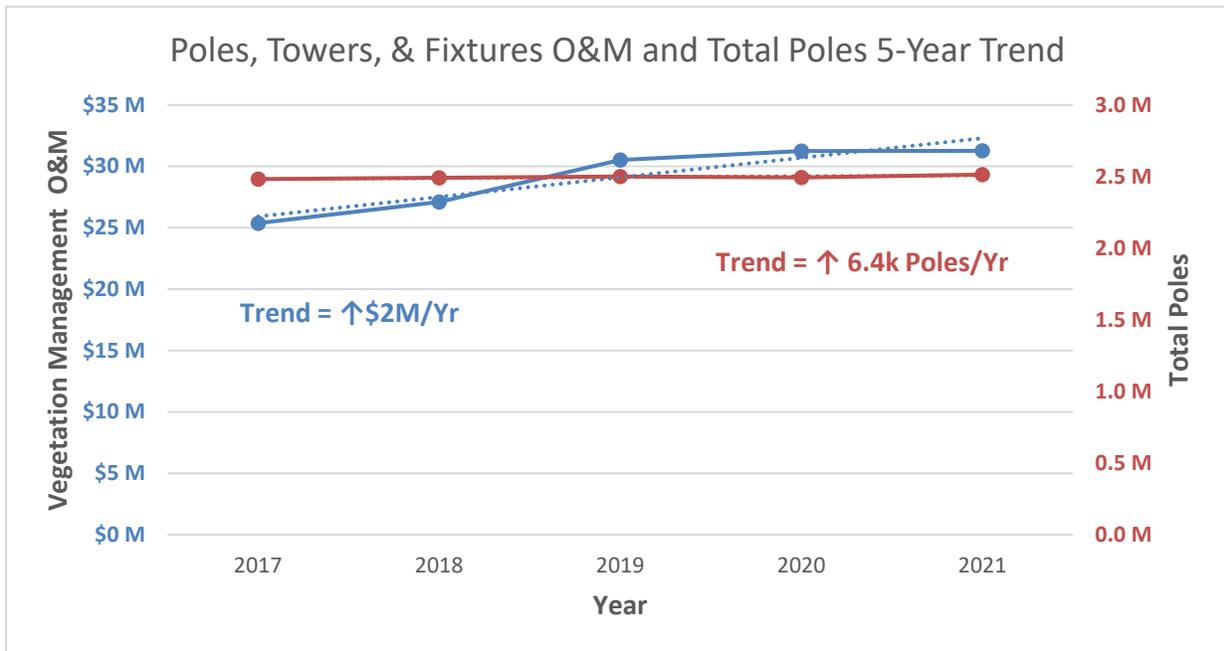
The total cost for distribution station equipment combined for the 45 distributors increased by 10.2% from 2020 to 2021, contrary to the five-year downtrend, whereas the overall MVA/stations increased by 2.5% for the same period, also contrary to the five-year downtrend.

The histogram below summarizes the 2021 unit cost results for distribution station equipment O&M. The median unit cost for 2021 is \$10,752 per MVA/station and the average unit cost is \$60,912 per MVA/station.



2.6 Poles, Towers and Fixtures O&M

For the five-year period of 2017-2021, the overall industry trend¹⁴ of poles, towers and fixtures cost¹⁵ as measured by the line of best fit increased by approximately \$2 million per year. For the same period, the overall trend of the total number of poles as measured by the line of best fit also increased by approximately 6,400 poles per year. The chart below shows the five-year trend.



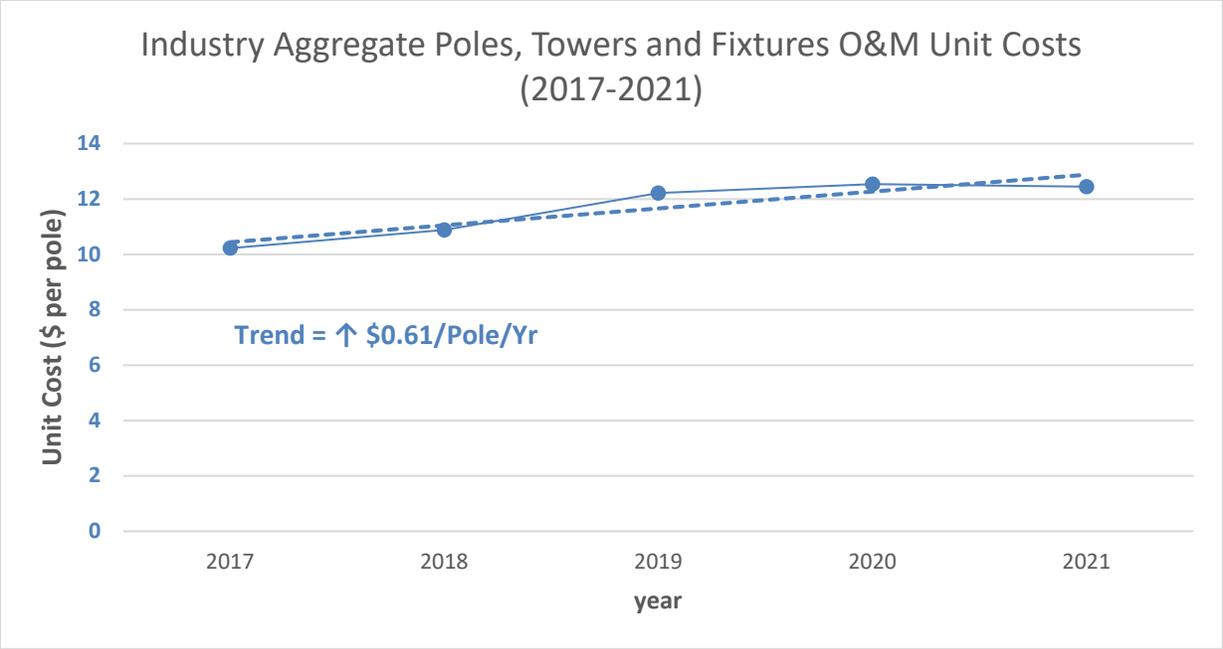
The unit cost for this metric is calculated by dividing the poles, towers and fixtures cost by the total number of poles.

$$\text{Unit Cost (\$/Pole)} = \frac{\text{USoA 5120 (\$)}}{\text{Total Number of Poles}}$$

The industry aggregate unit cost derived by dividing the total poles, towers and fixtures cost of all 57 distributors by the total number of poles in the system is shown in the chart below. Aggregated at the industry level, the unit cost increased by \$0.61/pole per year.

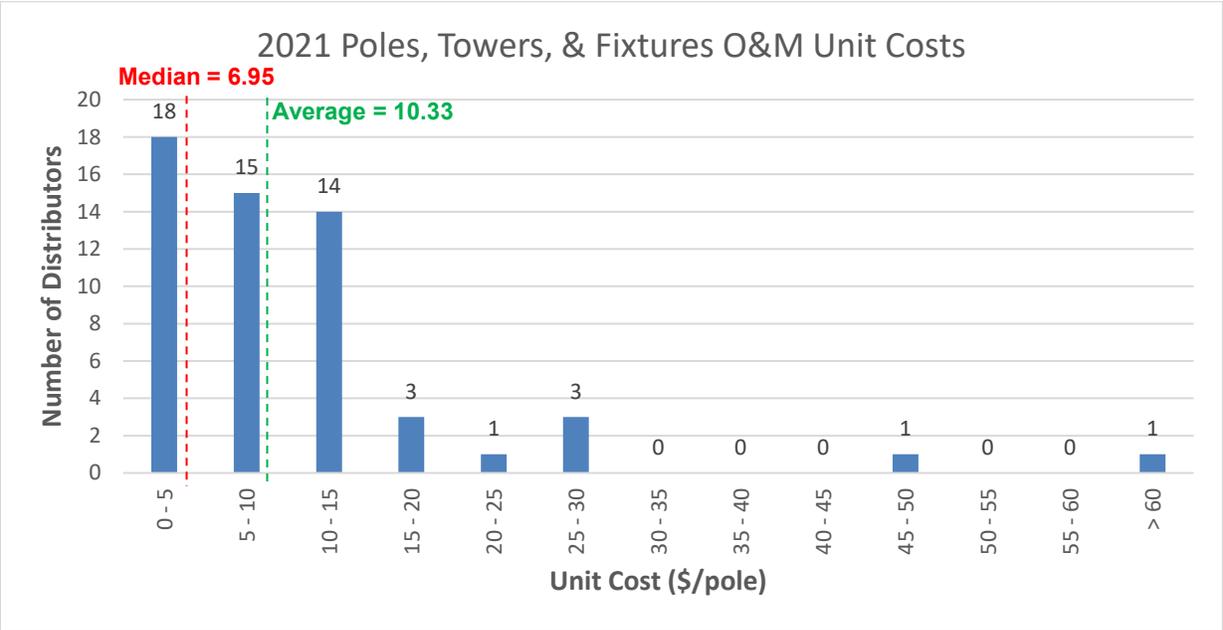
¹⁴ Combined for all 57 distributors.

¹⁵ Accounts 5120 as per Accounting Procedures Handbook for Electricity Distributors.



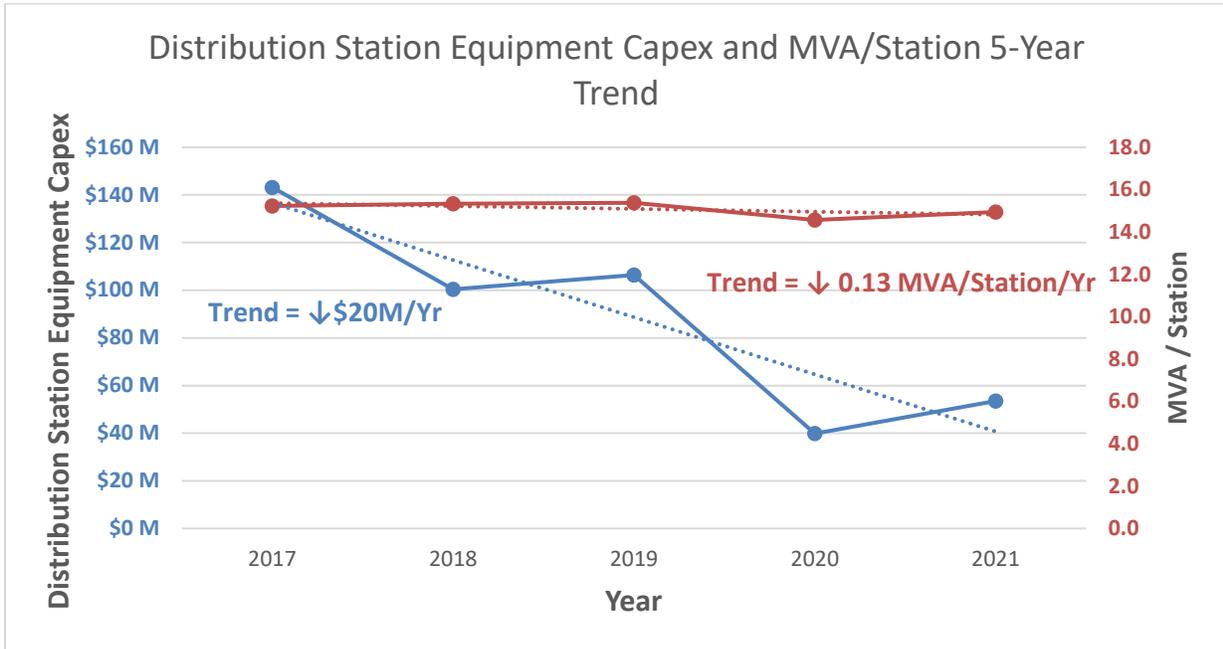
The total cost for lines O&M combined for all 57 distributors stayed approximately flat from 2020 to 2021, contrary to the five-year uptrend, whereas the total number of primary circuit kilometres increased by 0.44 % for the same period, in line with the five-year uptrend.

The histogram below summarizes the 2021 unit cost results for poles, towers and fixtures O&M. The median unit cost for 2021 is \$6.95 per pole and the average unit cost is \$10.33 per pole.



2.7 Capital Expenditures: Distribution Station Equipment

For the five-year period of 2017-2021, the overall industry trend¹⁶ of distribution station equipment capex¹⁷ as measured by the line of best fit decreased by approximately \$20 million per year. For the same period, the general trend of the MVA per station also decreased by approximately 0.13 MVA/stations per year. The chart below shows the five-year trend.



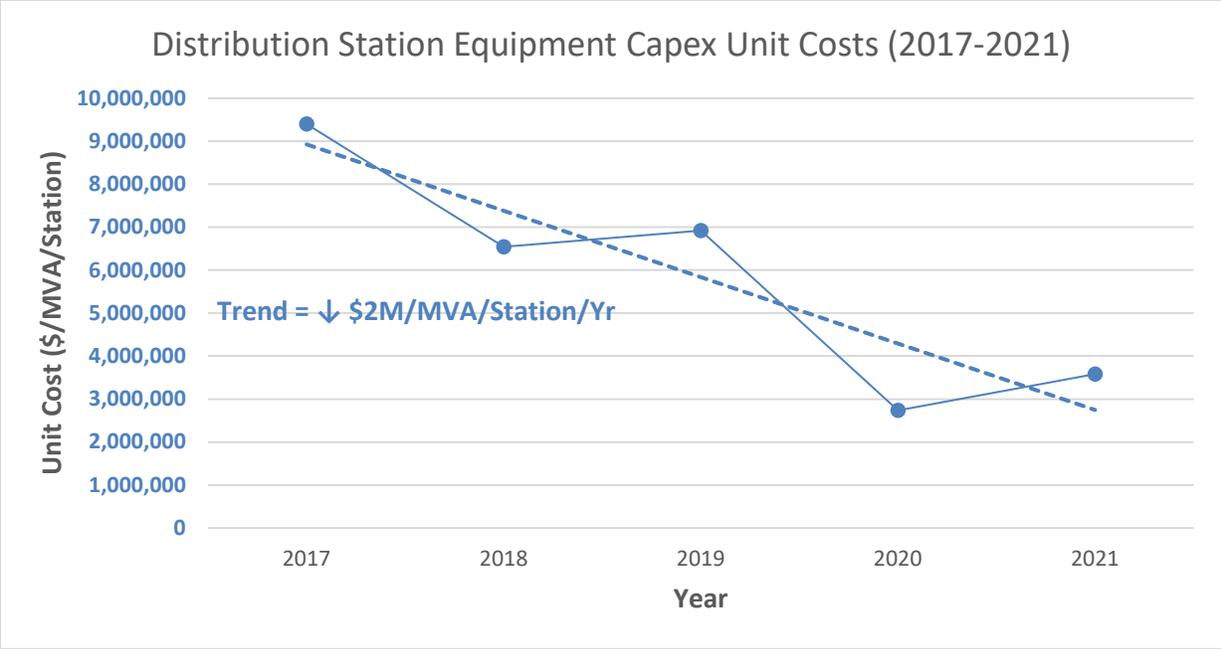
The unit cost for this metric is calculated by dividing the distribution station equipment capex by the MVA per station.

$$\text{Unit Cost} \left(\frac{\$}{\frac{\text{MVA}}{\text{Station}}} \right) = \frac{\text{USoA [1820]} (\$)}{\text{MV/Station}}$$

The industry aggregate unit cost derived by dividing the total distribution system equipment capex of the 45 distributors by MVA per station combined for all those distributors is shown in the chart below. Aggregated at the industry level, the unit cost decreased by \$2M/MVA/station per year.

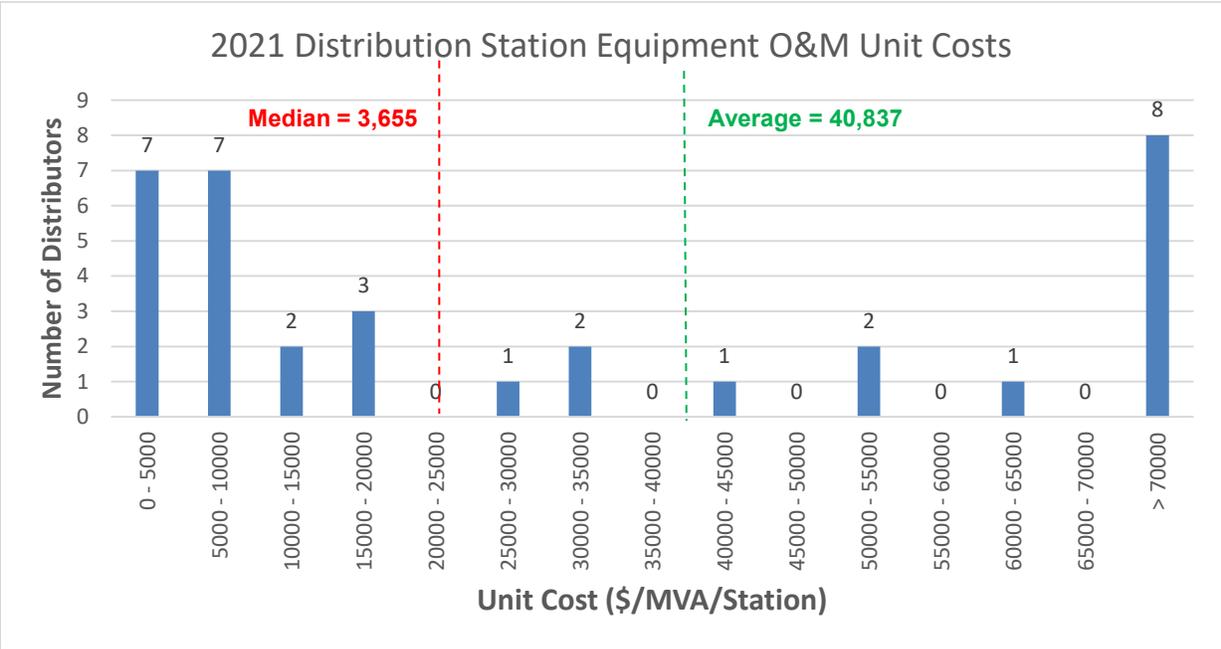
¹⁶ Combined for 45 distributors. Excludes 12 of the 57 distributors that do not own any distribution stations.

¹⁷ Account 1820 as per Accounting Procedures Handbook for Electricity Distributors.



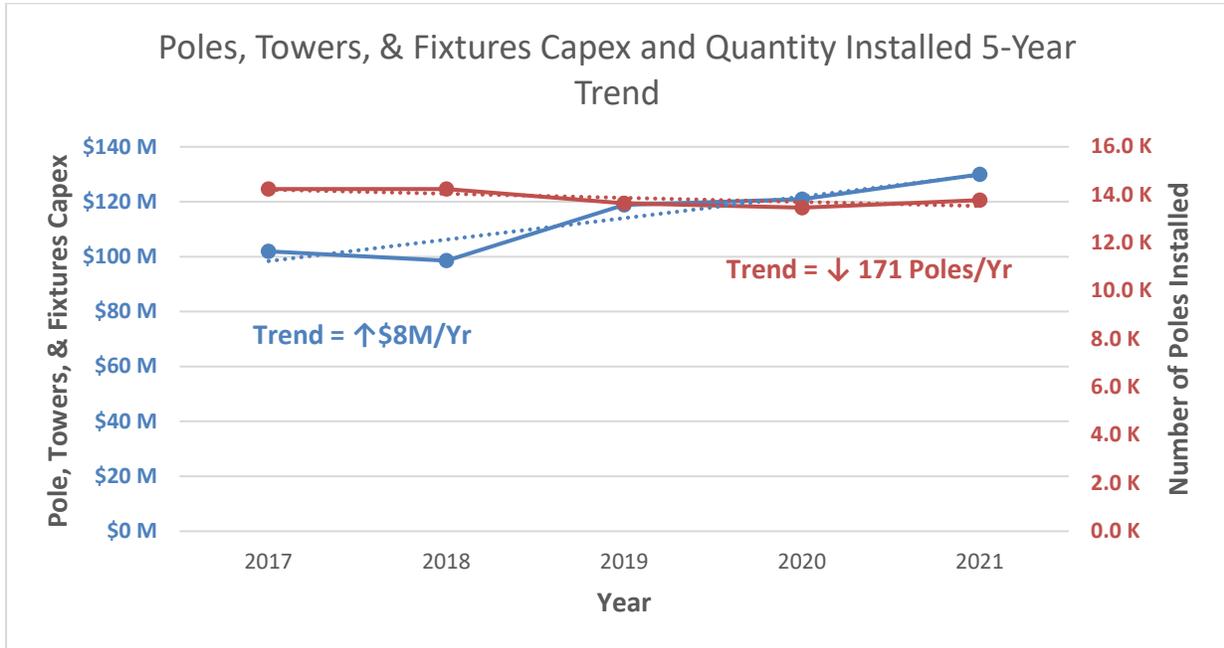
The total cost for distribution station equipment combined for the 45 distributors increased by 25.5% from 2020 to 2021, contrary to the five-year downtrend, whereas the overall MVA/station increased by 2.5% for the same period, also contrary to the five-year downtrend.

The histogram below summarizes the 2021 unit cost results for distribution station equipment O&M. The median unit cost for 2021 is \$3,655 per MVA/station and the average unit cost is \$40,837 per MVA/station.



2.8 Capital Expenditures: Poles, Towers and Fixtures

For the five-year period of 2017-2021, the overall industry trend¹⁸ of the poles, towers and fixtures capex¹⁹ as measured by the line of best fit increased by approximately \$8 million a year. For the same period, the overall trend of the number of poles installed per year as measured by the line of best fit decreased by 171 poles per year. The chart below shows the five-year trend.



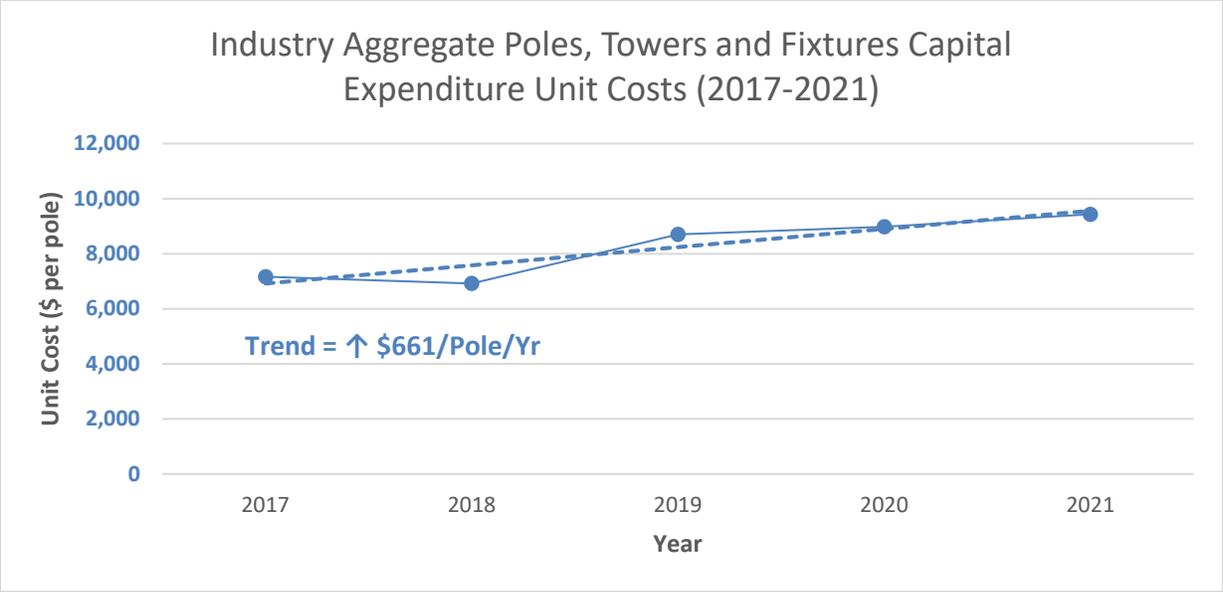
The unit cost for this metric is calculated by dividing the total poles, towers and fixtures capex by the number of poles installed.

$$\text{Unit Cost (\$/Pole)} = \frac{\text{USoA 1830 (\$)}}{\text{Number of Poles Installed}}$$

The industry aggregate unit cost derived by dividing the total poles, towers and fixtures capex of the 53 distributors by the total poles installed is shown in the chart below. Aggregated at the industry level, the unit cost increased by \$661/pole per year.

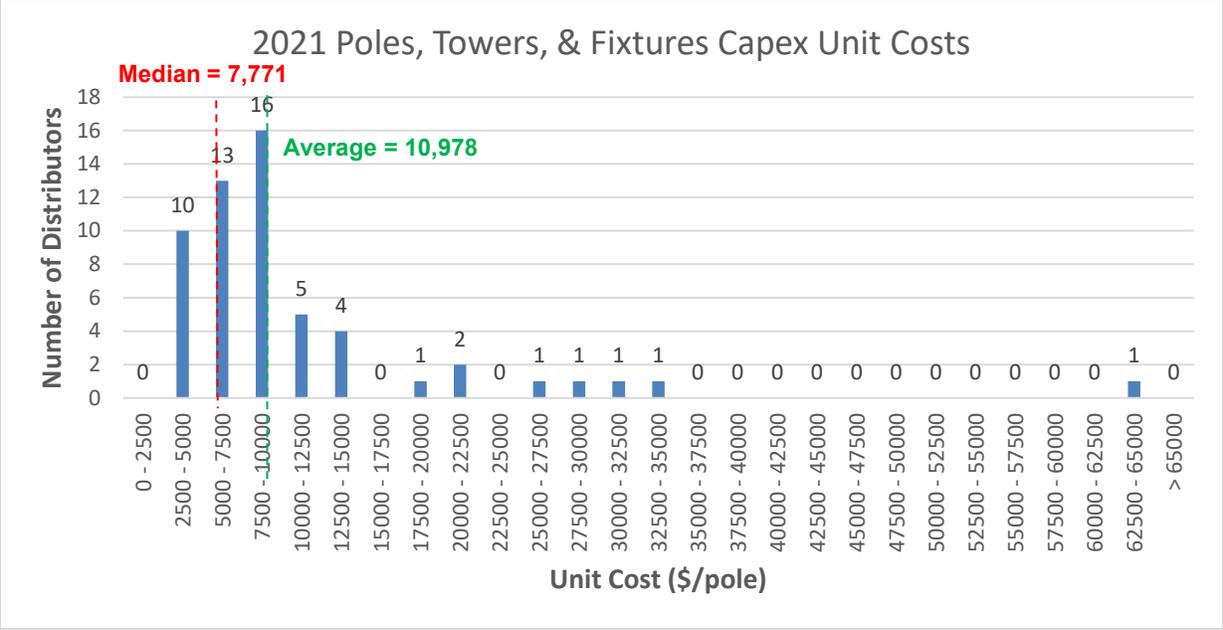
¹⁸ Alectra Utilities Corporation, Hydro One Networks Inc., Rideau St. Lawrence Distribution Inc., and Tillsonburg Hydro Inc. have been excluded since their number of pole additions aren't available for years 2017-2020.

¹⁹ Account 1830 as per Accounting Procedures Handbook for Electricity Distributors.



The total capex for Poles, Towers and Fixtures combined for the 53 distributors increased by 7.5% from 2020 to 2021, in line with the five-year uptrend, whereas the number of poles installed increased by 2.3% for the same period, contrary to the five-year downtrend.

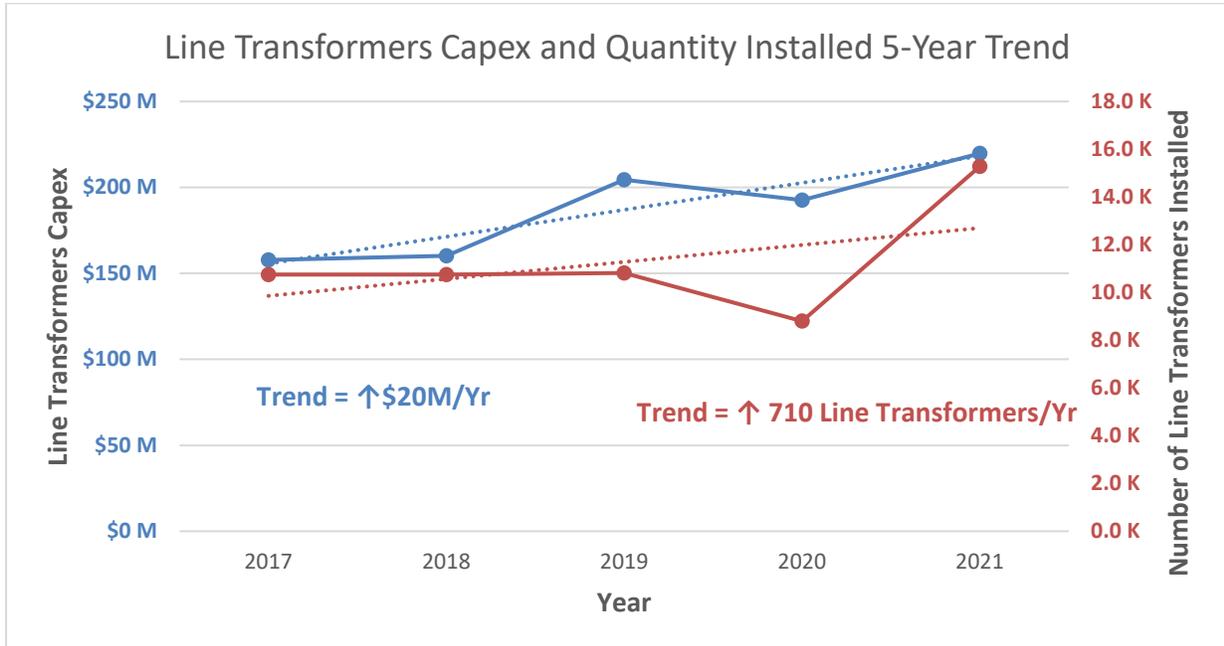
The histogram below summarizes the 2021 unit cost results for poles, towers and fixtures capex for 56 distributors²⁰. The median unit cost for 2021 is \$7,771 per pole and the average unit cost is \$10,978 per pole.



²⁰ Hydro One Networks Inc has been excluded since the number of pole additions is not available for year 2021.

2.9 Capital Expenditures: Line Transformers

For the five-year period of 2017-2021, the overall industry trend²¹ of the line transformers capex²² as measured by the line of best fit increased by approximately \$20 million a year. For the same period, the overall trend of the number of line transformers installed per year as measured by the line of best fit increased by 710 line transformers per year. The chart below shows the five-year trend.



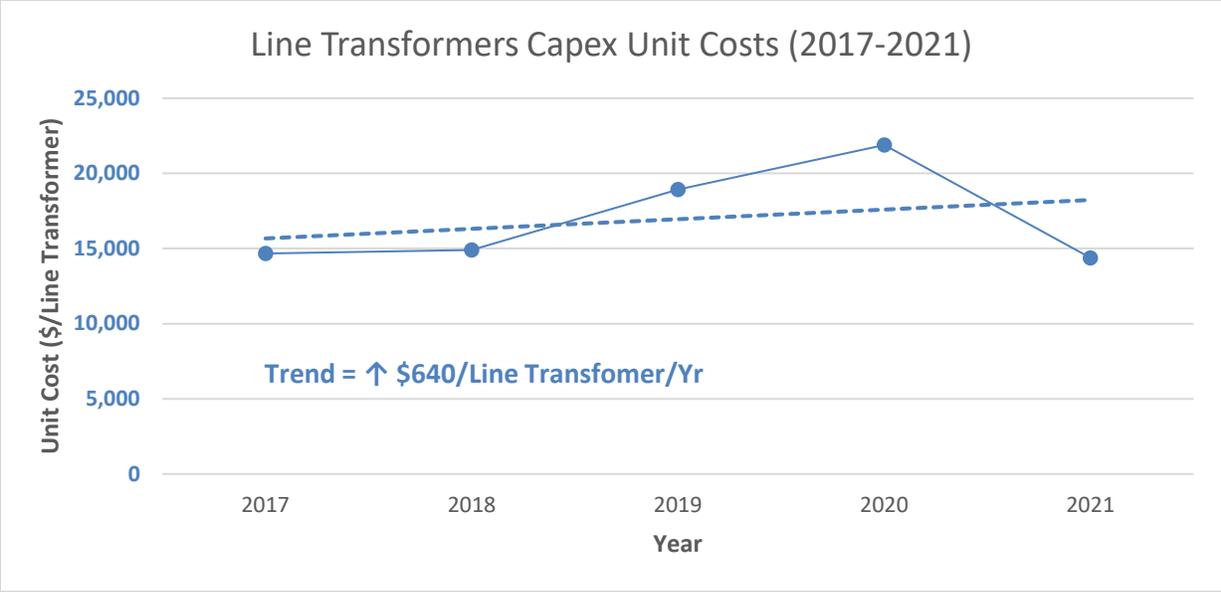
The unit cost for this metric is calculated by dividing the line transformer capex by the number of line transformers installed.

$$\text{Unit Cost (\$/Line Transformer)} = \frac{\text{USoA 1850 (\$)}}{\text{Number of Line Transformers Installed}}$$

The industry aggregate unit cost derived by dividing the line transformers capex of the 54 distributors by the number of line transformers installed is shown in the chart below. Aggregated at the industry level, the unit cost increased by \$640/line transformers per year.

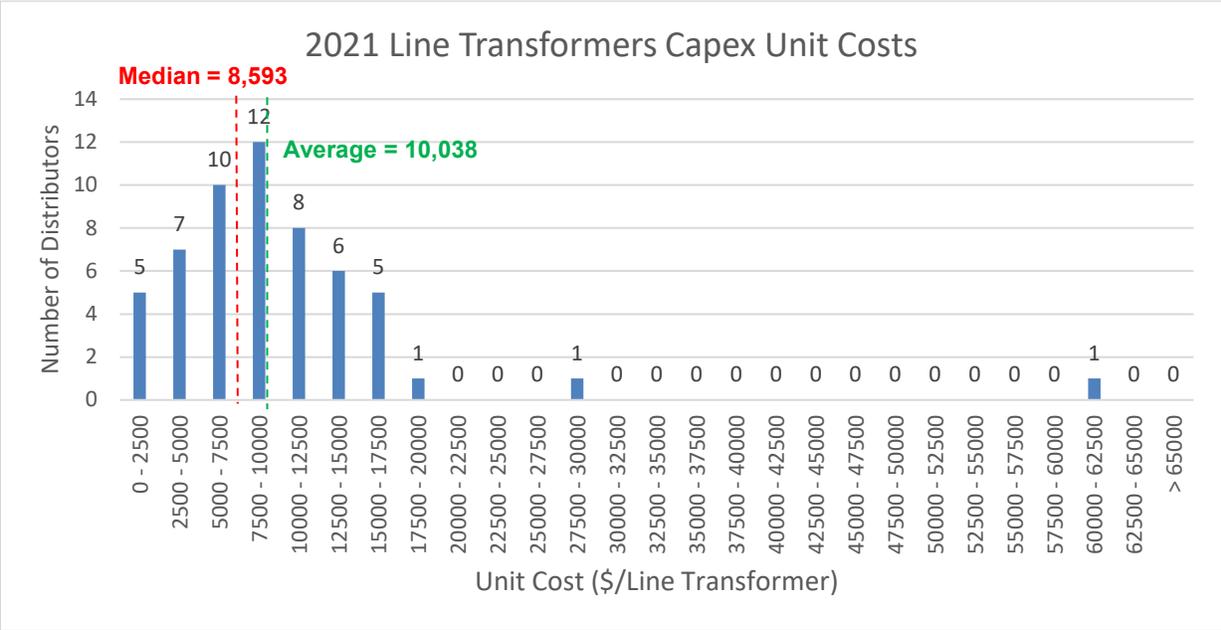
²¹ Hydro One Networks Inc., Rideau St. Lawrence Distribution Inc. and Tillsonburg Hydro Inc. have been excluded since their number of line transformer additions aren't available for years 2017-2020.

²² Account 1850 as per Accounting Procedures Handbook for Electricity Distributors.



The total capex for line transformers combined for the 54 distributors increased by 7.5% from 2020 to 2021, in line with the five-year uptrend, whereas the number of line transformers installed increased by 2.3% for the same period, also in line with the five-year trend.

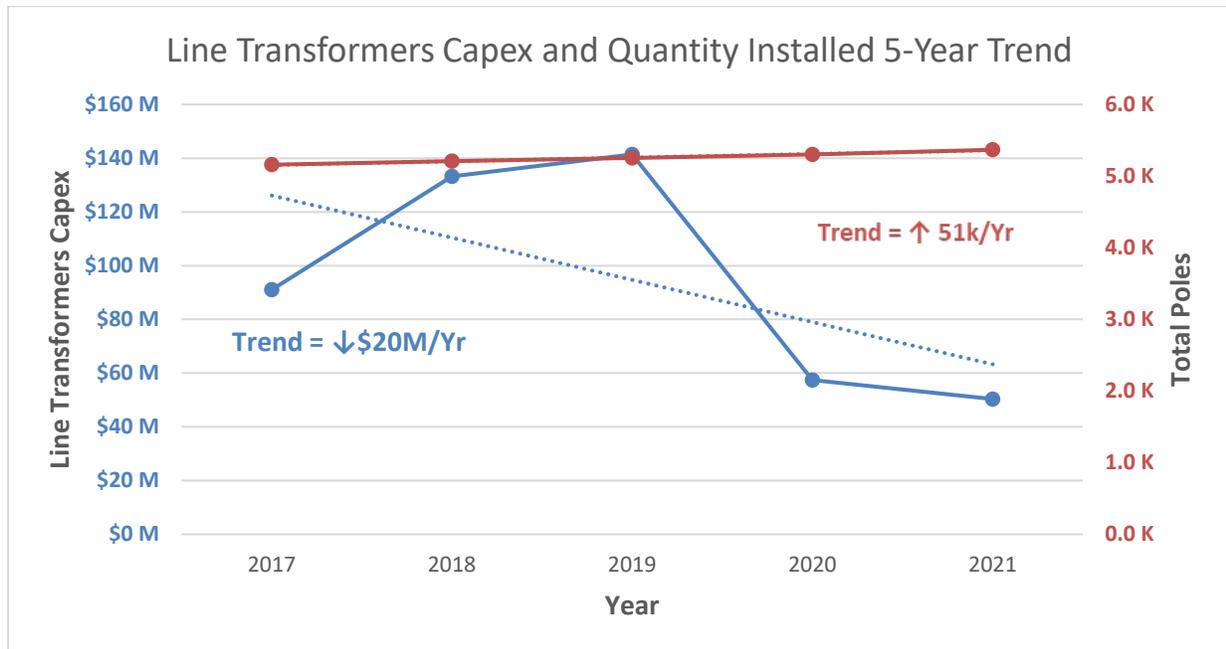
The histogram below summarizes the 2021 unit cost results for line transformers capex for the 56 distributors²³. The median unit cost for 2021 is \$8,593 per line transformer and the average unit cost is \$10,038 per line transformer.



²³ Hydro One Networks Inc has been excluded since the number of pole additions is not available for year 2021.

2.10 Capital Expenditures: Meters

For the five-year period of 2017-2021, the overall industry trend²⁴ of the meters capex²⁵ as measured by the line of best fit decreased by approximately \$20 million a year. For the same period, the overall trend of the total number of customers²⁶ as measured by the line of best fit increased by approximately 51,000 customers per year. The chart below shows the five-year trend.



The unit cost for this metric is calculated by dividing the meters capex by the total number of customers.

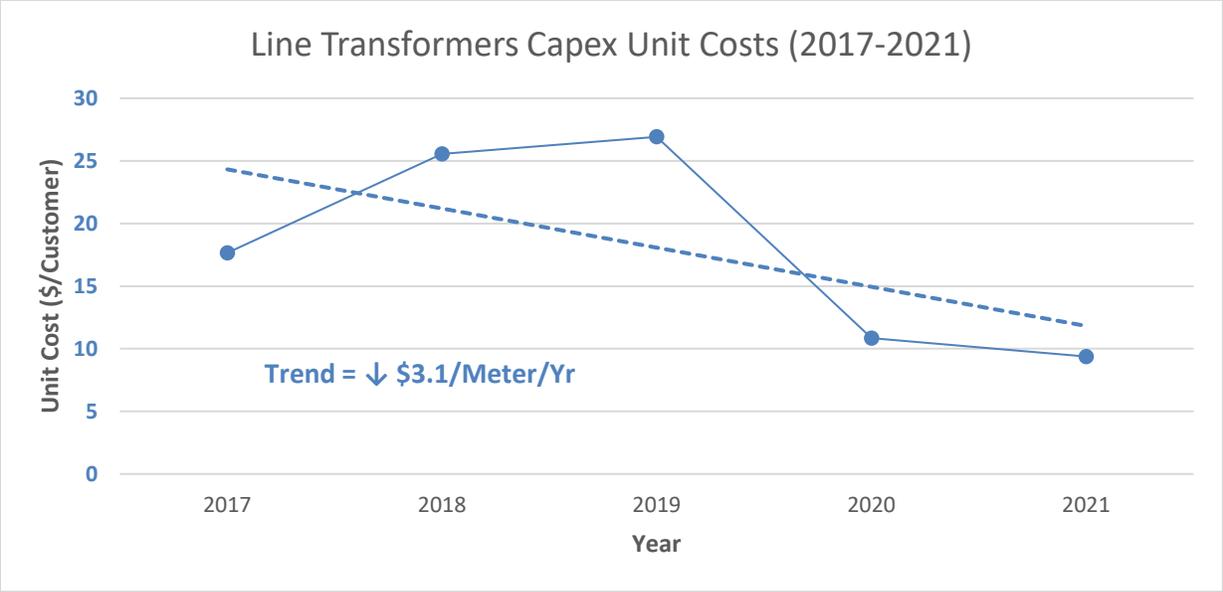
$$\text{Unit Cost (\$/Customer)} = \frac{\text{USoA 1860 (\$)}}{\text{Total Number of Customers}}$$

The industry aggregate unit cost derived by dividing the total meters capex of all 57 distributors by the total number of customers is shown in the chart below. Aggregated at the industry level, the unit cost decreased by \$3.10/customer per year.

²⁴ Combined for all 57 distributors.

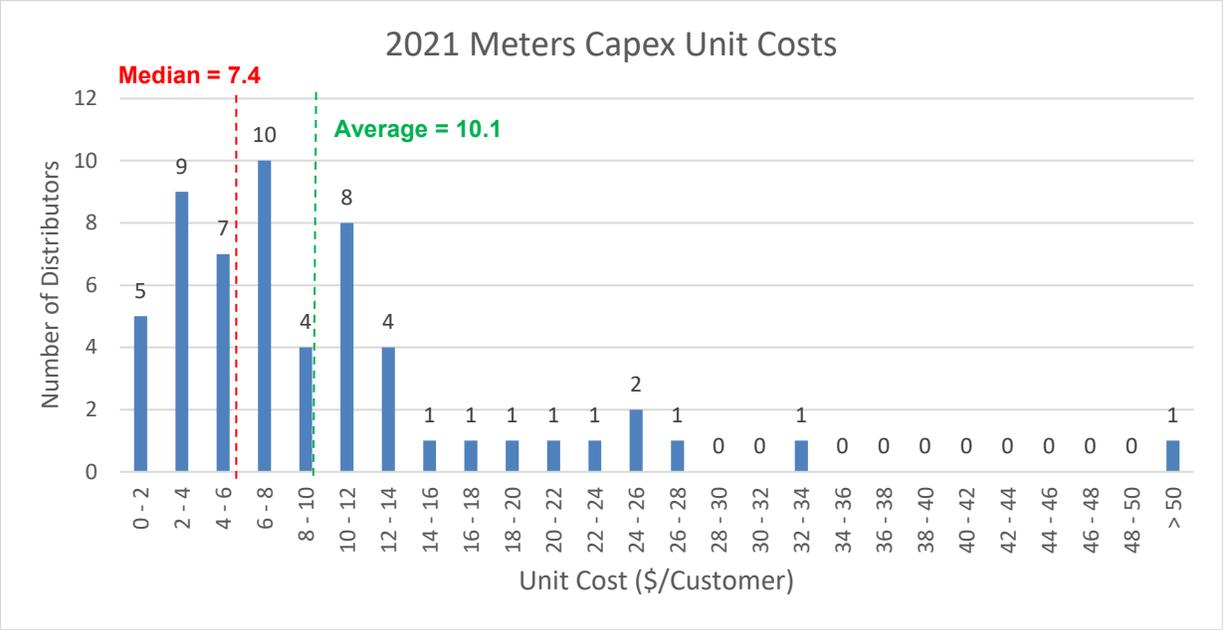
²⁵ Account 1860 as per Accounting Procedures Handbook for Electricity Distributors.

²⁶ Excludes street lighting, sentinel lighting, and USL connections.



The total meters capex combined for all 57 distributors decreased by 12.8% from 2020 to 2021, in line with the five-year downtrend, whereas the number of poles installed increased by 1.22% for the same period, in line with the five-year uptrend.

The histogram below summarizes the 2021 unit cost results for meters capex. The median unit cost for 2021 is \$7.40 per customer and the average unit cost is \$10.10 per customer.



3. Endnotes

- i. All the O&M and capex amounts used in the calculations are as reported by the distributors and no inflation adjustments have been made.