

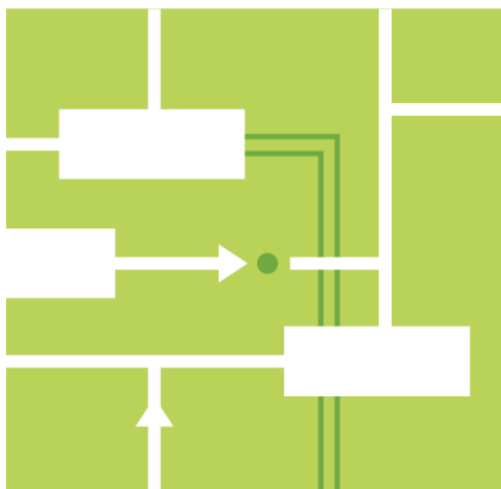
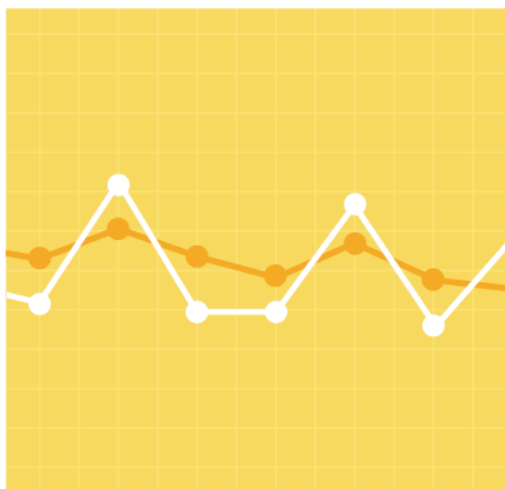


# Wholesale Load Cost Report April 2020

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Market Analysis and Settlements

MAY 12, 2020

ISO-NE PUBLIC



# 1. Introduction

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## 1.1 About ISO New England

Created in 1997, ISO New England Inc. (the ISO) is the not-for-profit regional transmission organization (RTO) responsible for the day-to-day reliable operation of New England's bulk power generation and transmission system, oversight and administration of the region's wholesale electricity markets, and management of a comprehensive regional bulk power system planning process.

## 1.2 Market Reporting

The ISO produces many reports that summarize the operations of New England's wholesale electricity markets. The weekly report provides summaries of key market activities for the trading week encompassing Monday-Sunday. It summarizes day-ahead and real-time pricing, demand bidding, reserve market results, and Net Commitment Period Compensation (NCPC) payments. This report, generally posted on Thursdays, can be found on the ISO's web site located [here](#).<sup>1</sup>

Monthly summaries of wholesale market results are reported by the ISO's Chief Operating Officer at the monthly NEPOOL Participants Committee Meeting. This report provides a retrospective on key market results and a detailed analysis of NCPC payments for the most recent month. These summaries are posted on the ISO's web site located [here](#).<sup>2</sup>

Section III.A.12.2 of Appendix A to Market Rule 1, can be found on the ISO web site located [here](#) is entitled 'Periodic Reporting by the ISO and Internal Market Monitor.' It requires monthly, quarterly, and annual market reports. The monthly market report, in addition to pricing summaries and analyses of the reserve and regulation markets, also presents summaries of the Financial Transmission Rights (FTR) auctions. Monthly reports can be found on the ISO's web site located [here](#).<sup>3</sup>

The ISO's Internal Market Monitor issues quarterly and annual reports of key statistics for the region's wholesale electric power markets. The quarterly reports can be found [here](#).<sup>4</sup> The market rule also requires an annual review of the operations of the New England Markets, which includes an evaluation of the procedures for the determination of energy, reserve and regulation clearing prices, NCPC costs and the performance of the Forward Capacity Market and FTR Auctions. This review is presented to the Federal Energy Regulatory Commission and the New England States' Public Utility Commissioners each year. The textual report can be found [here](#).<sup>5</sup>

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<sup>1</sup> Select "Weekly Markets Reports" from the document type filter on the left hand side of the page.

<sup>2</sup> Select "Meeting Materials" from the document type filter on the left hand side of the page.

<sup>3</sup> Select "Monthly Markets Reports" from the document type filter on the left hand side of the page.

<sup>4</sup> Select "Quarterly Markets Reports" from the document type filter on the left hand side of the page.

<sup>5</sup> Select "Annual Markets Reports" from the document type filter on the left hand side of the page.

Additional information about the ISO's multi-settlement system as it relates to wholesale customers who have a real-time load obligation ("metered" electricity use in the real-time market) may be found on the ISO web site located [here](#). The document posted there contains links to relevant market rules and procedures.

### 1.3 About This Report

The purpose of this report is to provide a monthly presentation of the average costs associated with serving a real-time load obligation in the New England Wholesale Markets. While this analysis and report detail the *majority* of costs accruing to wholesale, real-time load according to current Wholesale Market Settlement rules, there are costs that occur from time to time that are not included.

This analysis is intended to emphasize and underscore the locational aspects of the component costs of electricity in the New England Wholesale markets. The underlying information is derived at the zonal level, and in many cases, the component charges vary markedly by zone. Aggregating these costs to a New England level and dividing by the New England-level RTLO is potentially misleading. For this reason, a zonal load-weighted average of the hourly total zonal costs is computed. This load-weighted value is then averaged over the relevant time period and shown as the 'New England Total Cost' value.

In states where restructuring has occurred, the sum total of costs presented in this report most closely represents the 'energy supply' portion of the unbundled customer bill. Transmission and distribution charges, including restructuring transition payments (if any), time-of-use or demand charges, and other retail tariffs are not included here.

#### 1.3.1 Report Content and Timing

This report summarizes the major costs (on an hourly, historical basis) charged to real-time load-serving entities in New England's wholesale electricity markets. This report is generated once each month. From time to time, the ISO will reflect the effect of wholesale market resettlements on the historical series. These resettlements will not cause the downloadable data that accompanies this report located [here](#) to be materially different from the information presented here. All information presented here is the most recent as of the time of publication.

Over the course of the historical period presented, market rules have undergone revision. The information presented reflects the settlement rules that were in effect during the month shown.

**The average values published in this report do not fully represent the hourly volatility and risk inherent in the operation of wholesale electricity markets. Many important assumptions have been made in the formulation of this analysis. The 'Overview and Assumptions' Appendix to this report is vital to understanding the information presented.**

#### 1.3.2 Latest Settlement Data

As of the publication of this report, the latest settlement data reported here, and available for download through the web interface is April 2020.

#### 1.3.3 ISO Schedule 2 Transaction Units (TU) Based Costs

There are ISO charges that are assessed to each wholesale customer, regardless of size, if they take advantage of the spot-market clearing that the ISO does in the Real-Time Energy Market.

Because of assumptions made in this report, these particular costs are excluded from this report. During an average month in 2020, a wholesale market participant would see an additional charge of approximately \$483.31 that is not included in this analysis. Please see the Appendix for further discussion of this charge.

## 2. Table of Contents

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<b>1. Introduction.....</b>	<b>2</b>
1.1 About ISO New England.....	2
1.2 Market Reporting .....	2
1.3 About This Report .....	3
1.3.1 Report Content and Timing.....	3
1.3.2 Latest Settlement Data .....	3
1.3.3 ISO Schedule 2 Transaction Units (TU) Based Costs .....	3
<b>2. Table of Contents .....</b>	<b>5</b>
<b>3. Summary – April 2020 .....</b>	<b>6</b>
3.1 Zonal Component Costs, All Hours .....	6
3.2 Comparison of All Hours, On-Peak, and Off-Peak Total Cost .....	11
3.3 Zonal Component Costs, Last 13 Months .....	13
3.3.1 Maine Load Zone Wholesale Load Cost Components, Last 13 Months.....	14
3.3.2 New Hampshire Load Zone Wholesale Load Cost Components, Last 13 Months .	15
3.3.3 Vermont Load Zone Wholesale Load Cost Components, Last 13 Months .....	16
3.3.4 Connecticut Load Zone Wholesale Load Cost Components, Last 13 Months .....	17
3.3.5 Rhode Island Load Zone Wholesale Load Cost Components, Last 13 Months .....	18
3.3.6 SEMA Load Zone Wholesale Load Cost Components, Last 13 Months .....	19
3.3.7 WCMA Load Zone Wholesale Load Cost Components, Last 13 Months .....	20
3.3.8 NEMA Load Zone Wholesale Load Cost Components, Last 13 Months .....	21
<b>4. Appendix: Overview and Assumptions .....</b>	<b>22</b>
4.1 Assumptions .....	22
4.2 Background and Context .....	23
4.3 Derivation of Component Costs .....	23
4.4 Using the Component Costs .....	27
4.5 Downloadable Information.....	27
4.6 An Example .....	27

### 3. Summary – April 2020

The real-time, all-hours average wholesale load cost during April 2020 ranged from a low of \$28.54/MWh (2.85¢/kWh) in the Vermont (VT) Load Zone to a high of \$30.47/MWh (3.05¢/kWh) in the Northeastern Massachusetts (NEMA) Load Zone. The real-time, “on-peak” average wholesale load cost during the month ranged from a low of \$29.68/MWh (2.97¢/kWh) in the VT Load Zone to a high of \$31.75/MWh (3.17¢/kWh) in the NEMA Load Zone. Overall, on-peak prices ranged from 8-9% higher than their off-peak counterparts during April.

The cost of Capacity across the region averaged \$10.26/MWh (1.03¢/kWh) during the month. First Contingency Net Commitment Period Compensation (NCPC) per MWh in all Load Zones averaged \$0.37/MWh (0.04¢/kWh).

The April 2020 New England ‘all hours’ total cost rose by 5% to \$29.52/MWh from its March 2020 value of \$28.12/MWh. Increased RT LMPs resulting from increased fuel prices during April were responsible for this increase. For the year to-date, the New England average total wholesale load cost averaged \$31.85/MWh, or 3.19¢/kWh.

**A note about Capacity Costs** – As referenced in the Appendix to this report, this analysis assumes a fictitious customer with 1 MW/hour of real-time wholesale load consumption. For the year 2019, the New England system-level capacity factor was 55.7%. Using this value for illustration, a wholesale customer that used 8,760 MWh in a year (1 MW per hour for the year) would consume 1.80 MW at peak, and, in actuality, would be exposed to a total capacity charge that is higher than the value reported here. Customers with higher levels of temperature sensitive demand could use even more at the time of the system peak.

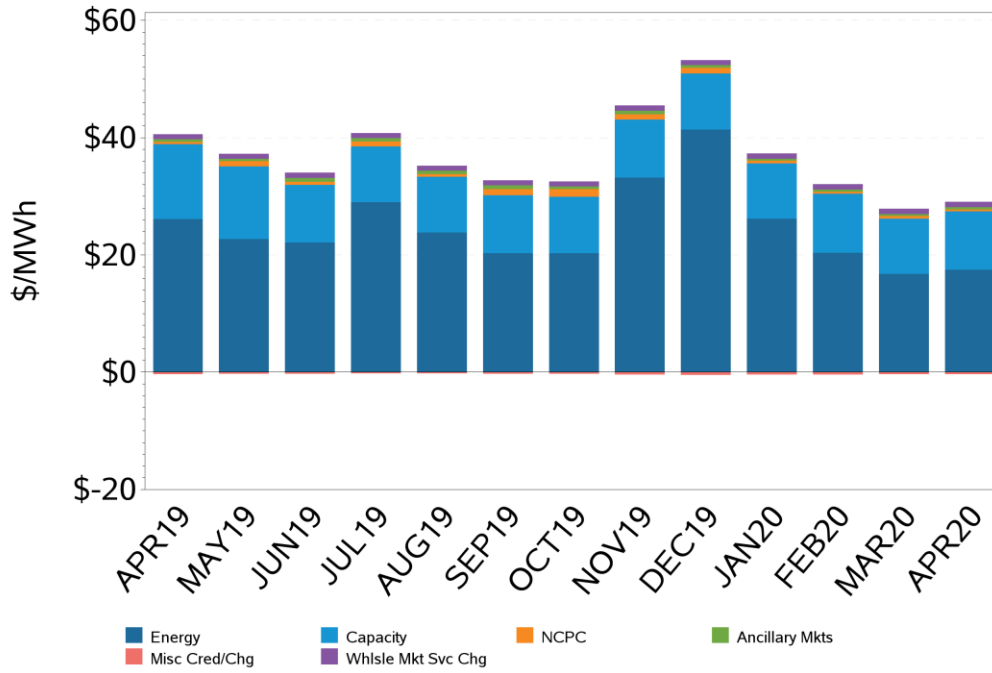
#### 3.1 Zonal Component Costs, All Hours

The following eight graphs compare the average of the major components of real-time wholesale load cost by month over all hours by load zone for the last 13 months. For purposes of presentation clarity, the component values are grouped into the following major categories:

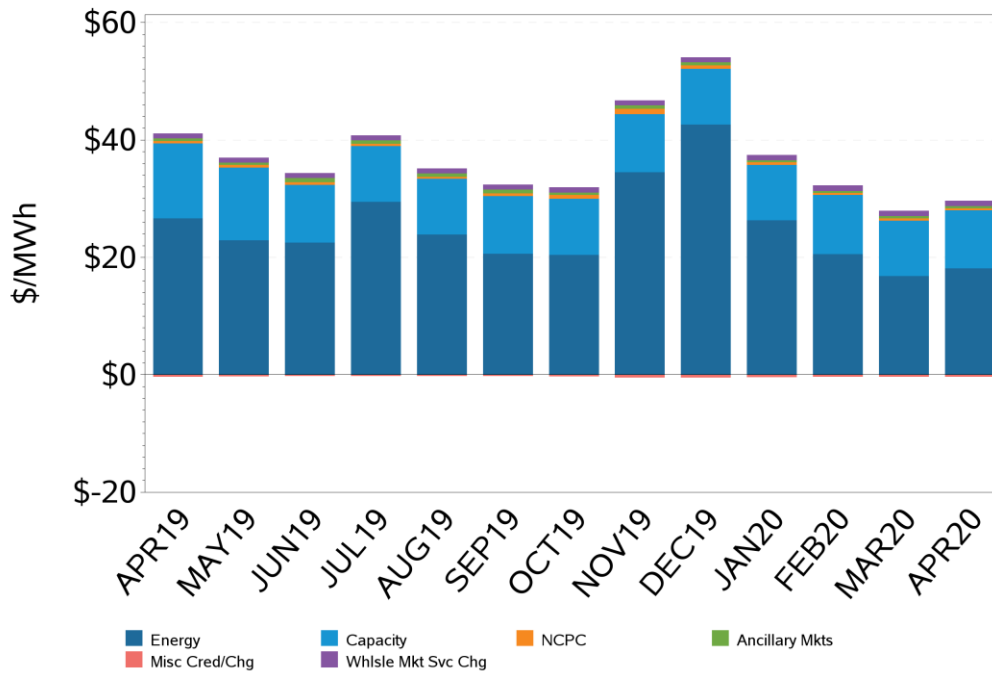
Major Category Name	Components Included
Energy	Real-Time LMP (RTLMP)
Capacity	Capacity Load Obligation Charge
NCPC	First and Second Contingency NCPC
Ancillary Markets	Regulation Market, Forward Reserve Market, Real-Time Reserve Market, Price Responsive Demand
Miscellaneous Credits/Charges	Inadvertent Energy, Marginal Loss Revenue Fund, Financial Transmission Rights (FTR) Auction Revenue Rights
Wholesale Market Service Charge	ISO Tariff Schedule 2 and 3 Expenses, NEPOOL Expenses

For a complete discussion of the components and their derivation, please see the appendix.

### Wholesale Load Cost - ME Load Zone By Major Component, 13 Months Ending 30APR20

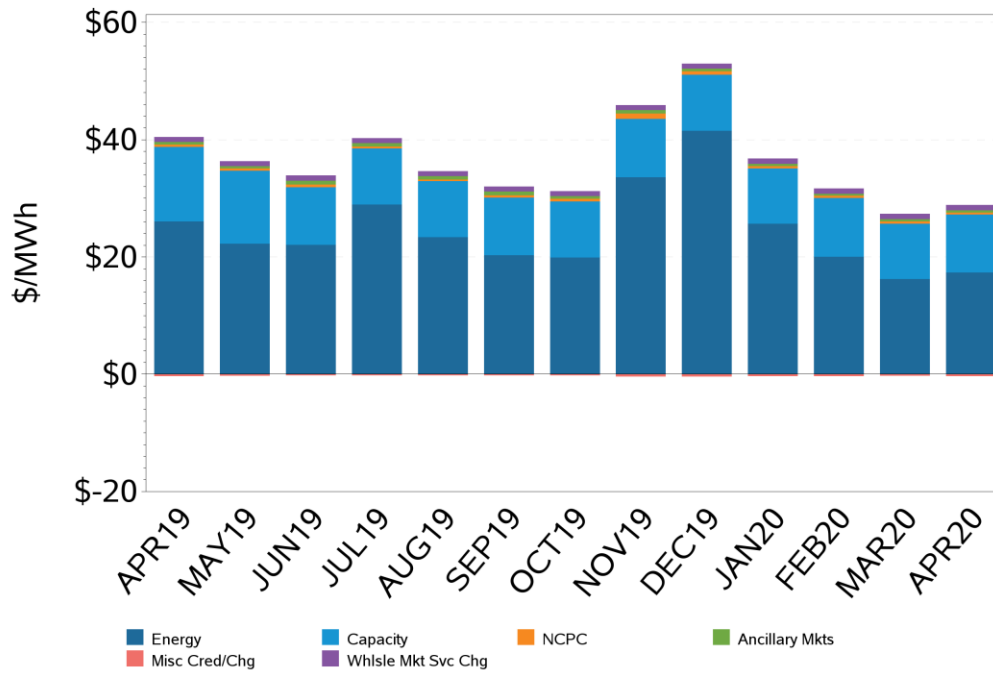


### Wholesale Load Cost - NH Load Zone By Major Component, 13 Months Ending 30APR20



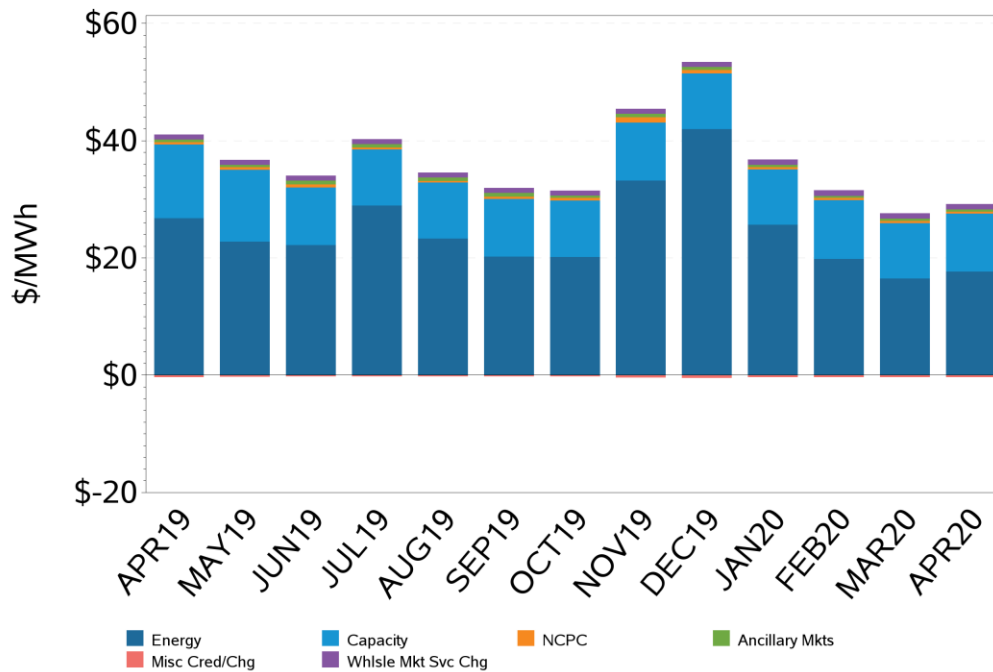
## Wholesale Load Cost - VT Load Zone

### By Major Component, 13 Months Ending 30APR20



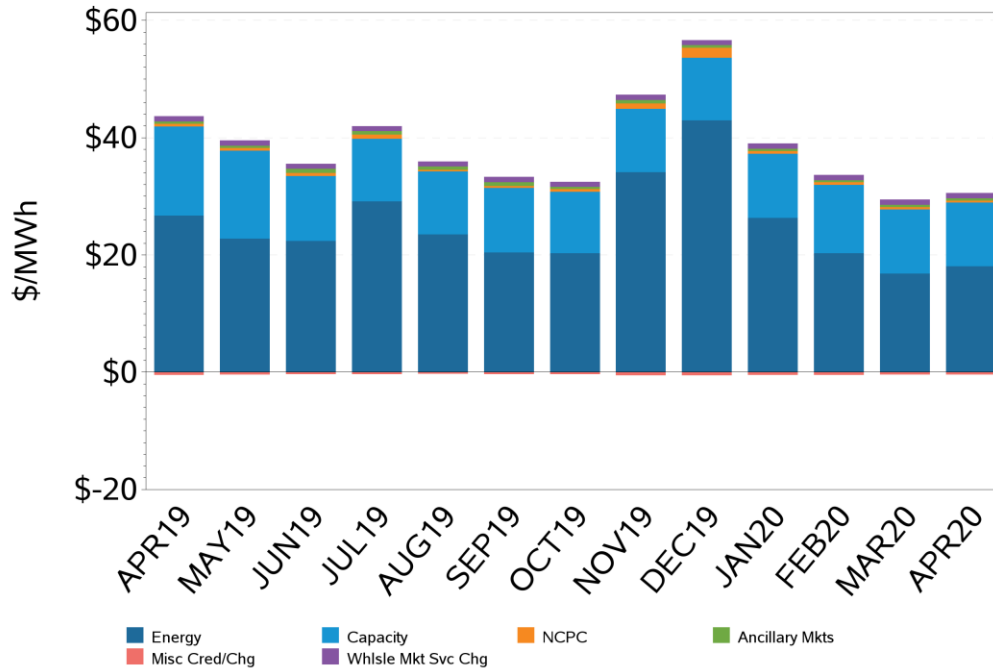
## Wholesale Load Cost - CT Load Zone

### By Major Component, 13 Months Ending 30APR20

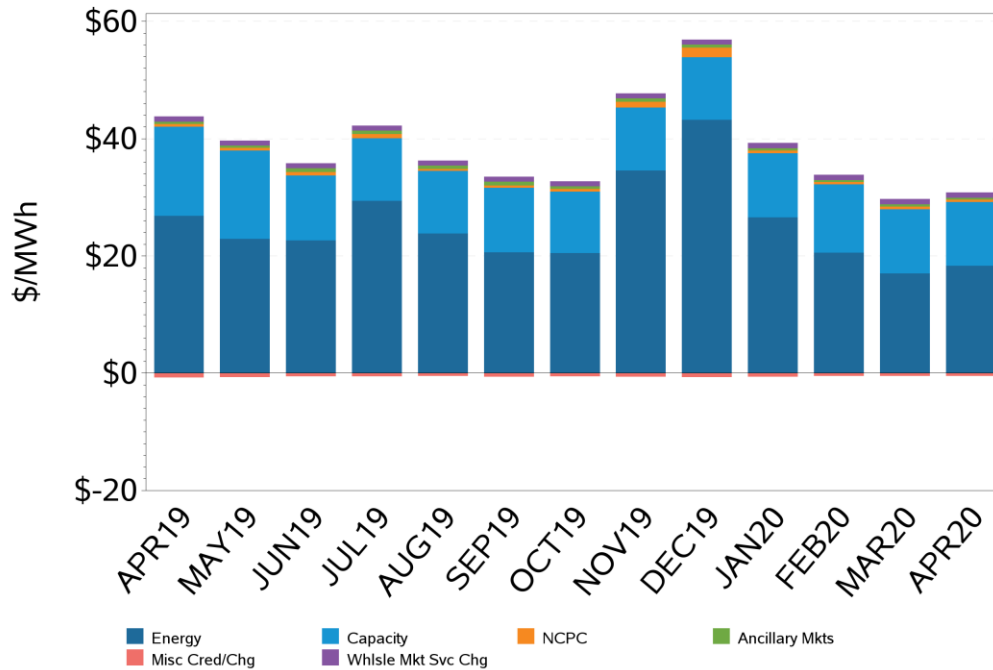




### Wholesale Load Cost - RI Load Zone By Major Component, 13 Months Ending 30APR20

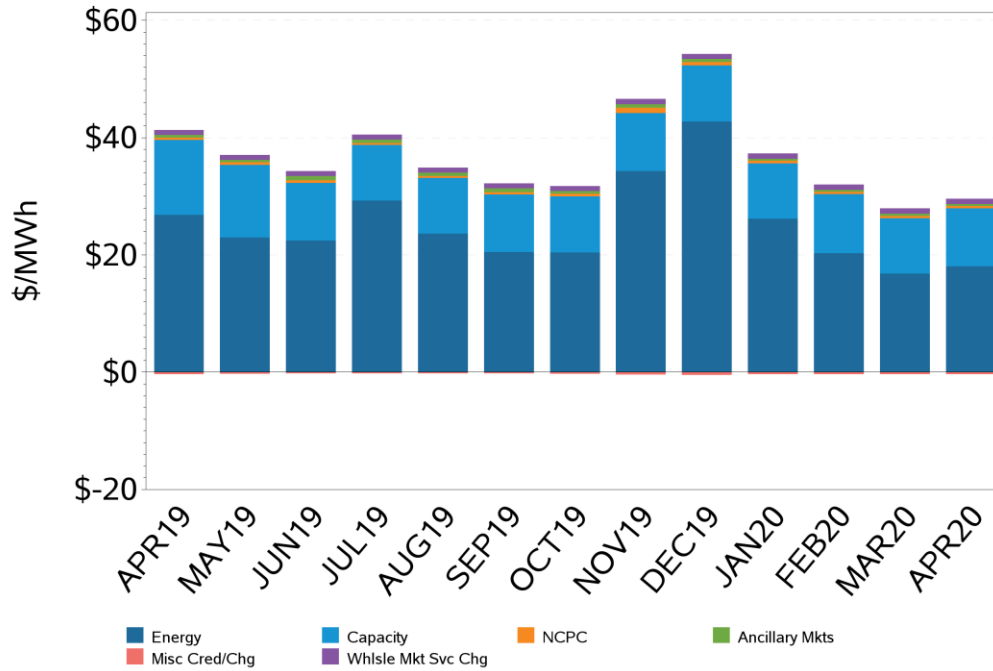


### Wholesale Load Cost - SEMA Load Zone By Major Component, 13 Months Ending 30APR20



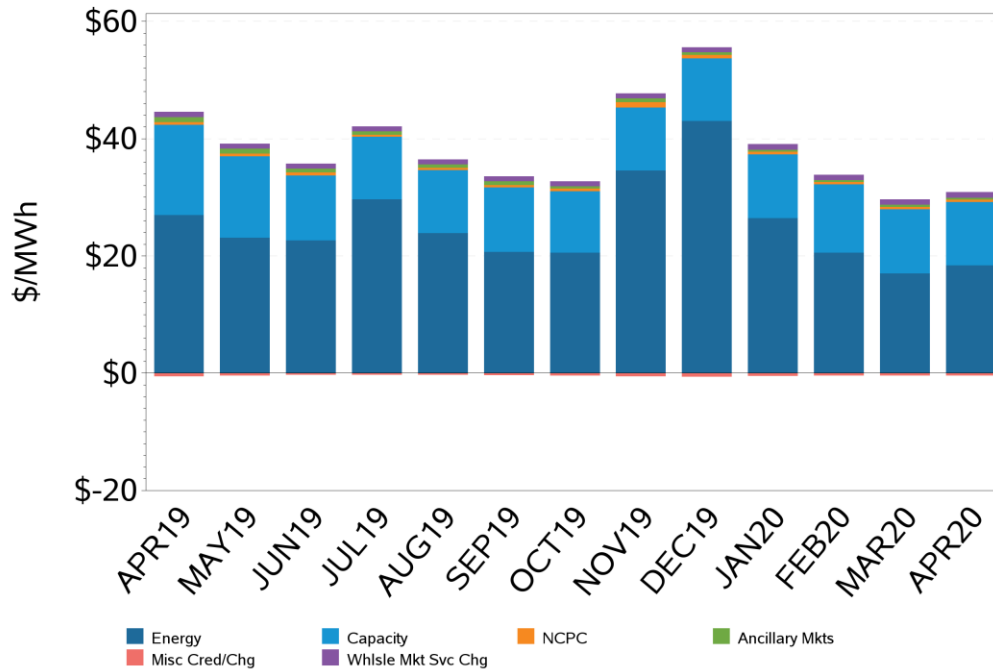
## Wholesale Load Cost - WCMA Load Zone

### By Major Component, 13 Months Ending 30APR20



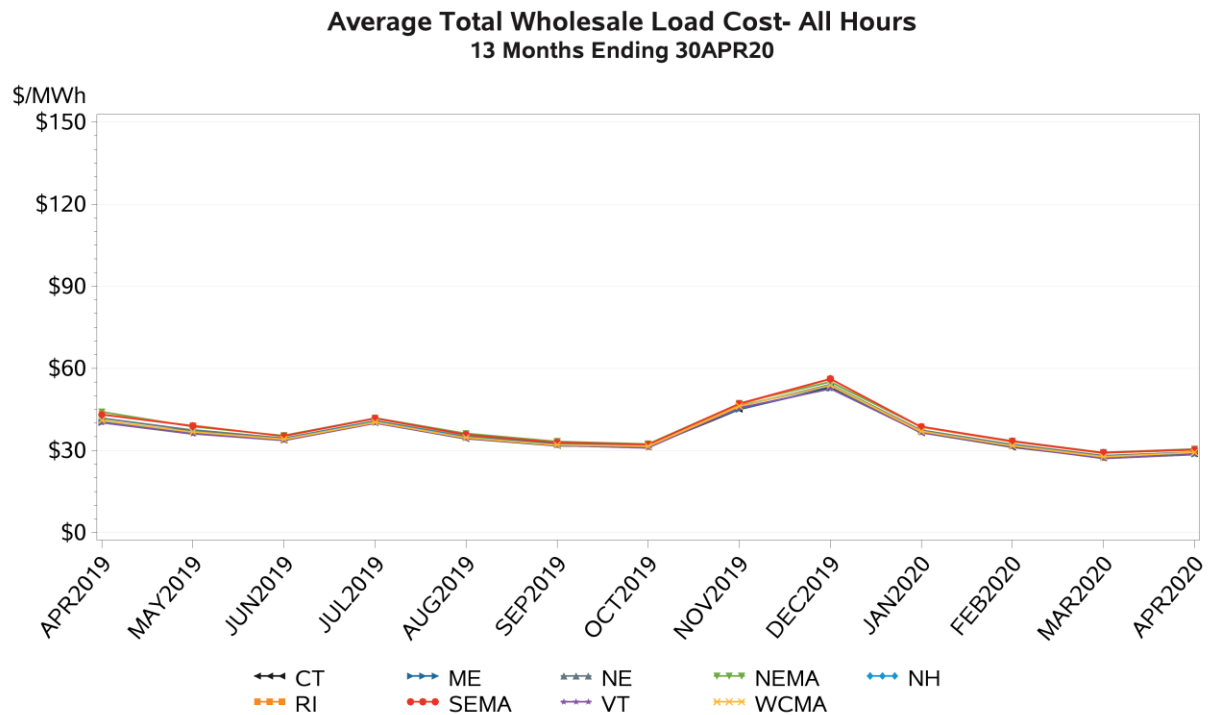
## Wholesale Load Cost - NEMA Load Zone

### By Major Component, 13 Months Ending 30APR20

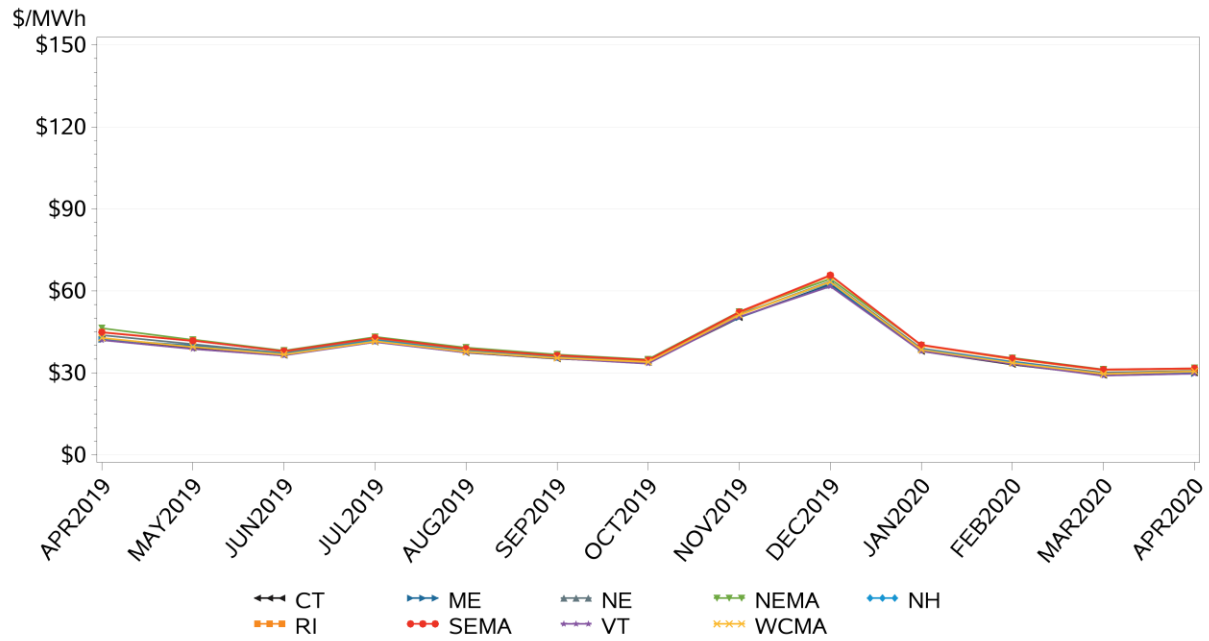


### 3.2 Comparison of All Hours, On-Peak, and Off-Peak Total Cost

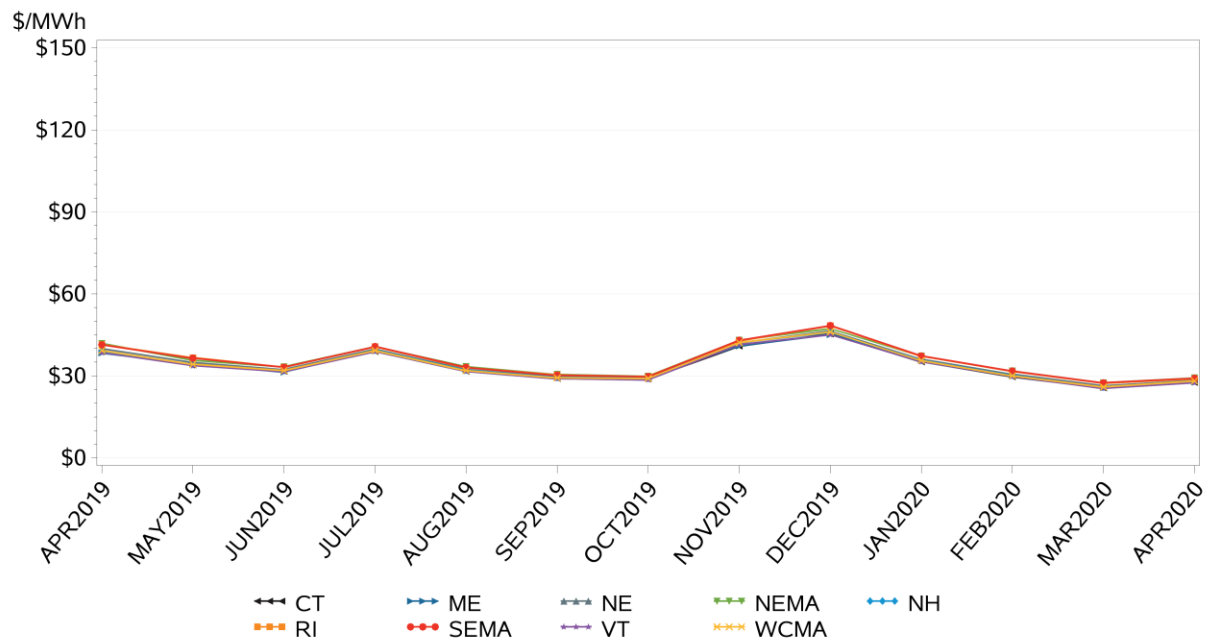
The following three graphs compare the total wholesale load cost by month averaged over all hours, on-peak hours, and off-peak hours for the last 13 months for the 8 load zones and New England. The New England value is a load-weighted average of the zonal prices. For a complete discussion of the development of the total cost of wholesale electricity, please see the appendix.



### Average Total Wholesale Load Cost- On-Peak Hours 13 Months Ending 30APR20



### Average Total Wholesale Load Cost- Off-Peak Hours 13 Months Ending 30APR20



### 3.3 Zonal Component Costs, Last 13 Months

The following eight tables show the average component wholesale load costs by month for each of the last 13 months. The total Real-Time Load Obligation and total cost for the Load Zone are also shown. It is important to note that the rates displayed in these tables are **average** values. These averages, when applied to the total, on-peak, and off-peak Real-Time Load Obligation, result in a representation of total costs that is internally consistent, however tempers some of the hourly variability in market rates that compose the series. They are meant to show how these particular market values move over time, not necessarily to tie to any actual billed quantities. For **total** pool-wide costs developed in a manner consistent with this study the interested reader should see Section 3 of the Regional Network Load Cost Report located [here](#)<sup>6</sup>.

To download a detailed breakdown of the major categories reported, see the comma-separated values file on the ISO web site located [here](#). For an explanation of the development of the components, please see the appendix.

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<sup>6</sup> Select “Regional Network Load Reports” from the document type filter and “PDF” from the file type filter on the left hand side of the page.

### 3.3.1 Maine Load Zone Wholesale Load Cost Components, Last 13 Months

Component (All Hours)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$40.26	\$36.98	\$33.78	\$40.53	\$35.03	\$32.52	\$32.29	\$45.06	\$52.76	\$36.95	\$31.71	\$27.60	\$28.72
Energy	\$26.12	\$22.67	\$22.11	\$28.95	\$23.77	\$20.27	\$20.27	\$33.16	\$41.38	\$26.18	\$20.34	\$16.74	\$17.47
Capacity	\$12.72	\$12.39	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.44	\$0.93	\$0.51	\$0.83	\$0.50	\$1.09	\$1.34	\$0.93	\$0.98	\$0.43	\$0.37	\$0.42	\$0.37
Ancillary Markets	\$0.43	\$0.40	\$0.67	\$0.58	\$0.58	\$0.65	\$0.42	\$0.60	\$0.49	\$0.37	\$0.34	\$0.38	\$0.35
Misc Credit/Charge	(\$0.31)	(\$0.26)	(\$0.20)	(\$0.19)	(\$0.19)	(\$0.20)	(\$0.20)	(\$0.39)	(\$0.42)	(\$0.35)	(\$0.33)	(\$0.28)	(\$0.30)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(866,600)	(864,965)	(860,484)	(1,078,075)	(1,017,865)	(877,535)	(900,022)	(931,277)	(1,032,660)	(1,028,578)	(944,489)	(931,736)	(831,935)
Total Cost	\$34,892,623	\$31,986,273	\$29,069,495	\$43,698,673	\$35,654,884	\$28,538,050	\$29,059,209	\$41,963,412	\$54,484,368	\$38,007,579	\$29,951,979	\$25,717,515	\$23,895,900
Component (On Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$42.24	\$39.92	\$36.78	\$42.12	\$38.28	\$36.31	\$34.87	\$50.25	\$62.05	\$38.57	\$33.72	\$29.66	\$29.79
Energy	\$27.99	\$25.43	\$24.73	\$30.04	\$26.59	\$23.43	\$22.73	\$38.10	\$50.29	\$27.64	\$22.17	\$18.68	\$18.36
Capacity	\$12.72	\$12.39	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.41	\$0.95	\$0.40	\$1.00	\$0.56	\$1.22	\$1.36	\$1.05	\$1.20	\$0.45	\$0.37	\$0.37	\$0.38
Ancillary Markets	\$0.58	\$0.58	\$1.20	\$0.93	\$0.98	\$1.17	\$0.55	\$0.78	\$0.74	\$0.54	\$0.55	\$0.58	\$0.55
Misc Credit/Charge	(\$0.33)	(\$0.30)	(\$0.21)	(\$0.21)	(\$0.21)	(\$0.21)	(\$0.23)	(\$0.44)	(\$0.46)	(\$0.40)	(\$0.36)	(\$0.31)	(\$0.33)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(464,216)	(452,373)	(424,841)	(563,321)	(544,074)	(431,529)	(486,990)	(448,273)	(508,064)	(527,470)	(466,640)	(476,082)	(444,956)
Total Cost	\$19,609,748	\$18,057,514	\$15,627,438	\$23,728,503	\$20,826,648	\$15,669,037	\$16,983,233	\$22,527,932	\$31,527,760	\$20,342,010	\$15,734,754	\$14,119,539	\$13,253,628
Component (Off Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$38.37	\$34.34	\$31.38	\$39.11	\$32.11	\$29.49	\$29.76	\$40.91	\$45.11	\$35.50	\$30.00	\$25.75	\$27.71
Energy	\$24.33	\$20.18	\$20.02	\$27.98	\$21.24	\$17.75	\$17.87	\$29.22	\$34.04	\$24.86	\$18.79	\$14.99	\$16.63
Capacity	\$12.72	\$12.39	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.47	\$0.92	\$0.59	\$0.67	\$0.44	\$0.98	\$1.32	\$0.82	\$0.80	\$0.42	\$0.36	\$0.46	\$0.35
Ancillary Markets	\$0.27	\$0.23	\$0.25	\$0.25	\$0.22	\$0.23	\$0.29	\$0.45	\$0.29	\$0.21	\$0.16	\$0.21	\$0.16
Misc Credit/Charge	(\$0.28)	(\$0.23)	(\$0.19)	(\$0.17)	(\$0.16)	(\$0.19)	(\$0.17)	(\$0.36)	(\$0.38)	(\$0.32)	(\$0.31)	(\$0.26)	(\$0.27)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(402,384)	(412,592)	(435,643)	(514,755)	(473,792)	(446,005)	(413,032)	(483,004)	(524,595)	(501,108)	(477,849)	(455,654)	(386,979)
Total Cost	\$15,439,855	\$14,169,286	\$13,671,150	\$20,130,762	\$15,213,779	\$13,152,204	\$12,290,011	\$19,761,892	\$23,663,328	\$17,790,621	\$14,337,558	\$11,733,423	\$10,721,793

### 3.3.2 New Hampshire Load Zone Wholesale Load Cost Components, Last 13 Months

Component (All Hours)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$40.79	\$36.73	\$34.16	\$40.58	\$34.92	\$32.22	\$31.69	\$46.35	\$53.61	\$37.09	\$31.92	\$27.64	\$29.32
Energy	\$26.64	\$22.90	\$22.47	\$29.43	\$23.85	\$20.59	\$20.37	\$34.45	\$42.58	\$26.31	\$20.53	\$16.80	\$18.08
Capacity	\$12.72	\$12.39	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.44	\$0.44	\$0.51	\$0.38	\$0.31	\$0.46	\$0.65	\$0.93	\$0.60	\$0.43	\$0.37	\$0.40	\$0.37
Ancillary Markets	\$0.43	\$0.40	\$0.67	\$0.58	\$0.58	\$0.65	\$0.42	\$0.60	\$0.49	\$0.37	\$0.34	\$0.38	\$0.35
Misc Credit/Charge	(\$0.30)	(\$0.26)	(\$0.19)	(\$0.19)	(\$0.19)	(\$0.19)	(\$0.21)	(\$0.40)	(\$0.43)	(\$0.35)	(\$0.32)	(\$0.29)	(\$0.31)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(836,005)	(842,234)	(887,733)	(1,147,986)	(1,034,188)	(853,988)	(853,330)	(909,577)	(1,024,592)	(1,007,031)	(916,496)	(895,058)	(810,439)
Total Cost	\$34,104,626	\$30,932,889	\$30,323,189	\$46,587,067	\$36,116,892	\$27,516,726	\$27,039,175	\$42,158,582	\$54,930,037	\$37,348,054	\$29,251,008	\$24,739,136	\$23,761,322
Component (On Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$42.64	\$39.60	\$36.89	\$41.85	\$38.06	\$35.75	\$34.28	\$51.56	\$62.98	\$38.61	\$33.92	\$29.65	\$30.55
Energy	\$28.38	\$25.69	\$24.79	\$30.37	\$26.63	\$23.65	\$22.86	\$39.40	\$51.67	\$27.69	\$22.35	\$18.70	\$19.13
Capacity	\$12.72	\$12.39	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.41	\$0.38	\$0.40	\$0.37	\$0.30	\$0.42	\$0.65	\$1.05	\$0.67	\$0.45	\$0.37	\$0.34	\$0.38
Ancillary Markets	\$0.58	\$0.58	\$1.20	\$0.93	\$0.98	\$1.17	\$0.55	\$0.78	\$0.74	\$0.54	\$0.55	\$0.58	\$0.55
Misc Credit/Charge	(\$0.32)	(\$0.30)	(\$0.20)	(\$0.21)	(\$0.21)	(\$0.20)	(\$0.24)	(\$0.45)	(\$0.47)	(\$0.40)	(\$0.35)	(\$0.32)	(\$0.34)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(455,922)	(449,391)	(451,927)	(605,786)	(566,841)	(430,998)	(473,697)	(445,900)	(512,909)	(527,584)	(459,588)	(466,595)	(439,018)
Total Cost	\$19,441,348	\$17,796,023	\$16,669,596	\$25,350,386	\$21,575,903	\$15,409,606	\$16,237,472	\$22,992,469	\$32,302,484	\$20,370,712	\$15,589,972	\$13,833,029	\$13,413,774
Component (Off Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$39.03	\$34.15	\$31.98	\$39.45	\$32.10	\$29.40	\$29.15	\$42.19	\$45.90	\$35.72	\$30.21	\$25.83	\$28.14
Energy	\$24.97	\$20.39	\$20.60	\$28.59	\$21.35	\$18.13	\$17.94	\$30.50	\$35.10	\$25.07	\$18.98	\$15.09	\$17.07
Capacity	\$12.72	\$12.39	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.47	\$0.50	\$0.59	\$0.39	\$0.32	\$0.49	\$0.65	\$0.82	\$0.53	\$0.42	\$0.36	\$0.45	\$0.35
Ancillary Markets	\$0.27	\$0.23	\$0.25	\$0.25	\$0.22	\$0.23	\$0.29	\$0.45	\$0.29	\$0.21	\$0.16	\$0.21	\$0.16
Misc Credit/Charge	(\$0.27)	(\$0.23)	(\$0.18)	(\$0.17)	(\$0.16)	(\$0.18)	(\$0.18)	(\$0.37)	(\$0.39)	(\$0.32)	(\$0.30)	(\$0.27)	(\$0.28)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(380,083)	(392,843)	(435,806)	(542,200)	(467,347)	(422,990)	(379,633)	(463,677)	(511,683)	(479,446)	(456,908)	(428,463)	(371,421)
Total Cost	\$14,833,883	\$13,414,508	\$13,935,304	\$21,387,169	\$15,003,211	\$12,434,192	\$11,066,404	\$19,561,809	\$23,484,879	\$17,125,263	\$13,802,886	\$11,068,415	\$10,450,971

### 3.3.3 Vermont Load Zone Wholesale Load Cost Components, Last 13 Months

Component (All Hours)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$40.17	\$36.10	\$33.68	\$40.07	\$34.43	\$31.81	\$30.99	\$45.50	\$52.57	\$36.47	\$31.41	\$27.10	\$28.54
Energy	\$26.00	\$22.25	\$22.01	\$28.94	\$23.37	\$20.26	\$19.85	\$33.59	\$41.51	\$25.63	\$19.98	\$16.23	\$17.30
Capacity	\$12.72	\$12.39	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.44	\$0.44	\$0.48	\$0.35	\$0.30	\$0.37	\$0.46	\$0.90	\$0.59	\$0.43	\$0.37	\$0.40	\$0.36
Ancillary Markets	\$0.43	\$0.40	\$0.67	\$0.58	\$0.58	\$0.65	\$0.42	\$0.60	\$0.49	\$0.37	\$0.34	\$0.38	\$0.35
Misc Credit/Charge	(\$0.29)	(\$0.24)	(\$0.19)	(\$0.19)	(\$0.20)	(\$0.18)	(\$0.19)	(\$0.36)	(\$0.39)	(\$0.28)	(\$0.27)	(\$0.26)	(\$0.30)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(382,032)	(365,551)	(368,401)	(457,905)	(424,469)	(375,571)	(398,561)	(444,666)	(496,631)	(495,895)	(438,977)	(404,438)	(341,550)
Total Cost	\$15,345,419	\$13,196,342	\$12,408,629	\$18,346,245	\$14,615,079	\$11,948,204	\$12,352,942	\$20,233,875	\$26,107,946	\$18,086,121	\$13,788,406	\$10,958,295	\$9,748,718
Component (On Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$41.94	\$38.76	\$36.35	\$41.31	\$37.51	\$35.30	\$33.44	\$50.51	\$61.67	\$37.92	\$33.29	\$28.96	\$29.68
Energy	\$27.67	\$24.83	\$24.29	\$29.86	\$26.10	\$23.30	\$22.23	\$38.34	\$50.34	\$26.93	\$21.67	\$17.99	\$18.26
Capacity	\$12.72	\$12.39	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.40	\$0.37	\$0.37	\$0.34	\$0.29	\$0.31	\$0.41	\$1.02	\$0.67	\$0.45	\$0.37	\$0.34	\$0.37
Ancillary Markets	\$0.58	\$0.58	\$1.20	\$0.93	\$0.98	\$1.17	\$0.55	\$0.78	\$0.74	\$0.54	\$0.55	\$0.58	\$0.55
Misc Credit/Charge	(\$0.31)	(\$0.28)	(\$0.20)	(\$0.21)	(\$0.22)	(\$0.19)	(\$0.22)	(\$0.41)	(\$0.43)	(\$0.33)	(\$0.30)	(\$0.29)	(\$0.33)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(196,074)	(187,337)	(175,889)	(228,381)	(216,782)	(176,904)	(213,084)	(213,732)	(242,321)	(251,827)	(213,589)	(202,503)	(173,268)
Total Cost	\$8,222,592	\$7,261,031	\$6,393,556	\$9,434,859	\$8,131,777	\$6,245,273	\$7,124,954	\$10,794,882	\$14,944,403	\$9,548,189	\$7,110,168	\$5,864,214	\$5,142,700
Component (Off Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$38.48	\$33.71	\$31.55	\$38.95	\$31.67	\$29.02	\$28.60	\$41.51	\$45.07	\$35.18	\$29.81	\$25.42	\$27.45
Energy	\$24.41	\$19.94	\$20.19	\$28.12	\$20.93	\$17.83	\$17.51	\$29.79	\$34.24	\$24.46	\$18.54	\$14.65	\$16.38
Capacity	\$12.72	\$12.39	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.47	\$0.50	\$0.58	\$0.36	\$0.32	\$0.41	\$0.51	\$0.81	\$0.53	\$0.42	\$0.36	\$0.45	\$0.35
Ancillary Markets	\$0.27	\$0.23	\$0.25	\$0.25	\$0.22	\$0.23	\$0.29	\$0.45	\$0.29	\$0.21	\$0.16	\$0.21	\$0.16
Misc Credit/Charge	(\$0.26)	(\$0.21)	(\$0.18)	(\$0.17)	(\$0.17)	(\$0.17)	(\$0.16)	(\$0.33)	(\$0.35)	(\$0.25)	(\$0.25)	(\$0.24)	(\$0.27)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(185,958)	(178,214)	(192,512)	(229,525)	(207,687)	(198,667)	(185,477)	(230,934)	(254,310)	(244,068)	(225,387)	(201,935)	(168,282)
Total Cost	\$7,155,012	\$6,007,932	\$6,073,438	\$8,939,151	\$6,576,583	\$5,765,643	\$5,305,087	\$9,586,311	\$11,462,894	\$8,585,098	\$6,719,137	\$5,132,675	\$4,620,019



### 3.3.4 Connecticut Load Zone Wholesale Load Cost Components, Last 13 Months

Component (All Hours)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$40.75	\$36.47	\$33.85	\$40.06	\$34.38	\$31.76	\$31.29	\$45.06	\$52.99	\$36.45	\$31.22	\$27.32	\$28.87
Energy	\$26.72	\$22.76	\$22.18	\$28.93	\$23.30	\$20.21	\$20.14	\$33.15	\$41.95	\$25.63	\$19.80	\$16.47	\$17.63
Capacity	\$12.58	\$12.26	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.44	\$0.44	\$0.48	\$0.35	\$0.30	\$0.37	\$0.46	\$0.90	\$0.59	\$0.43	\$0.37	\$0.40	\$0.36
Ancillary Markets	\$0.43	\$0.40	\$0.67	\$0.58	\$0.58	\$0.65	\$0.42	\$0.60	\$0.49	\$0.37	\$0.34	\$0.38	\$0.35
Misc Credit/Charge	(\$0.29)	(\$0.24)	(\$0.19)	(\$0.18)	(\$0.18)	(\$0.18)	(\$0.19)	(\$0.37)	(\$0.41)	(\$0.30)	(\$0.28)	(\$0.28)	(\$0.31)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(1,999,057)	(2,057,411)	(2,281,746)	(3,053,897)	(2,708,794)	(2,149,761)	(2,068,091)	(2,204,752)	(2,527,865)	(2,440,869)	(2,218,101)	(2,146,853)	(1,920,493)
Total Cost	\$81,457,354	\$75,036,456	\$77,228,083	\$122,350,107	\$93,139,031	\$68,280,764	\$64,700,481	\$99,337,287	\$133,963,231	\$88,967,481	\$69,244,252	\$58,644,127	\$55,438,908
Component (On Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$42.66	\$39.23	\$36.49	\$41.32	\$37.42	\$35.19	\$33.78	\$50.30	\$62.28	\$37.89	\$33.09	\$29.18	\$30.10
Energy	\$28.54	\$25.43	\$24.43	\$29.85	\$25.98	\$23.18	\$22.57	\$38.14	\$50.96	\$26.92	\$21.48	\$18.23	\$18.68
Capacity	\$12.58	\$12.26	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.40	\$0.37	\$0.37	\$0.34	\$0.29	\$0.31	\$0.41	\$1.02	\$0.67	\$0.45	\$0.37	\$0.34	\$0.37
Ancillary Markets	\$0.58	\$0.58	\$1.20	\$0.93	\$0.98	\$1.17	\$0.55	\$0.78	\$0.74	\$0.54	\$0.55	\$0.58	\$0.55
Misc Credit/Charge	(\$0.31)	(\$0.28)	(\$0.20)	(\$0.20)	(\$0.20)	(\$0.19)	(\$0.22)	(\$0.42)	(\$0.45)	(\$0.35)	(\$0.31)	(\$0.31)	(\$0.34)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(1,081,342)	(1,092,258)	(1,161,712)	(1,609,584)	(1,476,653)	(1,090,260)	(1,156,101)	(1,075,471)	(1,261,070)	(1,275,247)	(1,104,679)	(1,104,512)	(1,027,890)
Total Cost	\$46,132,029	\$42,849,590	\$42,396,193	\$66,503,545	\$55,251,881	\$38,367,047	\$39,052,268	\$54,093,450	\$78,541,178	\$48,318,588	\$36,555,279	\$32,229,295	\$30,935,505
Component (Off Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$38.92	\$33.99	\$31.73	\$38.94	\$31.66	\$29.02	\$28.84	\$40.87	\$45.35	\$35.16	\$29.62	\$25.64	\$27.69
Energy	\$24.99	\$20.35	\$20.37	\$28.10	\$20.90	\$17.82	\$17.75	\$29.17	\$34.53	\$24.46	\$18.36	\$14.89	\$16.62
Capacity	\$12.58	\$12.26	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.47	\$0.50	\$0.58	\$0.36	\$0.32	\$0.41	\$0.51	\$0.81	\$0.53	\$0.42	\$0.36	\$0.45	\$0.35
Ancillary Markets	\$0.27	\$0.23	\$0.25	\$0.25	\$0.22	\$0.23	\$0.29	\$0.45	\$0.29	\$0.21	\$0.16	\$0.21	\$0.16
Misc Credit/Charge	(\$0.26)	(\$0.21)	(\$0.18)	(\$0.16)	(\$0.15)	(\$0.17)	(\$0.16)	(\$0.34)	(\$0.37)	(\$0.27)	(\$0.26)	(\$0.26)	(\$0.28)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(917,715)	(965,153)	(1,120,035)	(1,444,312)	(1,232,140)	(1,059,500)	(911,990)	(1,129,281)	(1,266,796)	(1,165,622)	(1,113,422)	(1,042,340)	(892,604)
Total Cost	\$35,714,863	\$32,809,264	\$35,535,568	\$56,238,505	\$39,010,097	\$30,745,723	\$26,305,464	\$46,157,420	\$57,444,958	\$40,978,142	\$32,983,274	\$26,724,405	\$24,717,386

### 3.3.5 Rhode Island Load Zone Wholesale Load Cost Components, Last 13 Months

Component (All Hours)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$43.19	\$39.11	\$35.25	\$41.67	\$35.69	\$32.97	\$32.18	\$46.83	\$56.11	\$38.54	\$33.22	\$29.06	\$30.18
Energy	\$26.67	\$22.75	\$22.36	\$29.11	\$23.47	\$20.37	\$20.27	\$34.08	\$42.95	\$26.31	\$20.29	\$16.79	\$18.03
Capacity	\$15.23	\$15.03	\$11.07	\$10.67	\$10.73	\$11.01	\$10.45	\$10.79	\$10.65	\$10.91	\$11.66	\$10.92	\$10.85
NCPC	\$0.44	\$0.45	\$0.54	\$0.73	\$0.31	\$0.37	\$0.47	\$0.95	\$1.68	\$0.49	\$0.40	\$0.43	\$0.38
Ancillary Markets	\$0.43	\$0.40	\$0.67	\$0.58	\$0.58	\$0.65	\$0.42	\$0.60	\$0.49	\$0.37	\$0.34	\$0.38	\$0.35
Misc Credit/Charge	(\$0.44)	(\$0.38)	(\$0.28)	(\$0.27)	(\$0.26)	(\$0.31)	(\$0.30)	(\$0.46)	(\$0.52)	(\$0.44)	(\$0.41)	(\$0.38)	(\$0.37)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(548,891)	(562,031)	(622,972)	(857,843)	(778,766)	(610,067)	(568,812)	(592,869)	(662,380)	(644,409)	(590,618)	(579,050)	(530,336)
Total Cost	\$23,708,472	\$21,981,628	\$21,958,471	\$35,748,466	\$27,795,360	\$20,110,870	\$18,302,038	\$27,762,199	\$37,164,168	\$24,838,308	\$19,620,593	\$16,826,115	\$16,003,043
Component (On Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$44.96	\$41.83	\$37.81	\$42.78	\$38.66	\$36.28	\$34.62	\$51.90	\$65.53	\$40.09	\$35.12	\$30.99	\$31.43
Energy	\$28.33	\$25.39	\$24.52	\$29.95	\$26.07	\$23.24	\$22.65	\$38.90	\$52.04	\$27.68	\$22.03	\$18.59	\$19.10
Capacity	\$15.23	\$15.03	\$11.07	\$10.67	\$10.73	\$11.01	\$10.45	\$10.79	\$10.65	\$10.91	\$11.66	\$10.92	\$10.85
NCPC	\$0.40	\$0.39	\$0.44	\$0.65	\$0.29	\$0.32	\$0.42	\$1.07	\$1.81	\$0.53	\$0.38	\$0.39	\$0.39
Ancillary Markets	\$0.58	\$0.58	\$1.20	\$0.93	\$0.98	\$1.17	\$0.55	\$0.78	\$0.74	\$0.54	\$0.55	\$0.58	\$0.55
Misc Credit/Charge	(\$0.46)	(\$0.42)	(\$0.29)	(\$0.29)	(\$0.28)	(\$0.32)	(\$0.33)	(\$0.51)	(\$0.56)	(\$0.49)	(\$0.44)	(\$0.41)	(\$0.40)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(298,010)	(296,744)	(316,226)	(449,528)	(421,016)	(306,768)	(315,697)	(289,397)	(331,763)	(337,167)	(295,403)	(299,734)	(283,680)
Total Cost	\$13,397,052	\$12,413,095	\$11,957,420	\$19,229,362	\$16,274,994	\$11,130,797	\$10,928,907	\$15,019,996	\$21,741,543	\$13,516,023	\$10,373,721	\$9,289,064	\$8,916,871
Component (Off Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$41.51	\$36.67	\$33.20	\$40.68	\$33.03	\$30.31	\$29.79	\$42.78	\$48.34	\$37.16	\$31.61	\$27.32	\$28.97
Energy	\$25.08	\$20.39	\$20.64	\$28.34	\$21.13	\$18.08	\$17.95	\$30.24	\$35.46	\$25.07	\$18.81	\$15.16	\$17.00
Capacity	\$15.23	\$15.03	\$11.07	\$10.67	\$10.73	\$11.01	\$10.45	\$10.79	\$10.65	\$10.91	\$11.66	\$10.92	\$10.85
NCPC	\$0.47	\$0.51	\$0.63	\$0.81	\$0.32	\$0.42	\$0.51	\$0.85	\$1.57	\$0.45	\$0.42	\$0.47	\$0.36
Ancillary Markets	\$0.27	\$0.23	\$0.25	\$0.25	\$0.22	\$0.23	\$0.29	\$0.45	\$0.29	\$0.21	\$0.16	\$0.21	\$0.16
Misc Credit/Charge	(\$0.41)	(\$0.35)	(\$0.27)	(\$0.25)	(\$0.23)	(\$0.30)	(\$0.27)	(\$0.43)	(\$0.48)	(\$0.41)	(\$0.39)	(\$0.36)	(\$0.34)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(250,881)	(265,287)	(306,746)	(408,314)	(357,750)	(303,299)	(253,115)	(303,471)	(330,617)	(307,242)	(295,215)	(279,317)	(246,657)
Total Cost	\$10,413,662	\$9,727,723	\$10,182,724	\$16,610,621	\$11,816,181	\$9,192,920	\$7,539,137	\$12,981,829	\$15,983,401	\$11,416,817	\$9,330,625	\$7,630,368	\$7,146,220

### 3.3.6 SEMA Load Zone Wholesale Load Cost Components, Last 13 Months

Component (All Hours)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$43.07	\$38.98	\$35.29	\$41.75	\$35.82	\$32.95	\$32.17	\$47.14	\$56.24	\$38.68	\$33.38	\$29.23	\$30.38
Energy	\$26.79	\$22.89	\$22.60	\$29.38	\$23.77	\$20.60	\$20.49	\$34.51	\$43.20	\$26.55	\$20.50	\$17.02	\$18.32
Capacity	\$15.23	\$15.03	\$11.07	\$10.67	\$10.73	\$11.01	\$10.45	\$10.79	\$10.65	\$10.91	\$11.66	\$10.92	\$10.85
NCPC	\$0.44	\$0.45	\$0.58	\$0.73	\$0.31	\$0.37	\$0.47	\$0.95	\$1.68	\$0.49	\$0.40	\$0.43	\$0.38
Ancillary Markets	\$0.43	\$0.40	\$0.67	\$0.58	\$0.58	\$0.65	\$0.42	\$0.60	\$0.49	\$0.37	\$0.34	\$0.38	\$0.35
Misc Credit/Charge	(\$0.69)	(\$0.65)	(\$0.51)	(\$0.47)	(\$0.44)	(\$0.55)	(\$0.51)	(\$0.58)	(\$0.64)	(\$0.55)	(\$0.45)	(\$0.45)	(\$0.45)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(964,936)	(987,763)	(1,099,723)	(1,532,797)	(1,399,724)	(1,060,514)	(1,013,122)	(1,067,030)	(1,217,889)	(1,171,702)	(1,058,800)	(1,034,447)	(946,970)
Total Cost	\$41,558,538	\$38,506,196	\$38,808,894	\$63,993,674	\$50,133,101	\$34,946,980	\$32,596,893	\$50,295,480	\$68,497,249	\$45,324,227	\$35,347,632	\$30,232,213	\$28,771,355
Component (On Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$44.85	\$41.76	\$37.96	\$42.87	\$38.85	\$36.35	\$34.67	\$52.29	\$65.74	\$40.23	\$35.31	\$31.19	\$31.67
Energy	\$28.47	\$25.58	\$24.85	\$30.24	\$26.44	\$23.54	\$22.92	\$39.40	\$52.36	\$27.93	\$22.27	\$18.87	\$19.42
Capacity	\$15.23	\$15.03	\$11.07	\$10.67	\$10.73	\$11.01	\$10.45	\$10.79	\$10.65	\$10.91	\$11.66	\$10.92	\$10.85
NCPC	\$0.40	\$0.39	\$0.50	\$0.65	\$0.29	\$0.32	\$0.42	\$1.07	\$1.81	\$0.53	\$0.38	\$0.39	\$0.39
Ancillary Markets	\$0.58	\$0.58	\$1.20	\$0.93	\$0.98	\$1.17	\$0.55	\$0.78	\$0.74	\$0.54	\$0.55	\$0.58	\$0.55
Misc Credit/Charge	(\$0.71)	(\$0.69)	(\$0.52)	(\$0.49)	(\$0.46)	(\$0.56)	(\$0.54)	(\$0.63)	(\$0.68)	(\$0.60)	(\$0.48)	(\$0.48)	(\$0.48)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(516,888)	(515,040)	(554,708)	(799,962)	(756,461)	(526,546)	(558,980)	(518,260)	(609,559)	(608,258)	(525,835)	(530,804)	(503,583)
Total Cost	\$23,182,506	\$21,508,532	\$21,056,351	\$34,291,536	\$29,386,130	\$19,138,751	\$19,379,973	\$27,097,593	\$40,070,253	\$24,468,848	\$18,568,508	\$16,557,627	\$15,947,810
Component (Off Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$41.36	\$36.49	\$33.15	\$40.75	\$33.10	\$30.24	\$29.73	\$43.03	\$48.42	\$37.29	\$31.74	\$27.45	\$29.15
Energy	\$25.19	\$20.48	\$20.80	\$28.61	\$21.37	\$18.25	\$18.11	\$30.61	\$35.66	\$25.32	\$18.99	\$15.36	\$17.26
Capacity	\$15.23	\$15.03	\$11.07	\$10.67	\$10.73	\$11.01	\$10.45	\$10.79	\$10.65	\$10.91	\$11.66	\$10.92	\$10.85
NCPC	\$0.47	\$0.51	\$0.65	\$0.81	\$0.32	\$0.42	\$0.51	\$0.85	\$1.57	\$0.45	\$0.42	\$0.47	\$0.36
Ancillary Markets	\$0.27	\$0.23	\$0.25	\$0.25	\$0.22	\$0.23	\$0.29	\$0.45	\$0.29	\$0.21	\$0.16	\$0.21	\$0.16
Misc Credit/Charge	(\$0.66)	(\$0.62)	(\$0.50)	(\$0.45)	(\$0.41)	(\$0.54)	(\$0.48)	(\$0.55)	(\$0.60)	(\$0.52)	(\$0.43)	(\$0.43)	(\$0.42)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(448,048)	(472,723)	(545,016)	(732,835)	(643,263)	(533,968)	(454,141)	(548,771)	(608,330)	(563,443)	(532,964)	(503,642)	(443,387)
Total Cost	\$18,533,371	\$17,249,192	\$18,069,420	\$29,860,628	\$21,288,925	\$16,145,581	\$13,502,660	\$23,611,611	\$29,457,853	\$21,013,481	\$16,918,403	\$13,826,902	\$12,925,758

### 3.3.7 WCMA Load Zone Wholesale Load Cost Components, Last 13 Months

Component (All Hours)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$41.01	\$36.77	\$34.09	\$40.34	\$34.66	\$32.01	\$31.51	\$46.18	\$53.84	\$36.98	\$31.70	\$27.65	\$29.29
Energy	\$26.84	\$22.93	\$22.42	\$29.21	\$23.59	\$20.45	\$20.37	\$34.28	\$42.75	\$26.18	\$20.29	\$16.79	\$18.04
Capacity	\$12.72	\$12.39	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.44	\$0.44	\$0.48	\$0.35	\$0.30	\$0.37	\$0.46	\$0.90	\$0.65	\$0.43	\$0.37	\$0.40	\$0.36
Ancillary Markets	\$0.43	\$0.40	\$0.67	\$0.58	\$0.58	\$0.65	\$0.42	\$0.60	\$0.49	\$0.37	\$0.34	\$0.38	\$0.35
Misc Credit/Charge	(\$0.29)	(\$0.24)	(\$0.18)	(\$0.18)	(\$0.19)	(\$0.18)	(\$0.20)	(\$0.37)	(\$0.41)	(\$0.32)	(\$0.30)	(\$0.27)	(\$0.30)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(1,308,376)	(1,297,725)	(1,377,085)	(1,810,137)	(1,629,427)	(1,319,621)	(1,311,385)	(1,415,801)	(1,561,613)	(1,523,311)	(1,389,708)	(1,369,500)	(1,200,383)
Total Cost	\$53,650,407	\$47,718,375	\$46,950,361	\$73,027,706	\$56,477,169	\$42,242,060	\$41,316,968	\$65,384,145	\$84,084,749	\$56,325,529	\$44,047,858	\$37,860,819	\$35,155,608
Component (On Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$42.83	\$39.57	\$36.75	\$41.54	\$37.69	\$35.44	\$34.02	\$51.20	\$63.27	\$38.48	\$33.63	\$29.58	\$30.53
Energy	\$28.57	\$25.65	\$24.68	\$30.08	\$26.26	\$23.43	\$22.82	\$39.05	\$51.89	\$27.53	\$22.04	\$18.62	\$19.11
Capacity	\$12.72	\$12.39	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.40	\$0.37	\$0.37	\$0.34	\$0.29	\$0.31	\$0.41	\$1.02	\$0.73	\$0.45	\$0.37	\$0.34	\$0.37
Ancillary Markets	\$0.58	\$0.58	\$1.20	\$0.93	\$0.98	\$1.17	\$0.55	\$0.78	\$0.74	\$0.54	\$0.55	\$0.58	\$0.55
Misc Credit/Charge	(\$0.31)	(\$0.28)	(\$0.19)	(\$0.20)	(\$0.21)	(\$0.19)	(\$0.23)	(\$0.42)	(\$0.45)	(\$0.37)	(\$0.33)	(\$0.30)	(\$0.33)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(648,024)	(623,017)	(639,731)	(838,731)	(785,107)	(596,490)	(661,663)	(633,569)	(727,081)	(743,610)	(653,160)	(654,151)	(592,768)
Total Cost	\$27,756,055	\$24,652,342	\$23,507,281	\$34,838,678	\$29,587,440	\$21,137,342	\$22,506,568	\$32,439,906	\$46,004,563	\$28,610,795	\$21,964,040	\$19,348,815	\$18,099,017
Component (Off Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$39.26	\$34.26	\$31.97	\$39.27	\$31.94	\$29.27	\$29.05	\$42.18	\$46.08	\$35.63	\$30.05	\$25.91	\$28.10
Energy	\$25.19	\$20.49	\$20.61	\$28.43	\$21.20	\$18.08	\$17.97	\$30.47	\$35.22	\$24.96	\$18.81	\$15.15	\$17.02
Capacity	\$12.72	\$12.39	\$9.83	\$9.53	\$9.51	\$9.85	\$9.60	\$9.91	\$9.51	\$9.41	\$10.06	\$9.43	\$9.90
NCPC	\$0.47	\$0.50	\$0.58	\$0.36	\$0.32	\$0.41	\$0.51	\$0.81	\$0.58	\$0.42	\$0.36	\$0.45	\$0.35
Ancillary Markets	\$0.27	\$0.23	\$0.25	\$0.25	\$0.22	\$0.23	\$0.29	\$0.45	\$0.29	\$0.21	\$0.16	\$0.21	\$0.16
Misc Credit/Charge	(\$0.26)	(\$0.21)	(\$0.17)	(\$0.16)	(\$0.16)	(\$0.17)	(\$0.17)	(\$0.34)	(\$0.37)	(\$0.29)	(\$0.28)	(\$0.25)	(\$0.27)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(660,353)	(674,708)	(737,353)	(971,406)	(844,320)	(723,131)	(649,722)	(782,231)	(834,532)	(779,701)	(736,547)	(715,348)	(607,614)
Total Cost	\$25,924,274	\$23,114,047	\$23,575,255	\$38,148,980	\$26,971,234	\$21,166,327	\$18,875,039	\$32,991,149	\$38,455,613	\$27,779,931	\$22,134,640	\$18,531,631	\$17,071,010

### 3.3.8 NEMA Load Zone Wholesale Load Cost Components, Last 13 Months

Component (All Hours)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$44.06	\$38.75	\$35.47	\$41.83	\$36.17	\$33.29	\$32.41	\$47.20	\$55.04	\$38.61	\$33.45	\$29.26	\$30.47
Energy	\$26.92	\$23.09	\$22.63	\$29.61	\$23.89	\$20.67	\$20.55	\$34.52	\$42.98	\$26.40	\$20.53	\$17.00	\$18.35
Capacity	\$15.42	\$13.87	\$11.07	\$10.67	\$10.73	\$11.01	\$10.45	\$10.79	\$10.65	\$10.91	\$11.66	\$10.92	\$10.85
NCPC	\$0.45	\$0.44	\$0.49	\$0.36	\$0.36	\$0.38	\$0.46	\$0.91	\$0.60	\$0.43	\$0.37	\$0.40	\$0.37
Ancillary Markets	\$0.87	\$0.86	\$0.67	\$0.58	\$0.58	\$0.65	\$0.42	\$0.60	\$0.49	\$0.37	\$0.34	\$0.38	\$0.35
Misc Credit/Charge	(\$0.48)	(\$0.36)	(\$0.26)	(\$0.25)	(\$0.26)	(\$0.28)	(\$0.33)	(\$0.48)	(\$0.53)	(\$0.41)	(\$0.38)	(\$0.36)	(\$0.38)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(1,738,972)	(1,750,932)	(1,876,868)	(2,471,588)	(2,232,902)	(1,840,180)	(1,774,224)	(1,870,793)	(2,085,912)	(2,043,472)	(1,878,735)	(1,803,737)	(1,622,876)
Total Cost	\$76,612,317	\$67,855,945	\$66,576,267	\$103,392,772	\$80,762,727	\$61,266,432	\$57,498,799	\$88,303,250	\$114,817,469	\$78,904,317	\$62,850,121	\$52,769,134	\$49,453,641
Component (On Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$46.35	\$42.14	\$38.17	\$43.18	\$39.27	\$36.75	\$34.97	\$52.40	\$64.46	\$40.13	\$35.44	\$31.25	\$31.75
Energy	\$28.65	\$25.88	\$24.94	\$30.62	\$26.61	\$23.68	\$23.05	\$39.47	\$52.12	\$27.78	\$22.34	\$18.88	\$19.44
Capacity	\$15.42	\$13.87	\$11.07	\$10.67	\$10.73	\$11.01	\$10.45	\$10.79	\$10.65	\$10.91	\$11.66	\$10.92	\$10.85
NCPC	\$0.43	\$0.38	\$0.37	\$0.36	\$0.37	\$0.31	\$0.41	\$1.03	\$0.67	\$0.45	\$0.37	\$0.34	\$0.38
Ancillary Markets	\$1.49	\$1.56	\$1.20	\$0.95	\$0.98	\$1.17	\$0.55	\$0.78	\$0.74	\$0.54	\$0.55	\$0.58	\$0.55
Misc Credit/Charge	(\$0.50)	(\$0.40)	(\$0.27)	(\$0.27)	(\$0.28)	(\$0.29)	(\$0.36)	(\$0.53)	(\$0.57)	(\$0.46)	(\$0.41)	(\$0.39)	(\$0.41)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(938,931)	(925,582)	(949,545)	(1,285,794)	(1,209,354)	(922,697)	(983,886)	(912,776)	(1,041,149)	(1,064,699)	(935,883)	(928,813)	(856,427)
Total Cost	\$43,520,847	\$39,004,676	\$36,243,969	\$55,523,196	\$47,495,732	\$33,910,542	\$34,405,655	\$47,829,180	\$67,114,726	\$42,729,881	\$33,171,132	\$29,025,947	\$27,188,432
Component (Off Peak)	APR2019	MAY2019	JUN2019	JUL2019	AUG2019	SEP2019	OCT2019	NOV2019	DEC2019	JAN2020	FEB2020	MAR2020	APR2020
Total Wholesale Rate (\$/MWh)	\$41.86	\$35.71	\$33.31	\$40.62	\$33.38	\$30.53	\$29.90	\$43.05	\$47.29	\$37.25	\$31.76	\$27.46	\$29.25
Energy	\$25.27	\$20.58	\$20.79	\$28.70	\$21.45	\$18.25	\$18.10	\$30.58	\$35.46	\$25.17	\$18.99	\$15.30	\$17.30
Capacity	\$15.42	\$13.87	\$11.07	\$10.67	\$10.73	\$11.01	\$10.45	\$10.79	\$10.65	\$10.91	\$11.66	\$10.92	\$10.85
NCPC	\$0.48	\$0.50	\$0.58	\$0.37	\$0.35	\$0.43	\$0.51	\$0.82	\$0.53	\$0.42	\$0.36	\$0.45	\$0.35
Ancillary Markets	\$0.27	\$0.23	\$0.25	\$0.25	\$0.22	\$0.23	\$0.29	\$0.45	\$0.29	\$0.21	\$0.16	\$0.21	\$0.16
Misc Credit/Charge	(\$0.45)	(\$0.33)	(\$0.25)	(\$0.23)	(\$0.23)	(\$0.27)	(\$0.30)	(\$0.45)	(\$0.49)	(\$0.38)	(\$0.36)	(\$0.34)	(\$0.35)
Wholesale Mkt Service Charge	\$0.87	\$0.86	\$0.87	\$0.86	\$0.86	\$0.87	\$0.86	\$0.87	\$0.86	\$0.92	\$0.94	\$0.92	\$0.93
RTLO (MWh)	(800,041)	(825,350)	(927,323)	(1,185,794)	(1,023,548)	(917,482)	(790,339)	(958,016)	(1,044,763)	(978,773)	(942,851)	(874,923)	(766,450)
Total Cost	\$33,490,120	\$29,475,916	\$30,892,599	\$48,167,817	\$34,167,999	\$28,008,418	\$23,631,948	\$41,244,903	\$49,405,086	\$36,456,934	\$29,944,598	\$24,024,815	\$22,422,236

## 4. Appendix: Overview and Assumptions

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The information reported by the ISO is derived from the operation and settlement of the New England wholesale electricity markets by ISO New England Inc. Because of rules governing the settlement and re-settlement of various market products, the data presented concerning wholesale load costs will always be the latest available at the time of dissemination. *The data presented are informational only, and are compiled for the convenience of the user. ISO New England makes no warranty as to their accuracy or use.*

In the ISO's multi-settlement system, wholesale customers who have a real-time load obligation ("metered" electricity use in the real-time market) are also responsible for certain ancillary service costs in the markets. A tabular listing, including links to relevant rules and procedures can be found on the ISO web site located [here](#).

This report presents the background and assumptions used in developing the historical series of the average component costs of serving wholesale load within the New England marketplace on an overall, on-peak, and off-peak basis. To simplify the analysis, certain assumptions have been made and are detailed below.

### 4.1 Assumptions

For the values presented, the following assumptions are made:

1. The values presented are rates, not bill amounts. The rates represent the costs associated with serving one megawatt hour (MWh) of wholesale electricity in the New England wholesale markets. These costs may either be a charge or credit to the customer depending on the market product. Charges are positive amounts while credits are negative amounts. The following section of the appendix describes the derivation of the individual component costs associated with this level of consumption. The final section of the appendix provides guidance on applying the information to customers of differing sizes and load factors.
2. Elements of the component costs of serving load are calculated at 5-minute intervals, hourly, daily, or monthly, and are based upon hourly and/or peak levels of demand. Ultimately, all component of costs, whether energy or peak-related, have been converted to their equivalent hourly value before averaging. Also, because of methodological differences in the development of these rates, it is not always possible to arrive at the total zonal charge for each market service for the time period in question.
3. Real-time Locational Marginal Prices (LMPs) at the Load Zone level are used. The eight Load Zones in the New England wholesale marketplace are Maine, New Hampshire, Vermont, Connecticut, Rhode Island, Southeastern Massachusetts, Western/Central Massachusetts, and Northeastern Massachusetts.
4. The analysis assumes a 'real-time only' user of electricity. It assumes that no hedging mechanisms have been employed. This means that no bilateral contracts, no day-ahead position or bidding, and no Financial Transmission Rights have been reflected.
5. Relevant expenses associated with participation in the wholesale marketplace for a small customer have been included. These are expenses associated with membership in the New England Power Pool (NEPOOL) and fees charged by the ISO as part of their self-funding tariff.

6. No Open Access Transmission Tariff (OATT) costs have been assumed in this analysis; they are assumed to be part of the regulated rate charged by the distribution company for service on their system. Details of distribution tariff charges vary by jurisdiction and Distribution Company.

## 4.2 Background and Context

- 1) **Retail vs. Wholesale Load:** The level of electricity consumption at the customer premises (whether metered, profiled, or estimated) is called retail load. There is a certain level of low-voltage transmission and distribution line losses involved in delivering electricity from the high-voltage New England wholesale system across each distribution company's system to the customer. These loss factors can vary markedly by Distribution Company and by rate class within a distribution company's territory. This means that retail consumption is generally adjusted upward to arrive at wholesale consumption. For example, a customer who uses 943 kWh in a service territory with 6% low-voltage transmission and distribution losses will have an obligation of 1,000 kWh at the wholesale level.
- 2) **Real-Time Load Obligation (RTLO):** New England's wholesale market is location-based. The region is divided into eight load (or pricing) zones. Except for a small group of customers (called Asset-Related Demands or ARDs) that buy wholesale electricity at a specific nodal location, the majority of wholesale customers take financial delivery of their electricity at a load-zone level. Hourly, zonal-level RTLO is derived by summing wholesale customer-level RTLO at each of the eight zonal locations in New England. The hourly RTLO total for each zone (excluding ARDs) is used as an allocator to derive the \$/MWh value shown for most of the components.
- 3) **Quantity Unit of Measure:** All components presented in this report and reported by the ISO are provided in \$/MWh measures. In order to convert these to \$/kWh, divide \$/MWh by 1,000.

## 4.3 Derivation of Component Costs

- 1) **Energy: Real-Time LMP (RTLMP):** Zonal level RTLMP is computed by the ISO in its Scheduling, Pricing, and Dispatch (SPD) system every five minutes and represents the load-weighted average of the marginal cost of serving the next increment of demand within the specific zone during the interval, expressed in dollars per megawatt-hour (\$/MWh). The value shown in the report is the average wholesale cost of one MWh over the period shown. The actual cost of energy, weighted for consumption, can differ significantly from the simple average RTLMP presented in these reports.
  - a) Effective March 2017, ISO New England moved from using hourly LMPs to sub-hourly (5-minute) LMPs in various settlements, including the Energy and Reserve markets. To accommodate this change, LMP averages shown in this report prior to the March 1, 2017 boundary reflect the average of hourly LMPs, while LMP averages subsequent to that are derived from 5-minute values.
- 2) **Capacity:** Having a RTLO will obligate a wholesale customer to share in compensating resources that provide generating capacity to the New England system. Charges for capacity are computed monthly, and are based upon the wholesale customer's share of the region's consumption at the time of the system peak during the prior (June-May) year. The date and time of the annual system peak may be found [here](#) in the document entitled 'ISO New England Annual System Peak Day, Hour & Load MW.'
  - a) In New England, capacity (generation, imports, and demand resources) is supplied through the Forward Capacity Market (FCM), where resources are paid based on their Capacity Supply Obligation (CSO). CSOs are awarded via a multiple-auction process, and the final CSO for a month represents the requirement of a resource to deliver its capacity commitment during that month.

Load pays for capacity based on Capacity Load Obligation (CLO), which is calculated based upon ownership in load assets and is the consumption by their share of these assets at the time of the prior



year's system peak. Total payments to CSOs divided by the sum of CLOs results in the Net Regional Clearing Price (NRCP), the representative monthly charge rate for capacity. The rate expressed in this report is the NRCP divided by the number of hours in the month to express its value in equivalent \$/MWh for each hour during the month.

- b) Imports of capacity from external control areas can sometimes be subject to scheduling penalties that reduce the effective amount paid to the import for its capacity. Because of the small magnitude of this adjustment it is explicitly excluded from the analysis presented here.
- c) For more information on FCM, see the ISO web site [here](#).

**3) Net Commitment Period Compensation (NCPC):** NCPC is a term that refers to “make-whole” payments made to generators whose hourly commitment and dispatch by the ISO resulted in a shortfall between the resource's offered value in the Energy and Regulation Markets and the revenue earned from output over the course of the day. At times, this is the result of operation of resources that are ensuring the overall resource adequacy or the transmission or stability security of specific locations or of the entire system.

- a) **First Contingency NCPC** – This represents payments to generators that experienced a daily revenue shortfall after being committed by the ISO. This means that the resource's offered capacity was required to maintain prescribed levels of on-line capacity within New England, or the money garnered in course of operations over the course of the dispatch day was insufficient. The total cost of compensating these resources in the real-time market is allocated to those who had a real-time deviation from their day-ahead schedule across the entire New England region. In this analysis, any real-time consumption is inherently a deviation from the day-ahead position (because no day-ahead activity is assumed), and therefore is included. The New England-level daily cost is divided by the daily deviation total across all customers and across the entire marketplace, and the result is the \$/MWh rate.
- b) **Second Contingency NCPC** – This represents payments to resources that experienced a daily revenue shortfall after being committed by the ISO to provide zonal-level ‘insurance’ from ‘second contingency’ events. Generally, this means that the resource's capacity was required to provide reliability protection to a specific area of the system. The total cost of compensating these resources in the real-time market is allocated to those with RTLO in the Load Zone for which the Second Contingency cost was incurred. Total Second Contingency Costs billed to RTLO is the sum of both the Day-Ahead and Real-Time incurred costs, and is reflected in these data. In each case, the daily cost is divided by the daily allocator, and the result is divided by 24 hours to arrive at a \$/MWh rate.

The ISO has an additional NCPC component to account for ISO-initiated audits of generation in the real-time energy market. The ISO will calculate, for each Operating Day, the ISO-initiated audit NCPC charges in the Real-Time Energy Market for each Market Participant by allocating the total ISO-initiated audit NCPC cost to each Market Participant in proportion to the daily sum of their Real-Time Load Obligations, excluding Real-Time Load Obligations associated with Dispatchable Asset Related Demand Resources (pumps only). For expediency, any charges will be included in the Second Contingency NCPC category.

#### 4) Ancillary Markets

- a) **Regulation:** Regulation, or Automatic Generation Control (AGC), is necessary to balance supply levels against second-to-second variations in demand. Beginning on March 31, 2015, the Regulation Clearing price was split into two components, a Regulation Service Clearing price and a Regulation Capacity Clearing price. The market change was implemented to enable the participation of



alternative resources in this market, and to improve compensation for resources providing regulation services in New England. The cost of compensating resources that provided the service is summed on a region-wide, hourly basis and divided by the New England-level RTLO to derive the \$/MWh rate.

- b) **Forward Reserve Market:** The ISO procures forward reserves (essentially call options on energy) through an auction process. This ensures that resources are available in the event of system capacity shortages. The auction, its products, and compensation switched to a zonal methodology. A charge rate that allocates reserve zone obligations to load zone RTLO is computed that allocates the total costs of providing forward reserve to a load zone on an hourly basis. This rate is applied to a customer's RTLO to compute their charge. The charge rates reflect the reserves provided in more constrained zones to meet the overall system requirements. The product is only procured, and RTLO charged, during on-peak hours (as opposed to during *all* hours).
- c) **Real-Time Reserve Market:** The ISO operates a real-time reserve market to provide compensation to resources providing reserves in real-time. When real-time reserves become scarce, or the system is re-dispatched to produce a lower overall cost of energy or to maintain reserves, prices for reserve products become non-zero, and resources providing the product(s) are compensated. This can happen in both on- and off-peak hours. A charge rate that allocates the total costs of providing real-time reserve to a load zone on an hourly basis is applied to a customer's RTLO to compute their charge. The charge rates reflect the reserves provided in more constrained zones to meet the overall system requirements.
- d) **Transitional Demand Response Program and Price-Responsive Demand - Full Integration (PRD):** In June 2012, the Transitional Demand Response Program was introduced to allow demand response assets to participate in the energy markets and to be dispatched during a capacity deficiency based on real-time system conditions. In June 2018, demand response assets can fully participate in the Energy and Reserve Markets based on economics. The cost of compensating assets that were dispatched is summed on a region-wide, hourly basis and divided by the New England-level RTLO to derive the \$/MWh rate.

## 5) Miscellaneous Credits/Charges

- a) **Inadvertent Energy:** The difference between the amount of scheduled external transactions both into and out of New England and the actual metered amounts of these transactions results in small imbalances of energy between control areas. When the total dollars defined by reconciling the schedules with the actual amounts in an hour is calculated, it is divided by the difference between the sum of real-time generation obligations and RTLO. This defines a \$/MWh rate that may, depending on the direction of the imbalance, result in either a charge or credit to RTLO.
- b) **Emergency Energy:** The New England Control area participates in cooperative agreements with its neighbors to either buy or sell energy under stipulated conditions and cost structures in emergency conditions. When these purchases or sales occur, real-time *adjusted* load obligation incurs a charge or credit. The hourly value is divided by the system-wide real-time adjusted load obligation to arrive at the \$/MWh rate. In this analysis, due to the 'no hedging' assumption, RTLO incurs a charge or receives a credit. *Because of the way the calculation is performed, the charge or credit is implicit to the Marginal Loss Revenue Fund category below.* For reference, the aggregate value of emergency purchases or sales is shown in a separate file on the web site located [here](#).
- c) **Marginal Loss Revenue Fund:** Because of the difference between marginal hourly losses and average hourly losses, an over-collection of funds associated with system losses occurs in each hour. The hourly over-collection from both the Day-Ahead and Real-Time markets, plus any Emergency

Energy purchases/sales is charged or credited to system-wide real-time adjusted load obligation to arrive at the \$/MWh rate. In this analysis, due to the 'no hedging' assumption, RTLO incurs a charge or receives a credit. This component is usually a credit to RTLO.

- d) **Auction Revenue Rights (ARR):** The ISO conducts annual and monthly Financial Transmission Rights (FTR) auctions. Participants who are awarded FTRs in the auction receive a hedge against congestion costs in the Day-Ahead Market. The money collected through the auction (Auction Revenue) is allocated to entities that have increased the transfer capability of the New England transmission system and to congestion paying load-serving entities (LSEs). The majority of auction revenue is allocated to the second category. After certain pre-defined allocations are made, the remaining funds are allocated to the proportional RTLO share of LSE's at the time of the pool's coincident peak for the month. This monthly, zonal-level rate is then divided by the number of hours in the month to arrive at an equivalent \$/MWh rate. Because this rate is derived from a peak load value, it is not possible to derive the total value of the ARR allocation to a specific Load Zone from the data presented here.

## 6) Wholesale Market Service Charge

- a) **ISO Schedule 2 – Energy Administration Service (ISO Sched 2):** The ISO's cost of operation is recovered by way of a self-funding tariff. ISO Sched 2 comprises services associated with the Energy Market and its accounting. There is both a transaction-based component (charged to those who are submitting bids, offers, and contracts) and a volumetric component that is based upon RTLO. Due to the 'no hedging' assumption in this analysis, only volumetric-based charges are included. The tariff rate shown in these reports (\$0.35542/MWh during 2020) applies to any level of consumption up to a tariff-prescribed 250,000 MWh in a month. This rate varies by year, and can be reviewed in the document entitled "Section IV.A – Self-Funding Tariff" posted [here](#).
- i) **Transaction Unit (TU) Based Charges:** While they are not included within this analysis, there are ISO charges that are assessed to each transaction or "transactional unit" (which includes any Price-MWh pair bid to purchase energy) submitted by a wholesale customer, regardless of size. These charges are collected through the ISO Tariff to help the ISO recover costs related to the energy administration services they provide. In this analysis, we assume the customer is purchasing 1 MW each hour of the month, for a total of 720 individual transactions during the current reporting month. The charge rate varies by year, but during 2020, this rate has been set to approximately 66.0¢ per transaction. This means that, during April 2020, a wholesale market participant would see an additional charge of approximately \$475.39 that is not included in this tabulation.
- b) **ISO Schedule 3 – Reliability Administration Service (ISO Sched 3):** An additional component of the self-funding Tariff, ISO Sched 3, comprises services associated with maintaining New England reliability. Transmission-only customers pay fees, and energy market participants pay a volumetric component that is based upon their non-coincident peak load. The rate shown in these reports is derived by applying the rate (\$0.24413/kW during 2020) times the customer non-coincident peak load (1,000 kW assumed) divided by the number of hours in the month. The rate is expressed in equivalent hourly \$/MWh. This rate varies by year, and can be seen in the document entitled "Section IV.A – Self-Funding Tariff" posted [here](#).
- c) **NEPOOL Expenses:** This analysis assumes that the wholesale customer is an 'End Use Market Participant' in the New England Power Pool. Members in the 'Small End-User' sub-category (monthly peak demand less than one MW) pay a fixed \$500 annual membership fee.

End-Use Market Participants whose monthly peak demand is greater than one MW are called 'Large End-Users' and pay the fixed \$500 fee plus \$500/MW of annual non-coincident peak load (capped at \$5,000 from 10 to 20 MW). Above 20 MW annual non-coincident peak load, there is an additional charge of \$200/MW.

Additionally, this class of participant contributes to deferring overall participant expenses via a schedule derived from the customer's highest RTLO during the prior year as indicated below.

Peak Load Obligation of Market Participant End User (or Individual RTO Participant)	Annual Participant Expenses Allocated to Market Participant End User (or Individual RTO Participant)
less than 20 KW	\$100
20 KW < X < 100 KW	\$250
100 KW < X < 1,000 KW (1 MW)	\$1,000
1 MW < X < 5 MW	\$1,000 per megawatt
> 5 MW	amount equal to the lowest amount of Participant Expenses paid by an individual voting Participant in the Generation, Transmission, or Supplier Sectors pursuant to Section 1.1 of this Agreement

To simplify the presentation in these reports, the annual expense is computed as the \$500 annual fee, plus \$500 for one MW of annual peak, plus \$1,000 toward expenses for an annual peak of one MW. Thus, in these reports, NEPOOL Expenses are \$0.23/MWh (\$2,000 / 8,760 hours) in every hour. Individual participant charges will vary based upon actual consumption.

#### 4.4 Using the Component Costs

The purpose of this analysis is to provide a historical series of the costs associated with serving a real-time load obligation in the New England Wholesale Markets. While this analysis details the majority of costs according to current Wholesale Market Settlement rules, there are costs that occur from time to time that are not shown here.

In states where restructuring has occurred, the sum total of costs presented here most closely represents the 'energy supply' portion of the unbundled customer bill. Transmission and distribution charges, including restructuring transition payments (if any), time-of-use or demand charges, and other retail tariffs are not included here.

Because the data presented here are averages, it is virtually impossible to accurately compute an actual customer bill from these data. The series *may* assist in spotting trends, differentiating between costs at times of the day or year, and showing zonal differences.

#### 4.5 Downloadable Information

Comma-separated value (.csv) files of the latest hourly, monthly, and yearly average values, including values for all components, can be found [here](#). The files contain several header rows that describe the requested settlement data.

#### 4.6 An Example

Assume that a small commercial/industrial customer located in the Southeastern Massachusetts Load Zone wanted to estimate their wholesale electricity costs during April 2020 using the monthly cost components

published for April 2020 in this report.

Assume that the customer is a real-time only wholesale customer and has the following characteristics:

- 943 kW peak demand at the meter at the time of the New England seasonal peak, July 30, 2019. See the document entitled 'ISO New England Annual System Peak Day, Hour & Load MW' located [here](#) in the document.
- Distribution system losses reflect electrical losses incurred during the delivery of electricity from the bulk (wholesale) power system, across the distribution system, to the customer. Your local distribution company can tell you what this value is for your location or customer class. For this example, we assume these losses are 6%.
- Total energy consumption (again at the meter) for April was **407,000 kWh**, with **271,000 kWh** consumed during wholesale on-peak hours (non-holiday weekdays from 7:00 a.m.-11:00 p.m.) and the balance, **136,000 kWh**, used during off-peak hours. As previously discussed, because the application of rates to these consumption values are performed on averages, the hour-to-hour volatility of prices is masked.
  - For a discussion of on-peak vs. off-peak hours, please see the North American Electric Reliability (NERC) web site located [here](#).
- The relevant wholesale cost components for the analysis, found on page 18, are shown below:

April 2020 (\$/MWh)	Total Cost	Energy Cost	Capacity Cost	NCPC Costs	Ancillary Markets Costs	Misc Cred/Chg	Whisl Mkt Svc Chg
On-Peak Average	\$31.67	\$19.42	\$10.85	\$0.39	\$0.55	(\$0.48)	\$0.93
Off-Peak Average	\$29.15	\$17.26	\$10.85	\$0.36	\$0.16	(\$0.42)	\$0.93

## Estimating the Monthly Wholesale Load Cost

- Reflect all consumption values at the wholesale level, and convert to MWh.

Compute Wholesale Peak Demand			
Retail Peak Demand in 2019 (kW)	Retail Peak Demand (MW)	Loss Factor	Wholesale Peak Demand MW
943	0.943	1 + .06 = 106%	1.000
(a)	(a)/1000=(b)	(c)	(b)*(c)=(d)

Compute Wholesale Usage by Time of Day, April 2020				
	Retail Usage (kWh)	Retail Usage (MWh)	Loss Factor	Wholesale Usage (MWh)
On-Peak	271,000	271	106%	287
Off-Peak	136,000	136	106%	144
Total	407,000	407	106%	431
	(a)	(a)/1000=(b)	(c)	(b)*(c)=(d)

- Estimate the Capacity portion of costs.

Compute Capacity Costs			
Wholesale Peak Demand in 2019 (MW)	Capacity Cost (\$/MWh)	Hours in the Month	Est. Capacity Cost
1.000	\$10.85	720	\$7,812
(a)	(b)	(c)	(a)*(b)*(c)=(d)

- Estimate the non-Capacity portion of costs

Compute Non-Capacity Costs								
Time of Day	Wholesale Usage (MWh)	Real-Time LMP (\$/MWh)	NCPC (\$/MWh)	Ancillary Markets (\$/MWh)	Misc Cred/Chg (\$/MWh)	Whlsl Mkt Svc Chg	Total Non-Capacity Rate (\$/MWh)	Est. Cost.
On-Peak	287	\$19.42	\$0.39	\$0.55	(\$0.48)	\$0.93	\$20.82	\$5,975
Off-Peak	144	\$17.26	\$0.36	\$0.16	(\$0.42)	\$0.93	\$18.30	\$2,636
Total	431							\$8,611
	(a)	(b)	(c)	(d)	(e)	(f)	(b)+(c)+(d)+(e)+(f)=(g)	(a)*(g)=(h)

- Estimate the total wholesale costs.

Component	Cost
Capacity	\$7,812
On-Peak Costs	\$5,975
Off-Peak Costs	\$2,636
<b>Total Estimated Cost</b>	<b>\$16,423</b>

Wholesale Usage	431 MWh
Aggregate \$/MWh	\$38.10
Aggregate ¢/kWh	3.81

## Document History

<b>Date</b>	<b>Version</b>	<b>Description</b>
5/12/2020	Original Posting	