



Control Number: 27706



Item Number: 437

Addendum StartPage: 0

PROJECT NO. 27706

REPORTS OF THE ELECTRIC
RELIABILITY COUNCIL OF TEXAS

§
§

PUBLIC UTILITY COMMISSION
OF TEXAS



ELECTRIC RELIABILITY COUNCIL OF TEXAS, INC.'S
2019 ANNUAL REPORT ON EMERGENCY RESPONSE SERVICE

Electric Reliability Council of Texas, Inc. (ERCOT) hereby submits this report on the effectiveness and benefits of Emergency Response Service (ERS) for the 2019 program year. Public Utility Commission Substantive Rule 25.507(g) requires ERCOT to report its findings to the Commission by April 15 of each calendar year and requires that the report “contain, at a minimum, the number of MW procured in each period, the total dollar amount spent, the number and level of EEA events, and the number and duration of deployments.” ERCOT’s evaluation of ERS is contained in Attachment A to this report, and the underlying data are included in Attachment B.

Respectfully submitted,

/s/ Erika M. Kane

Chad V. Seely
VP and General Counsel
Texas Bar No. 24037466
(512) 225-7035 (Phone)
(512) 225-7079 (Fax)
Chad.Seely@ercot.com

Nathan Bigbee
Assistant General Counsel
Texas Bar No. 24036224
(512) 225-7093 (Phone)
Nathan.Bigbee@ercot.com

Erika Kane
Sr. Corporate Counsel
Texas Bar No. 24050850
(512) 225-7010 (Phone)
Erika.Kane@ercot.com

ERCOT
7620 Metro Center Drive
Austin, Texas 78744

ATTORNEYS FOR ELECTRIC
RELIABILITY COUNCIL OF TEXAS, INC.

**ERCOT Annual Report Pursuant to P.U.C. SUBST. R. 25.507(g)
Regarding Emergency Response Service (ERS) for the
ERS Program Year February 1, 2019, through January 31, 2020**

ERS History

On March 20, 2007, the Public Utility Commission of Texas (Commission) approved Substantive Rule 25.507, *Electric Reliability Council of Texas (ERCOT) Emergency Interruptible Load Service (EILS)*,¹ requiring ERCOT to develop and administer EILS. Later that year, the Commission approved amendments to Rule 25.507 that eliminated the 500 MW procurement floor and increased the annual cost cap from \$20 million to \$50 million.²

On March 22, 2012, the Commission adopted an order repealing the rule and replaced it with a new Rule 25.507 that expanded the program to allow participation by generators and removed certain program restrictions.³ To reflect the broader participation, the program was renamed “Emergency Response Service” (ERS). Prior to the 2012 ERS program year, all ERS Resources provided the service with a 10-minute ramp requirement. In 2012, ERCOT administered a pilot project to test the viability of a 30-minute ramp ERS product. After the successful completion of the pilot project, ERCOT implemented the 30-minute ramp ERS service during the 2013 ERS program year.

Since 2007, the ERCOT Board of Directors (ERCOT Board) has approved a total of 29 Protocol revisions that pertain to ERS. During the 2019 ERS program year, one Protocol revision related to ERS—Nodal Protocol Revision Request (NPRR) 909, *Address Unavailability Gap for ERS and other Minor Clarifications*—was approved. This NPRR made adjustments to how ERCOT determines when an ERS Resource is unavailable and made other minor changes to the ERS Protocols.

Procurement History and Analysis

Under current Protocols, ERCOT procures ERS three times annually for four-month ERS Standard Contract Terms. In each ERS Standard Contract Term, ERCOT procures ERS according to two different response times—thirty minutes (“ERS-30”) and ten minutes (“ERS-10”). ERCOT can procure Weather-Sensitive and Non-Weather Sensitive ERS.

The general ERS procurement methodology used during the 2019 program year has been in place since 2014, although slight adjustments to the procurement process have been made since that

¹ *PUC Rulemaking Concerning a Demand-Response Program for ERCOT Emergency Conditions*, Project No. 33457.

² *PUC Rulemaking to Amend ERCOT Emergency Interruptible Load Service*, Project No. 34706.

³ *Rulemaking to Amend Substantive Rule § 25.507, Relating to Electric Reliability Council of Texas (ERCOT) Emergency Interruptible Load Service (EILS)*, Project No. 39948.

time. In 2019, for example, ERCOT increased the number of ERS Time Periods for which ERS is procured from six to eight. This change was made effective with the October 2019 to January 2020 ERS Standard Contract Term. The addition of numerous wind and solar Resources to the ERCOT System in recent years has increased the potential for higher Load ramp on the weekends and holidays during certain times of the year.⁴ To help address this issue, two new ERS Time Periods were added for Operating Hours ending 0600 to 0900 and 1600 to 2100 on weekends and ERCOT holidays. See slides 5 & 6, Attachment B. Prior to the change from six to eight ERS Time Periods, the Operating Hours included in the two new ERS Time Periods were grouped with other off-peak hours in a single, “all other hours” ERS Time Period.

The procurement of ERS is administered in accordance with the ERS Procurement Methodology document posted to the ERS page on the ERCOT website.⁵ Pursuant to Public Utility Commission Substantive Rule 25.507(b)(2), ERCOT may spend a maximum of \$50 million per year on ERS. ERCOT allocates the spend limit over all ERS Time Periods in the ERS program year by assigning a risk-weighting factor to each ERS Time Period. The risk-weighting factors are values from 1 to 100, with 100 representing the highest risk of ERCOT entering into an Energy Emergency Alert (EEA) Level 1. In determining the appropriate risk-weighting factor to assign each ERS Time Period, ERCOT considers a number of factors, including, but not limited to, forecasted operating reserves, forecasted Load, and Resource outage information. The risk-weighting factors assigned to each ERS Time Period for 2019 are set forth in the attached Risk Weighting Factor Table; the table includes the spend limit allocation for each ERS Time Period. See slide 7, Attachment B.

A Weather-Sensitive ERS product was implemented in 2014 to help utilize the considerable Demand response potential from residential and commercial air conditioning Loads in Texas. The greatest opportunity to utilize these Loads for Demand response occurs during the summer months. For the June through September 2019 ERS Standard Contract Term, ERCOT procured 26.4 MW of Weather-Sensitive ERS in both ERS Time Periods 3 and 4; significantly smaller quantities of the Weather-Sensitive ERS product were procured in the other two ERS Standard Contract Terms. Participation in Weather-Sensitive ERS continues to be impacted by competition from Transmission and Distribution Service Providers (TDSPs) Standard Offer Programs, which implement their own versions of a Demand response service.

Slides 12 through 29 in Attachment B provide detailed results of ERCOT’s procurement of ERS during the 2019 program year, including:

- Descriptions of ERS Standard Contract Terms and ERS Time Periods.
- Capacity procurements by ERS Time Period and by ERS Standard Contract Term, including the number of MW procured and the total number of MW offered.
- Number of procured ERS Resources.
- Number of individual sites submitted to ERCOT for resource identification.
- Summary of final settlement costs of ERS, adjusted to account for payment reductions due to availability and testing results.

⁴ See Net Load Ramp Risk Factor Heat Diagram and Typical Load Profiles, slides 3 and 4, Attachment B.

⁵ See <http://www.ercot.com/services/programs/load/eils>.

- Detailed tables with capacity procurements by ERS Time Period and by ERS Standard Contract Term for each ERS service type, including clearing price (in dollars per MW per hour).

ERS Deployments

The deployment of ERS occurs when the ERCOT System experiences a capacity insufficiency and declares an EEA. There are three levels of EEA. EEA Level 1 may be declared when ERCOT's Physical Responsive Capability (PRC) falls below 2,300 MW and is not projected to recover above that level within 30 minutes. During an EEA Level 1, ERCOT may deploy ERS-30. If PRC falls below 1,750 MW and is not expected to recover within 30 minutes, ERCOT may declare an EEA Level 2 and deploy ERS-10. If system conditions continue to decay, ERCOT may declare an EEA Level 3 and deploy any remaining ERS Resources not deployed in EEA Levels 1 and 2.

Since the inception of the ERS program, there have been five deployment events. Two of the five deployment events occurred during the 2019 ERS program year. On August 13, 2019, ERCOT declared an EEA Level 1 and deployed all ERS-30 resources that had an obligation in ERS Time Periods 3 and 4. Additionally, ERS-10 resources with an obligation during these ERS Time Periods were deployed in error but recalled 14 minutes after being deployed.⁶ The total duration of this deployment event was just over 23 minutes. See slides 8 & 9, Attachment B. On August 15, 2019, ERCOT declared an EEA Level 1 and deployed all ERS-30 resources with an obligation during the relevant ERS Time Periods. The total duration of this event was 72 minutes. See slide 10, Attachment B.

ERS is one of a number of tools used by ERCOT operators to maintain system reliability during an EEA event. In the case of the two EEA events in 2019, ERCOT was able to maintain system reliability and ultimately exit both EEA events without having to declare an EEA Level 2. As reflected in Slides 8 and 10 of Attachment B, during both events ERCOT observed Load reduction from obligated ERS-30 resources that exceeded the contracted obligation of those ERS Resources. This was one of many factors that contributed to the maintenance of ERCOT System reliability during these EEA events.

Availability

The effectiveness of Non-Weather Sensitive ERS is ensured to a large degree by incentives that encourage ERS Resources to maintain a minimal level of availability for deployment. For a Qualified Scheduling Entity's (QSE) portfolio of Non-Weather Sensitive ERS Resources, the QSE must achieve a portfolio-level availability factor of at least 95% across committed ERS Time Periods.⁷ Portfolio-level availability factors are calculated after the end of the ERS Standard Contract Term by aggregating availability factors across ERS Resources in each QSE's portfolio; resource-level availability factors are calculated using aggregated site-level interval meter data for

⁶ ERCOT filed a report with the Commission detailing the erroneous deployment of ERS-10 on August 13, 2019. See *Electric Reliability Council Of Texas, Inc.'s Notice of Violations of the ERCOT Protocols and Nodal Operating Guide*, filed September 27, 2019, in PUC Project No. 27706, *Reports of the Electric Reliability Council of Texas*.

⁷ See Protocols § 8.1.3.1.3.1(1)(a).

each ERS Resource. Any QSE whose portfolio of Non-Weather Sensitive ERS Resources achieves an aggregate availability factor of less than 95% is subject to payment reductions for any individual ERS Resource that achieves an availability factor of less than 85%. For Weather-Sensitive ERS, a comparable evaluation is not a reasonable indicator of the portfolio's ability to provide the service, so ERCOT does not conduct an evaluation of availability.

All ERS Resources, regardless of service type, are subject to periodic Load-shed tests. Each Non-Weather Sensitive ERS Resource is subject to at least one annual, unannounced Load-shed test, whereas each Weather-Sensitive ERS Resource is tested at least once, but no more than twice, each month during the ERS Standard Contract Term for which it is obligated to provide the service. ERCOT conducts this testing by issuing a Verbal Dispatch Instruction (VDI) and an XML instruction to each QSE, just as ERCOT would do in an actual EEA event. Failed test performance may result in payment reductions to the QSE. For Weather-Sensitive ERS, test performance is the sole determinant of payment in the absence of an event deployment.

Through the end of the 2019 program year, ERS payment reductions due to availability or testing results totaled \$2,153,794.79.

ERCOT maintains that the combination of performance metrics and payment reduction penalties for non-compliance—which are among the most stringent for any Demand response program in North America—provides integrity to the ERS product.

Participation

ERCOT's experience with ERS in the 2019 program year reflects that participation in ERS has continued to grow. As shown in slide 21, the number of unique sites offering to provide ERS has steadily increased since the initial implementation of Weather-Sensitive ERS in 2014. See slide 21, Attachment B. The total number of ERS Resources offering into the program has remained relatively constant. See slide 20, Attachment B. This is due to the fact that most new unique ERS sites are added to existing ERS Resources.

Cost Per MW

Since ERCOT adopted its current procurement methodology in 2014, the average unit cost per MW of ERS has remained relatively constant, with a slight downward trend being observed in the past few years. This can be attributed to a slight increase in the overall capacity participating in the service. In the 2019 program year, the weighted unit cost per MW of ERS ranged from \$5.60 to \$7.20 per hour. See slide 11, Attachment B. After taking into consideration the ERS Time Period risk factors, the unit cost during the 2019 program year was similar to the previous couple of years. See slide 23, Attachment B.



ERCOT Emergency Responsive Service (ERS)

Report to the Public Utility Commission of Texas
for the 2019 ERS Program Year

Project No. 27706
Attachment B

Load Ramp Evaluation for Setting ERS Time Periods and Risk Factors

ERS Deployment Evaluations

Procurement Summary Trends

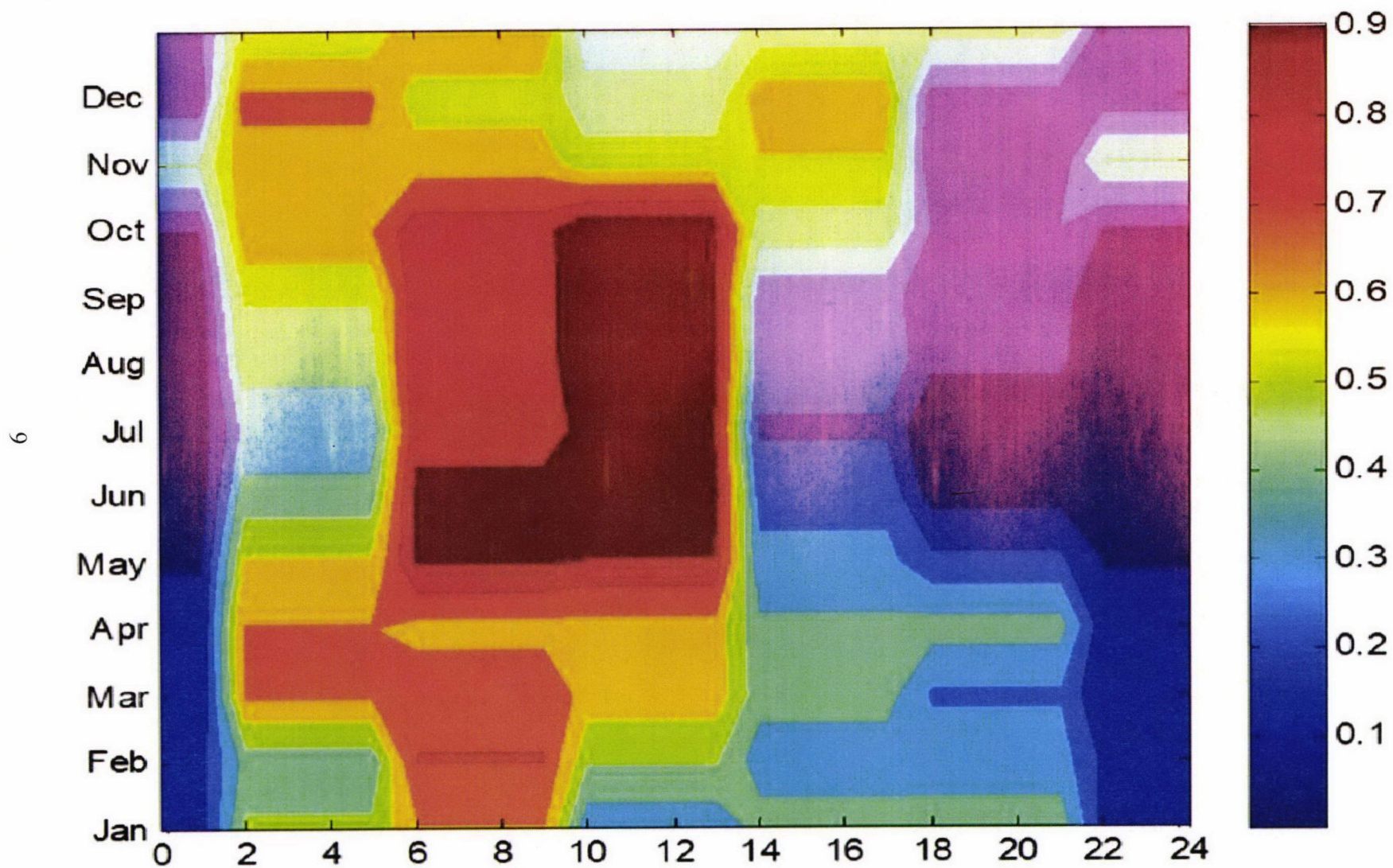
- Capacity (MW) offered and procured
- Number of ERS Resources (All Service Types)
- Cumulative Individual Sites Participating in ERID Process

Detailed Procurement Results for the 2019 ERS Program Year



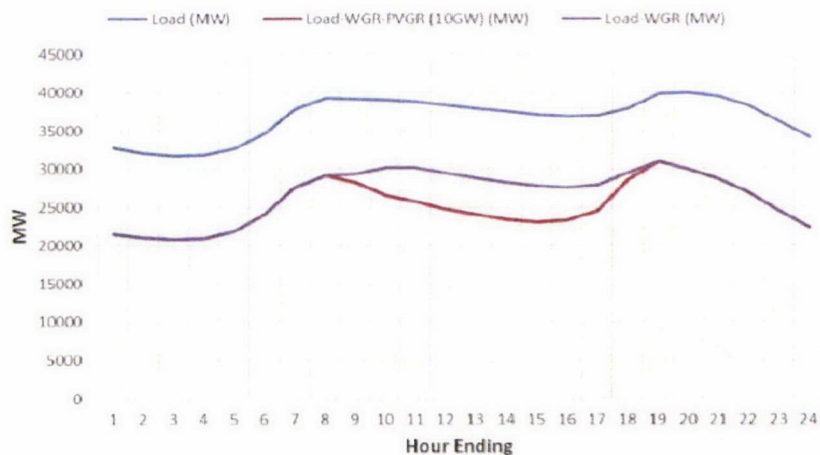
Settlement Summary

Net Load Ramp Risk Factor Heat Diagram

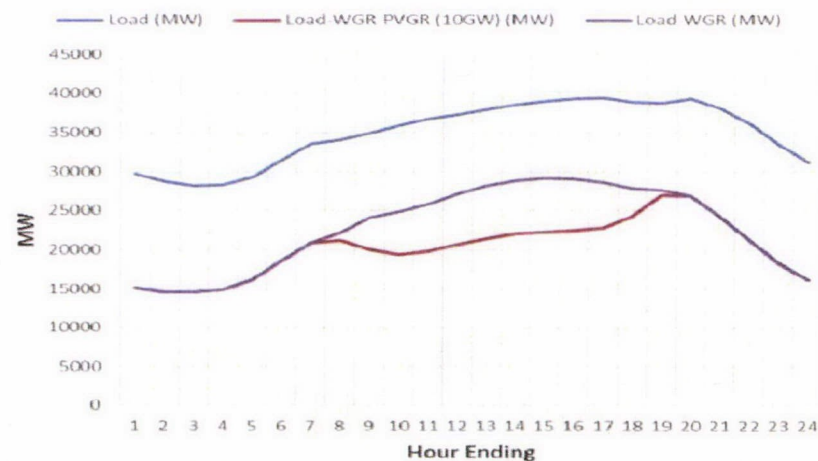


Net Load Profile

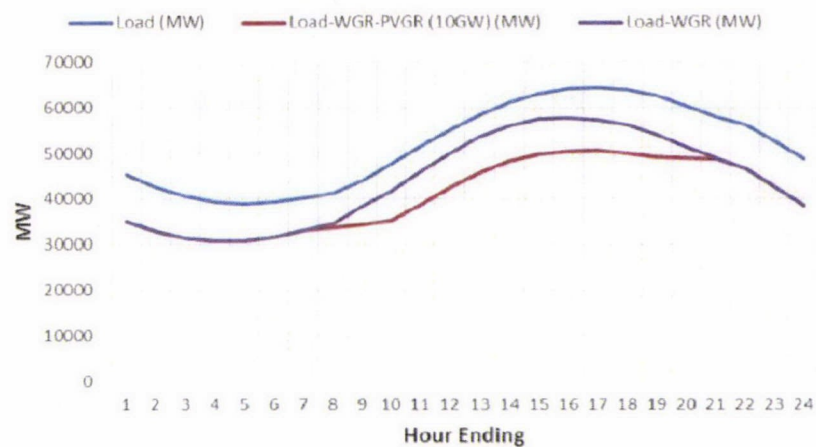
Typical Jan. Profile



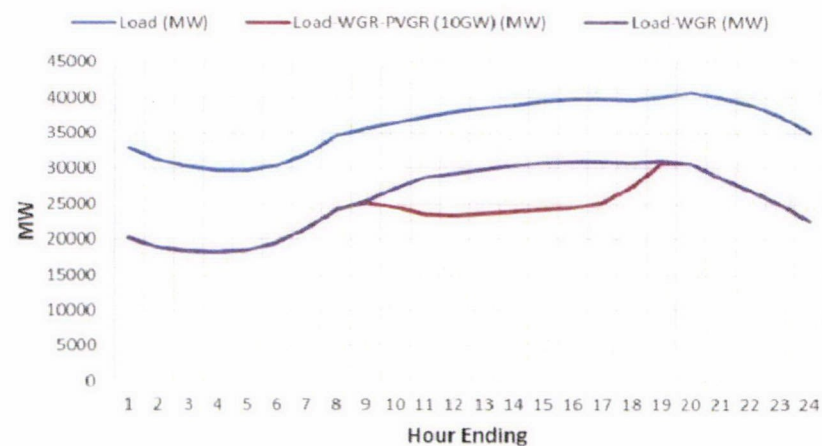
Typical March Profile



Typical July Profile



Typical Nov. Profile



10

Standard Contract Terms & Time Periods

ERS is procured 3 times annually for 4-month Standard Contract Terms

- February through May
- June through September
- October through January

Participants may offer to provide ERS for one or more Time Periods:

For the Feb-May 2019 and Jun-Sep 2019 Standard Contract Terms, the following Time Periods applied:

Time Period	Time Period Hours
Time Period 1	Hours Ending 0600 - 0800 (5:00:00 a.m. to 8:00:00 a.m.) Monday through Friday except ERCOT Holidays.
Time Period 2	Hours Ending 0900 - 1300 (8:00:00 a.m. to 1:00:00 p.m.) Monday through Friday except ERCOT Holidays.
Time Period 3	Hours Ending 1400 - 1600 (1:00:00 p.m. to 4:00:00 p.m.) Monday through Friday except ERCOT Holidays.
Time Period 4	Hours Ending 1700 - 1900 (4:00:00 p.m. to 7:00:00 p.m.) Monday through Friday except ERCOT Holidays.
Time Period 5	Hours Ending 2000 - 2200 (7:00:00 p.m. to 10:00:00 p.m.) Monday through Friday except ERCOT Holidays.
Time Period 6	All other hours

11

Standard Contract Terms & Time Periods

For the Oct 2019-Jan 2020 Standard Contract Term, the following Time Periods applied:

Time Period	Time Period Hours
Time Period 1	Hours Ending 0600 - 0800 (5:00:00 a.m. to 9:00:00 a.m.) Monday through Friday except ERCOT Holidays.
Time Period 2	Hours Ending 1000 - 1300 (9:00:00 a.m. to 1:00:00 p.m.) Monday through Friday except ERCOT Holidays.
Time Period 3	Hours Ending 1400 - 1600 (1:00:00 p.m. to 4:00:00 p.m.) Monday through Friday except ERCOT Holidays.
Time Period 4	Hours Ending 1700 - 1900 (4:00:00 p.m. to 7:00:00 p.m.) Monday through Friday except ERCOT Holidays.
Time Period 5	Hours Ending 2000 - 2200 (7:00:00 p.m. to 10:00:00 p.m.) Monday through Friday except ERCOT Holidays.
Time Period 6	Hours Ending 0600 - 0900 (5:00:00 a.m. to 9:00:00 a.m.)
Time Period 7	Hours Ending 1600 - 2100 (3:00:00 p.m. to 9:00:00 p.m.)
Time Period 8	All other hours

Time Periods are designed to allow flexibility for customers during traditional business hours.

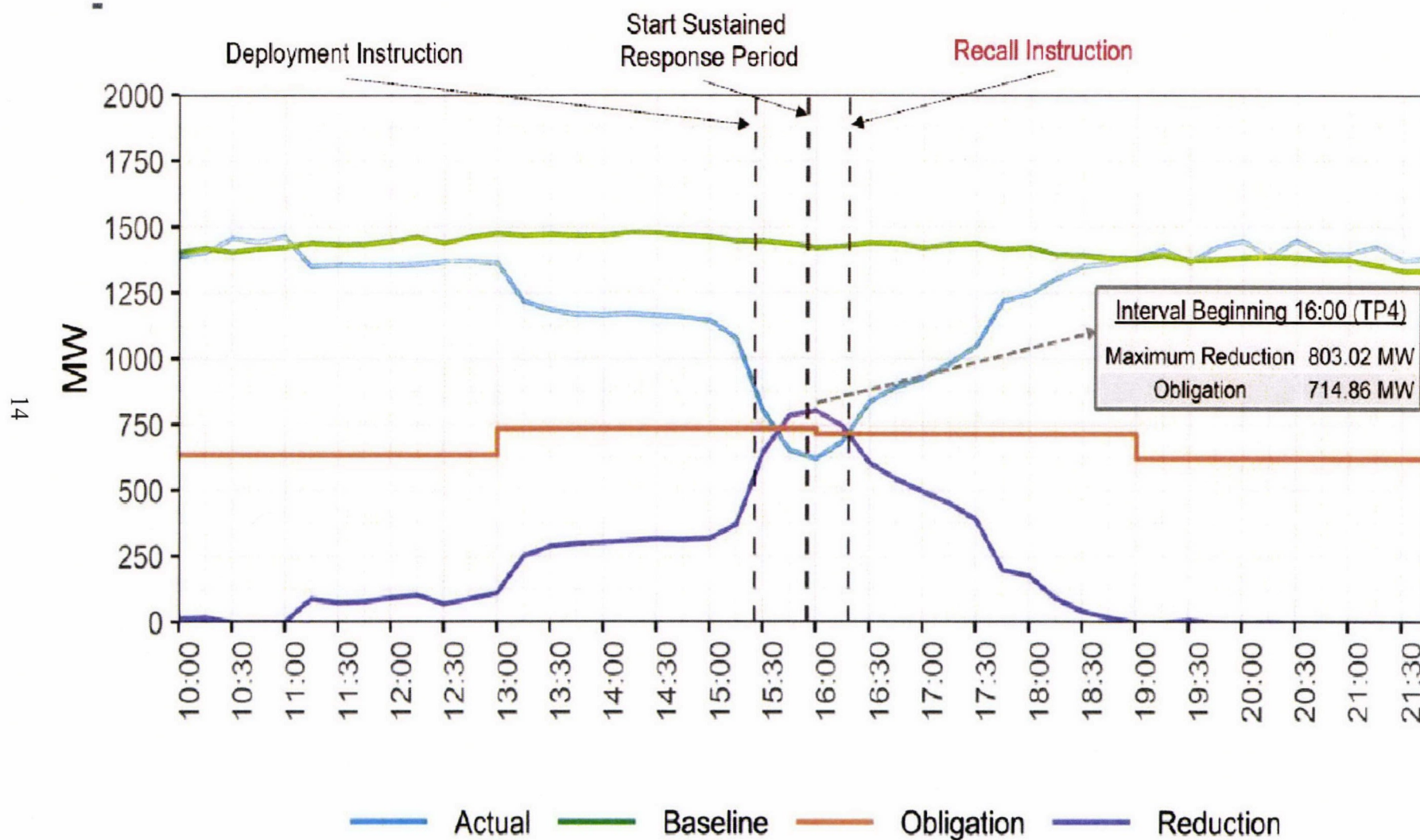
2019 Risk Weighting Factors

Standard Contract Term	Time Period	Risk Level	Risk Weighting Factor (a)	Time Period Hours (b)	Offer Cap (c)	(a)*(b)*(c)	Expenditure Limit Allocation Factor	ERS Time Period Expenditure Limit	Capacity Inflection Point (MW)
FebMay19	TP1	H	100	255	\$ 80	2,040,000	10.41%	5,207,100	255.2
	TP2	M	60	425	\$ 80	2,040,000	10.41%	5,207,100	153.1
	TP3	L	5	255	\$ 80	102,000	0.52%	260,355	12.8
	TP4	H	100	255	\$ 80	2,040,000	10.41%	5,207,100	255.2
	TP5	M	60	255	\$ 80	1,224,000	6.25%	3,124,260	153.1
	TP6	L	1	1,434	\$ 80	114,720	0.59%	292,823	2.6
JunSep19	TP1	L	1	252	\$ 80	20,160	0.22%	68,758	3.4
	TP2	L	1	420	\$ 80	33,600	0.37%	114,596	3.4
	TP3	H	100	252	\$ 80	2,016,000	22.14%	6,875,759	341.1
	TP4	H	100	252	\$ 80	2,016,000	22.14%	6,875,759	341.1
	TP5	L	1	252	\$ 80	20,160	0.22%	68,758	3.4
	TP6	L	1	1,500	\$ 80	120,000	1.32%	409,271	3.4
Oct19Jan20	TP1	H	80	332	\$ 80	2,124,800	35.58%	6,393,011	240.7
	TP2	L	1	332	\$ 80	26,560	0.44%	79,913	3.0
	TP3	L	1	249	\$ 80	19,920	0.33%	59,934	3.0
	TP4	H	80	249	\$ 80	1,593,600	26.68%	4,794,758	240.7
	TP5	M	50	249	\$ 80	996,000	16.68%	2,996,724	150.4
	TP6	M	50	160	\$ 80	640,000	10.72%	1,925,606	150.4
	TP7	L	25	240	\$ 80	480,000	8.04%	1,444,204	75.2
	TP8	L	1	1,142	\$ 80	91,360	1.53%	274,880	3.0

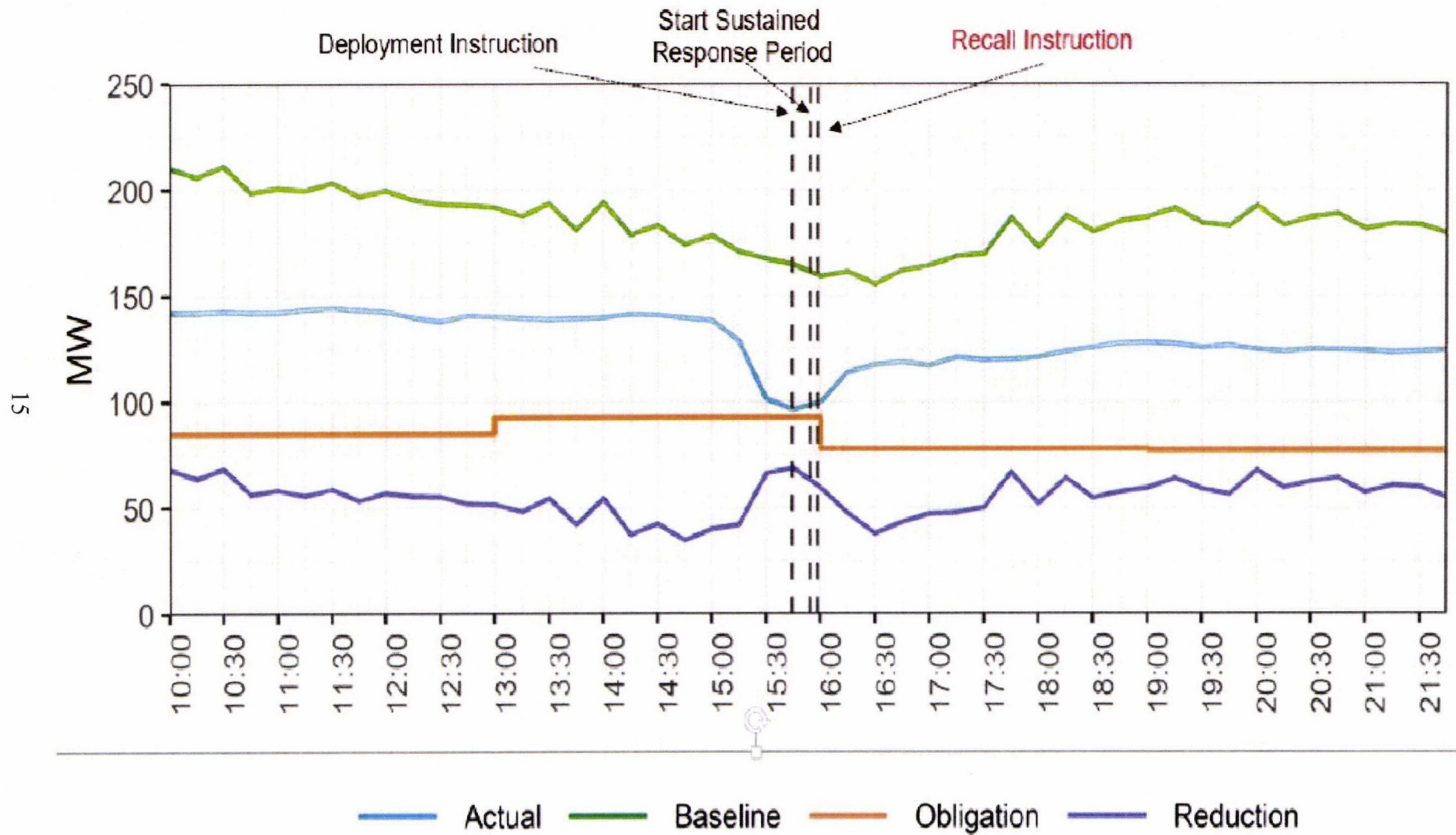
13



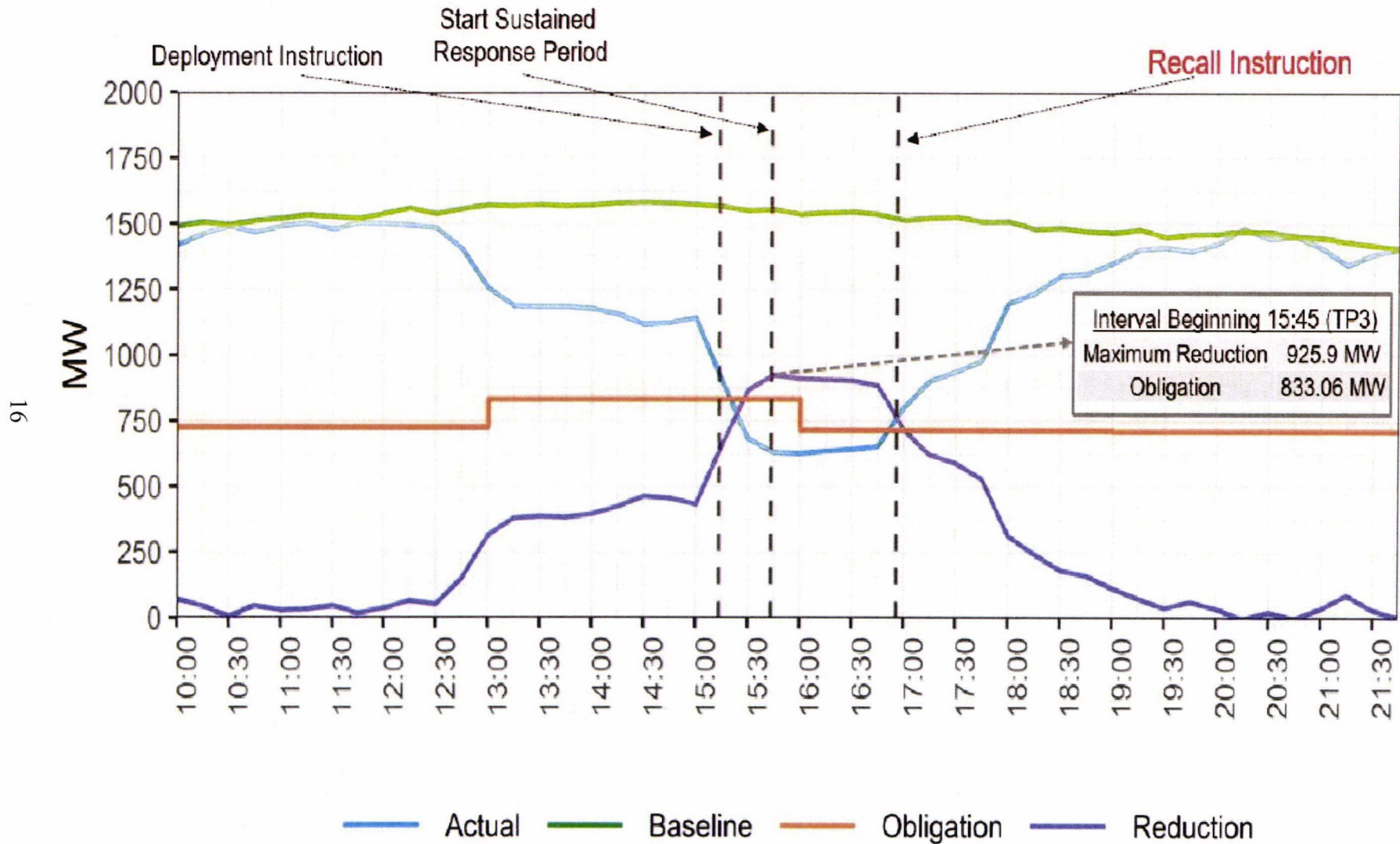
ERS-30 Deployment Event on August 13, 2019



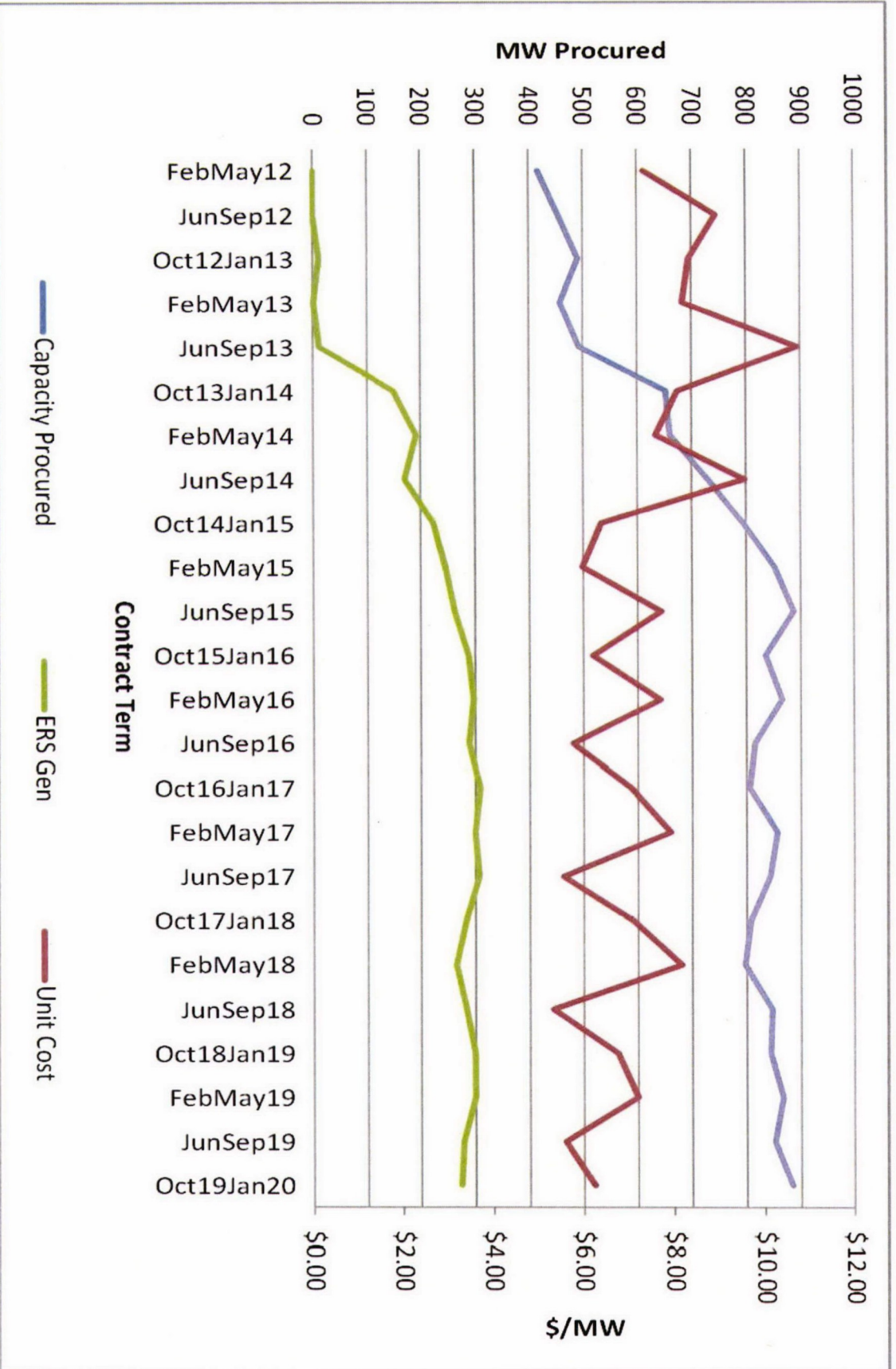
ERS-10 Deployment Event on August 13, 2019



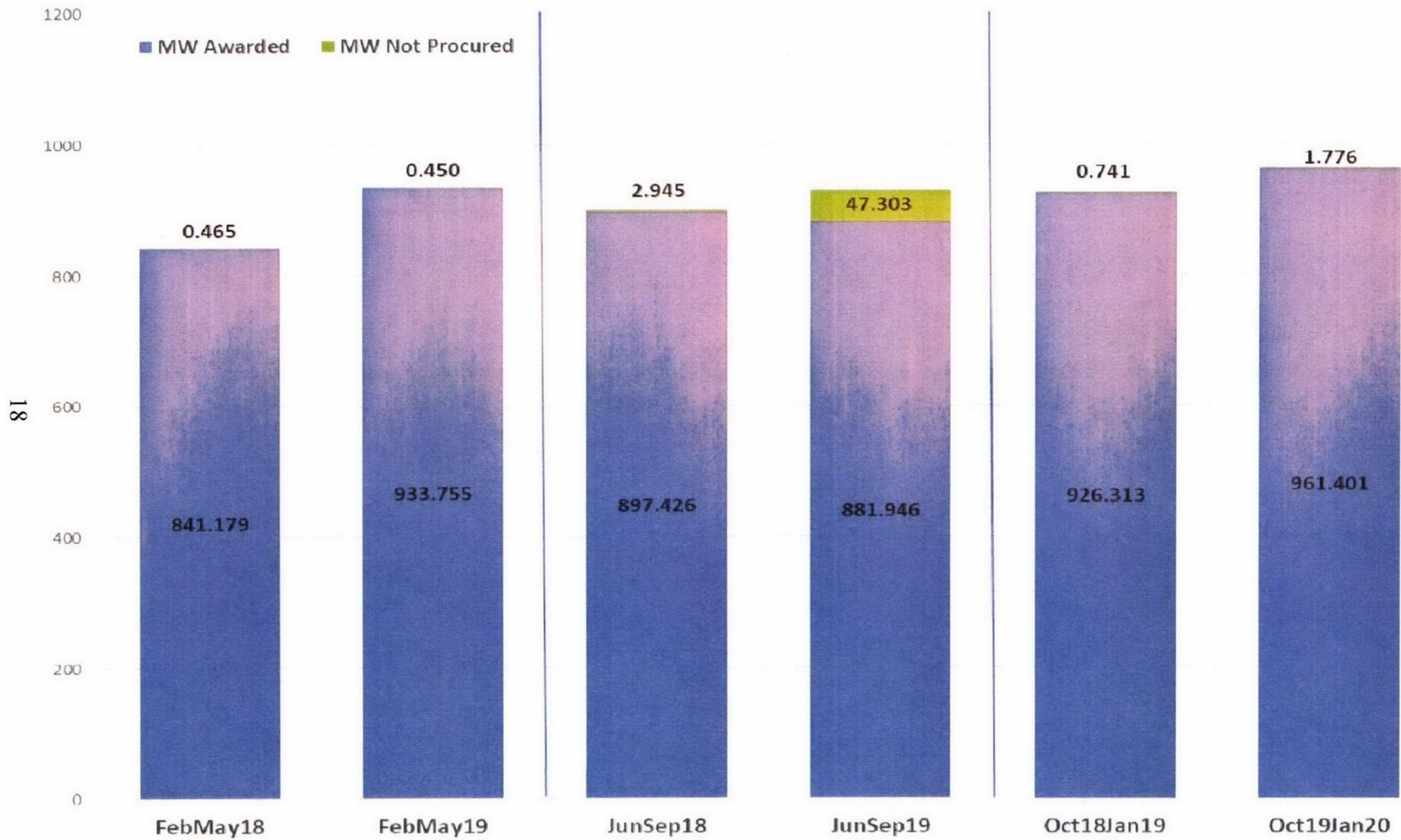
ERS-30 Deployment Event on August 15, 2019



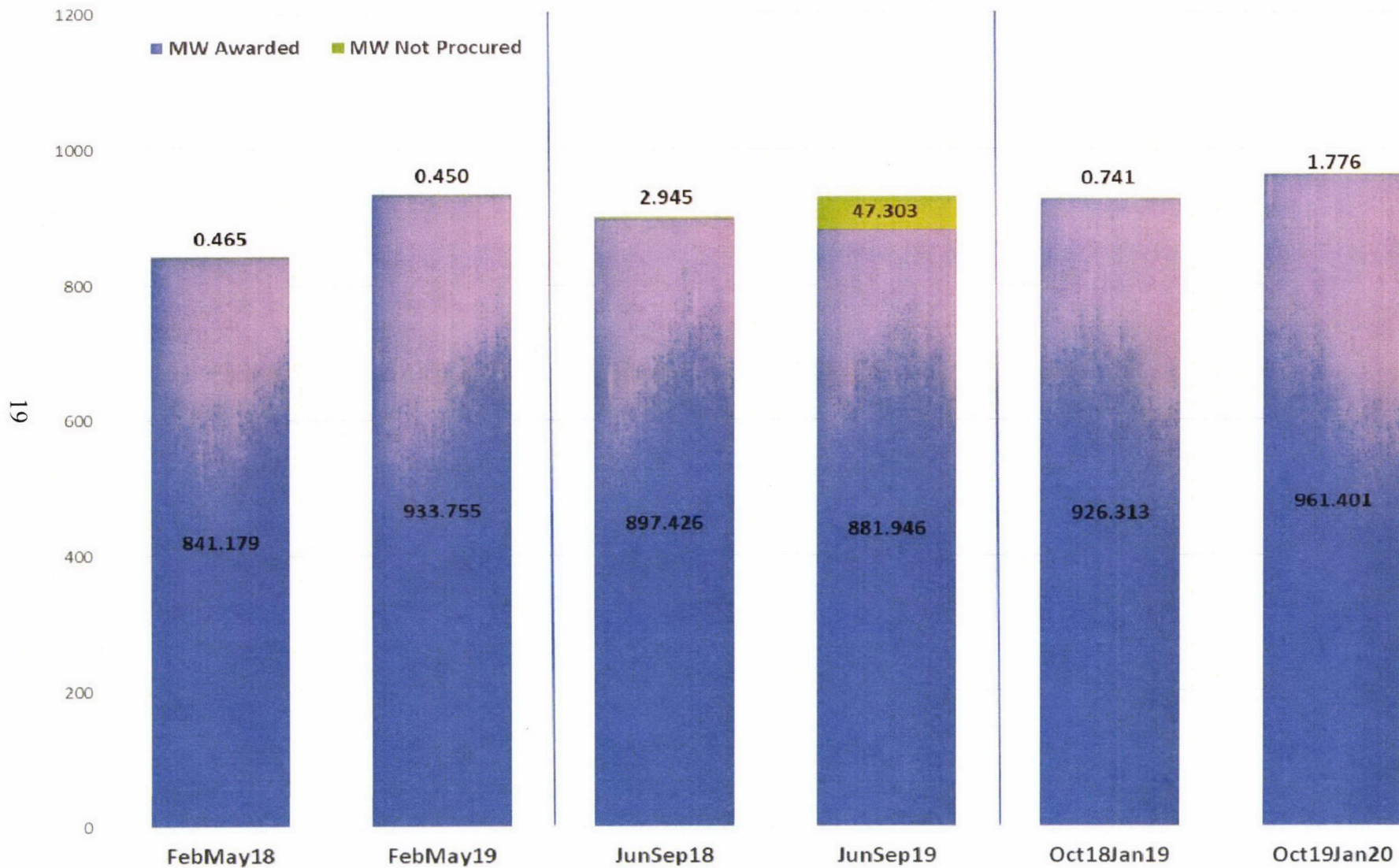
Emergency Response Service Trends



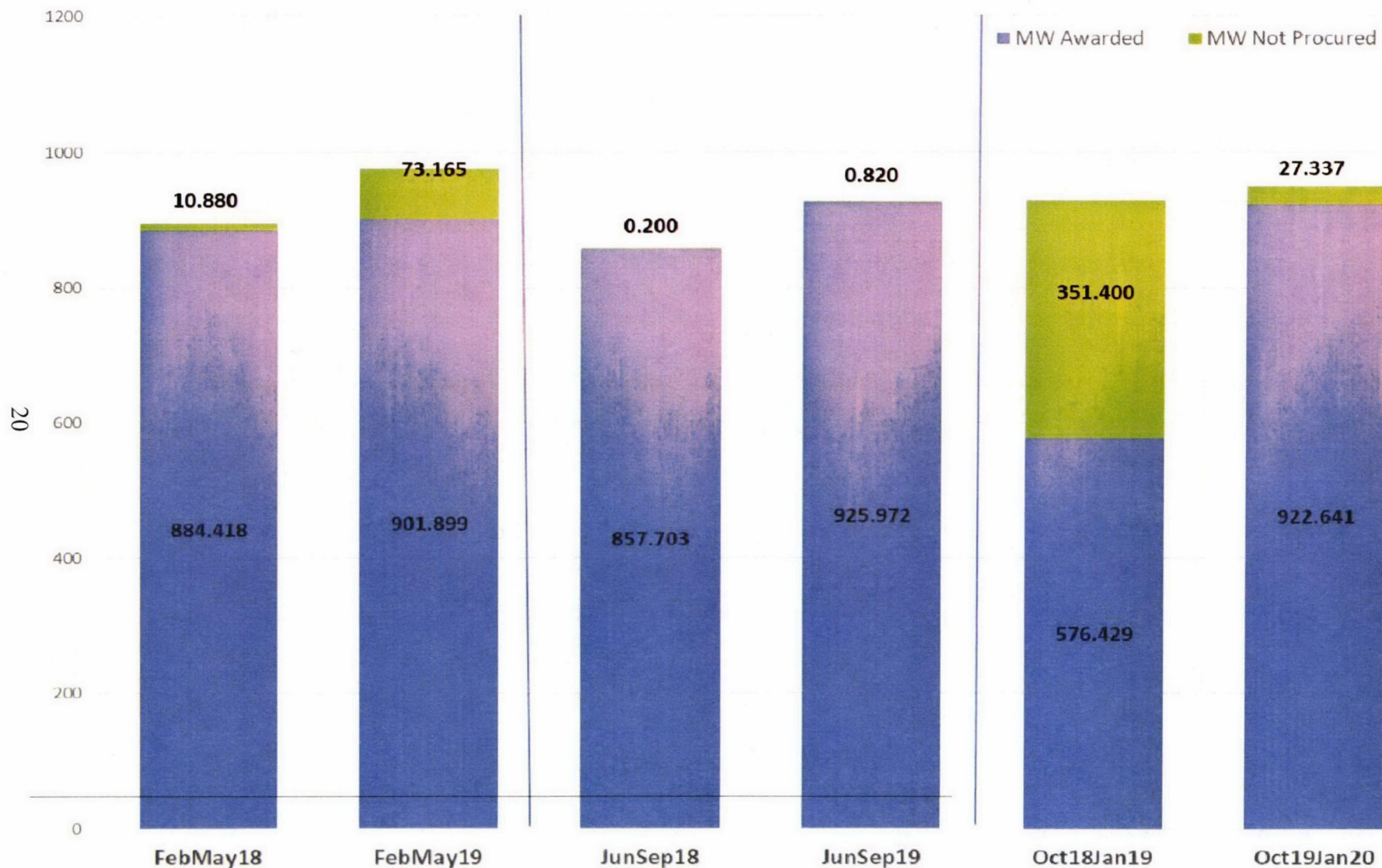
ERS Capacity Procurement Trends (Time Period 1)



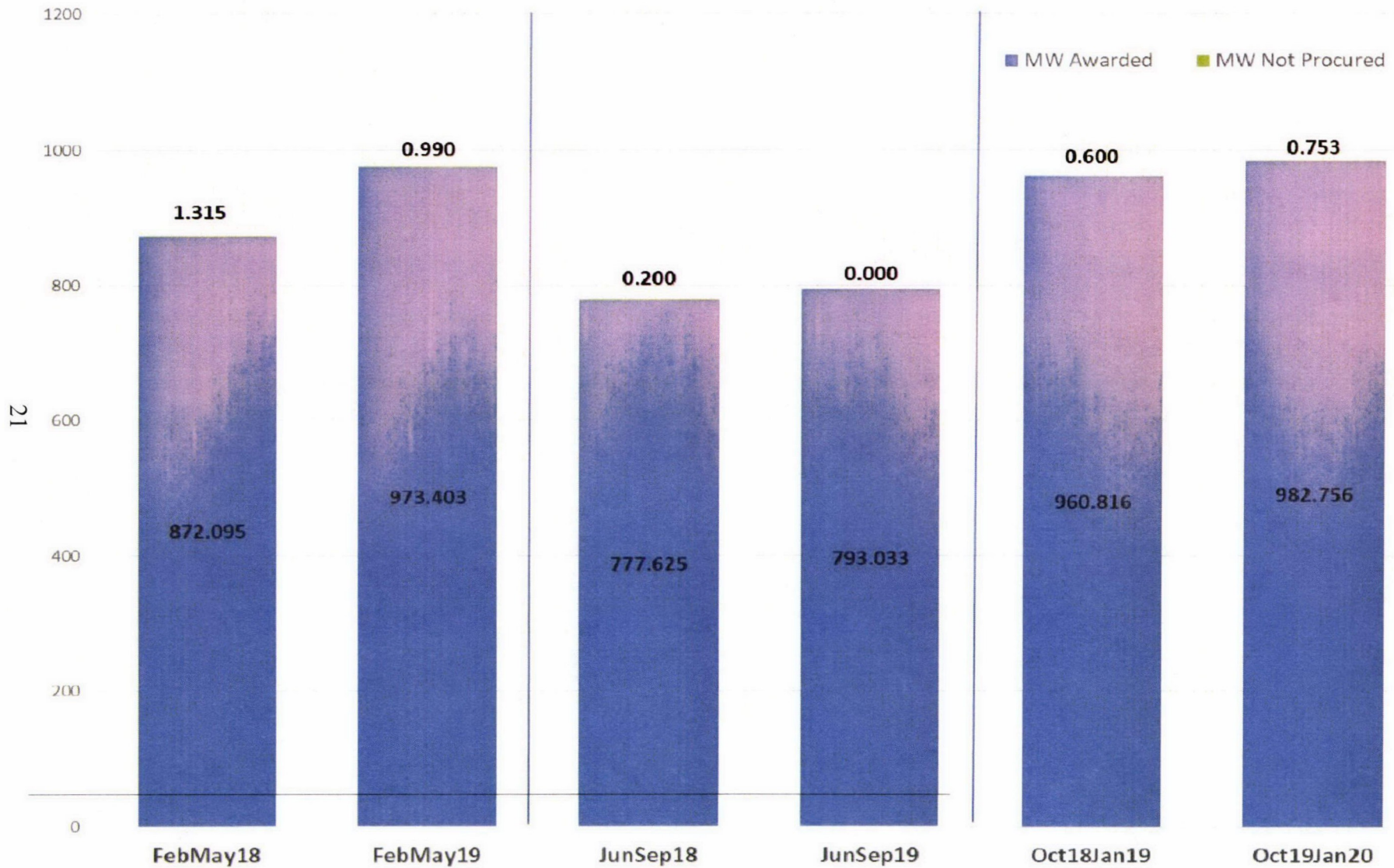
ERS Capacity Procurement Trends (Time Period 2)



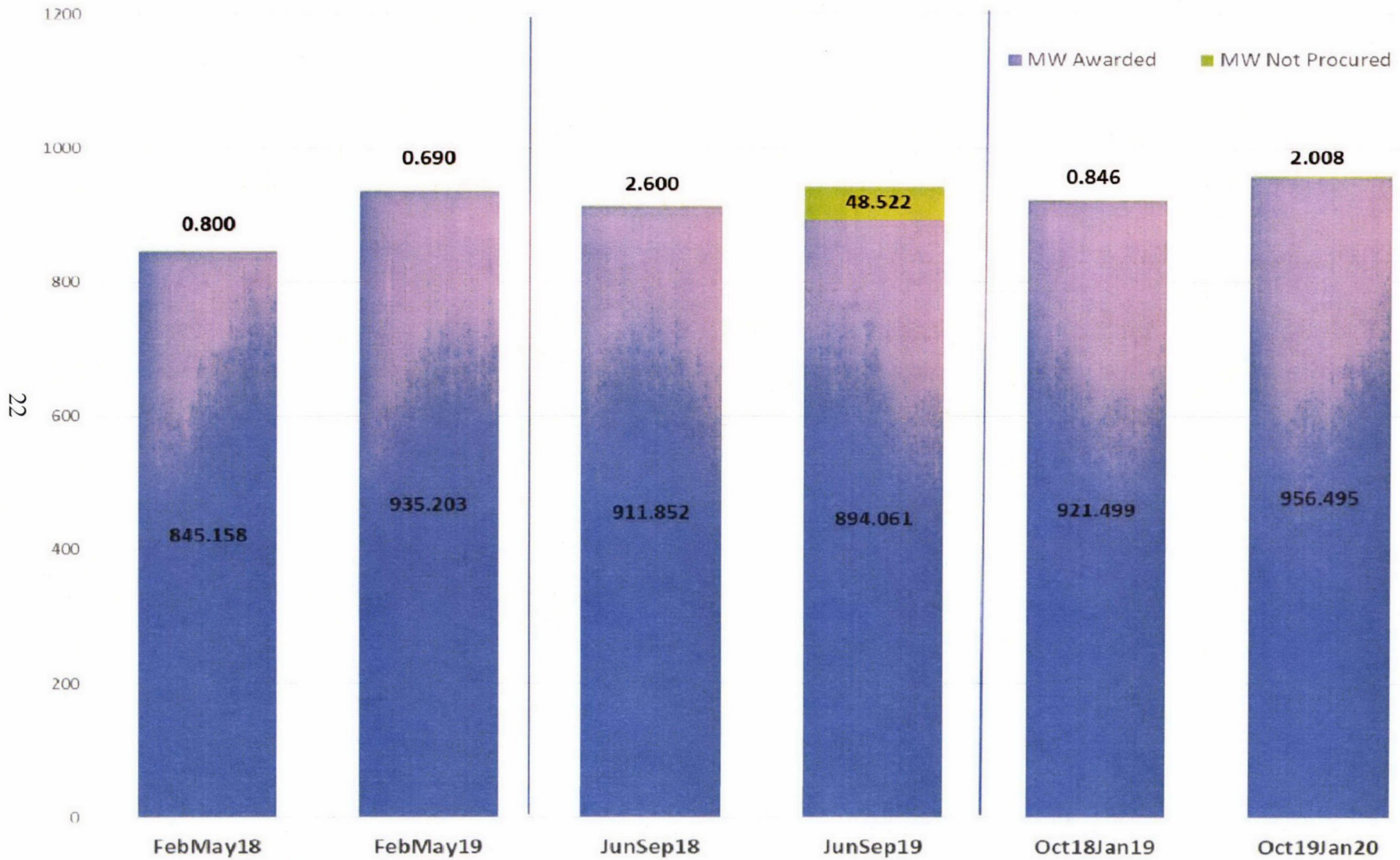
ERS Capacity Procurement Trends (Time Period 3)



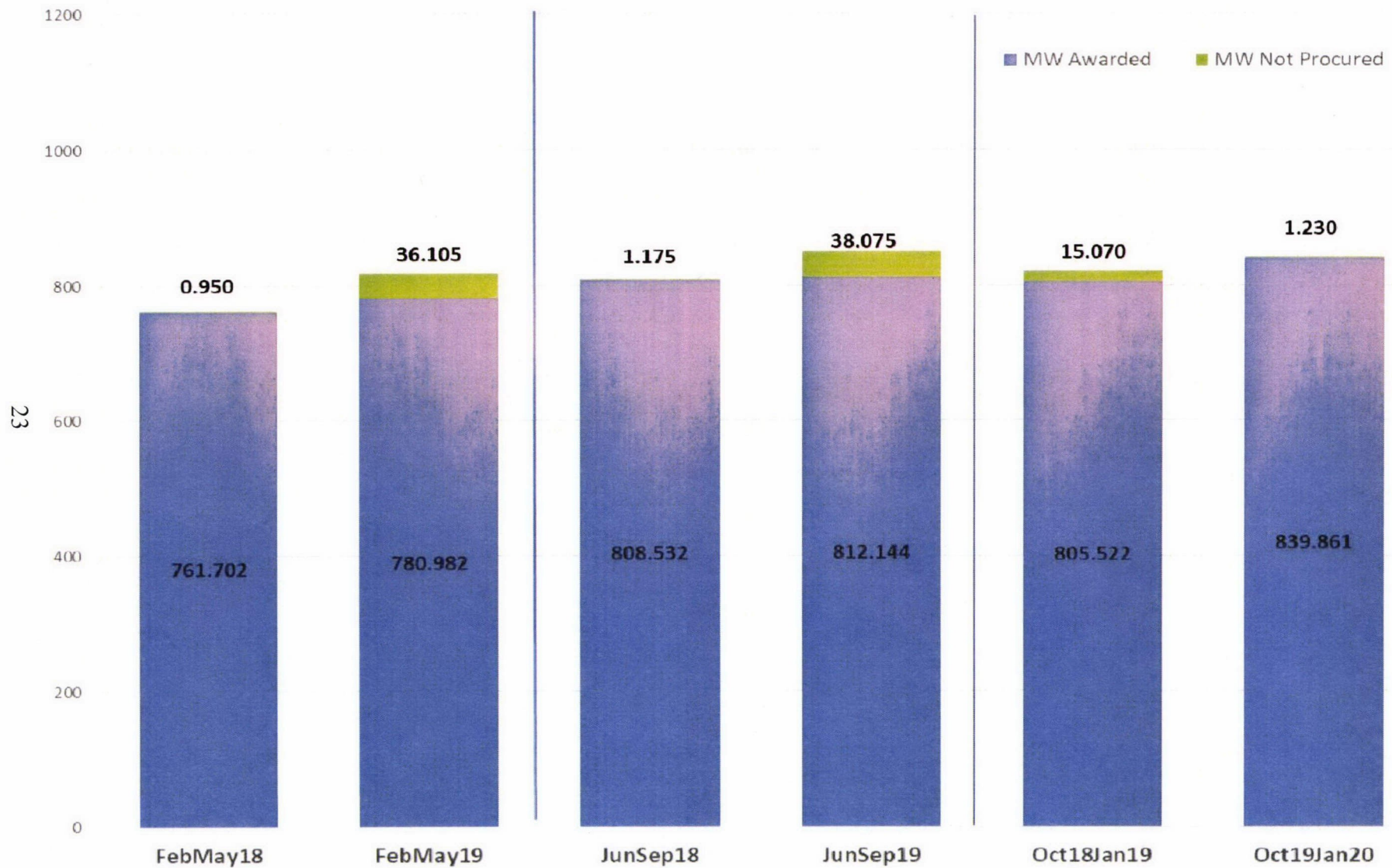
ERS Capacity Procurement Trends (Time Period 4)



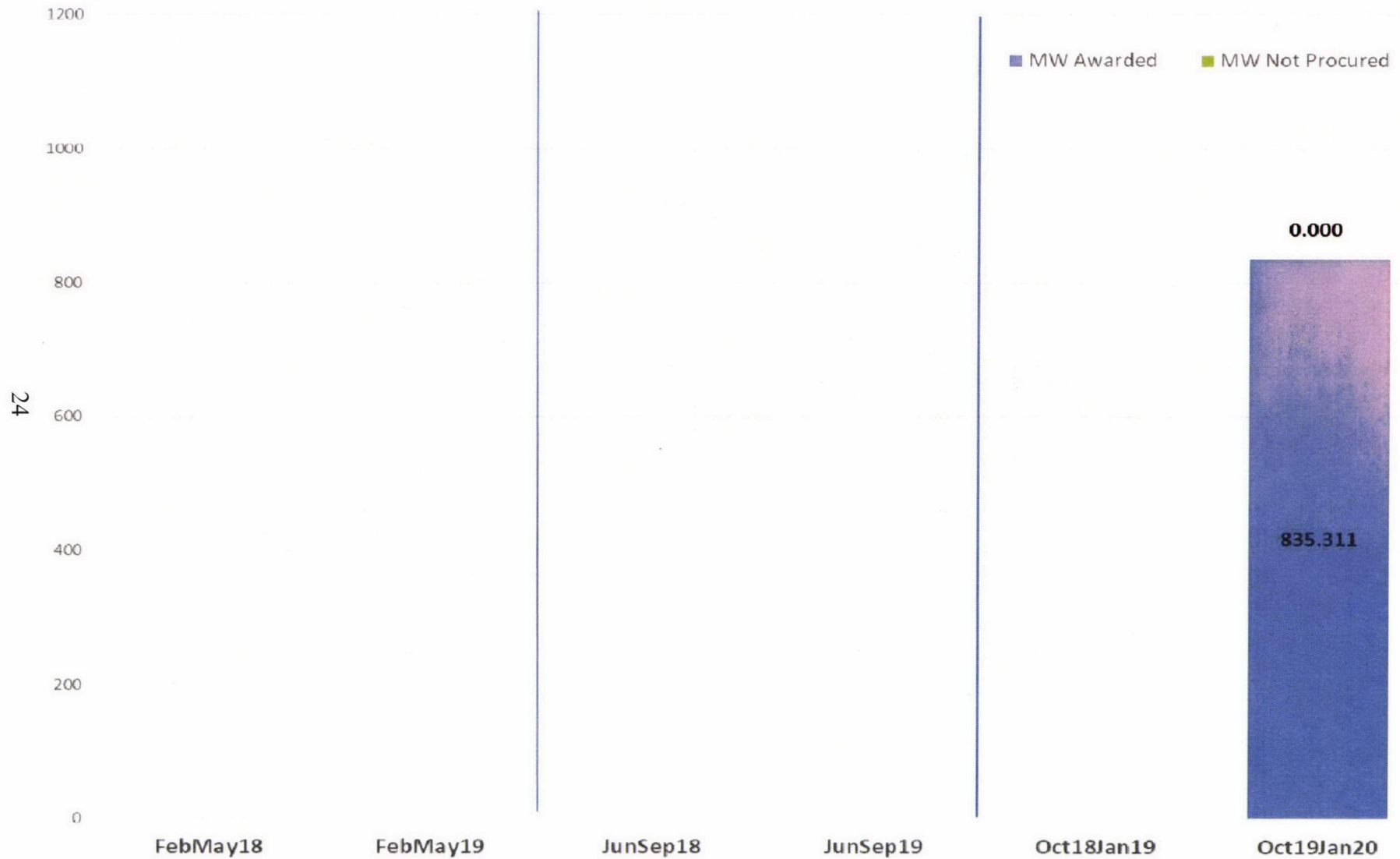
ERS Capacity Procurement Trends (Time Period 5)



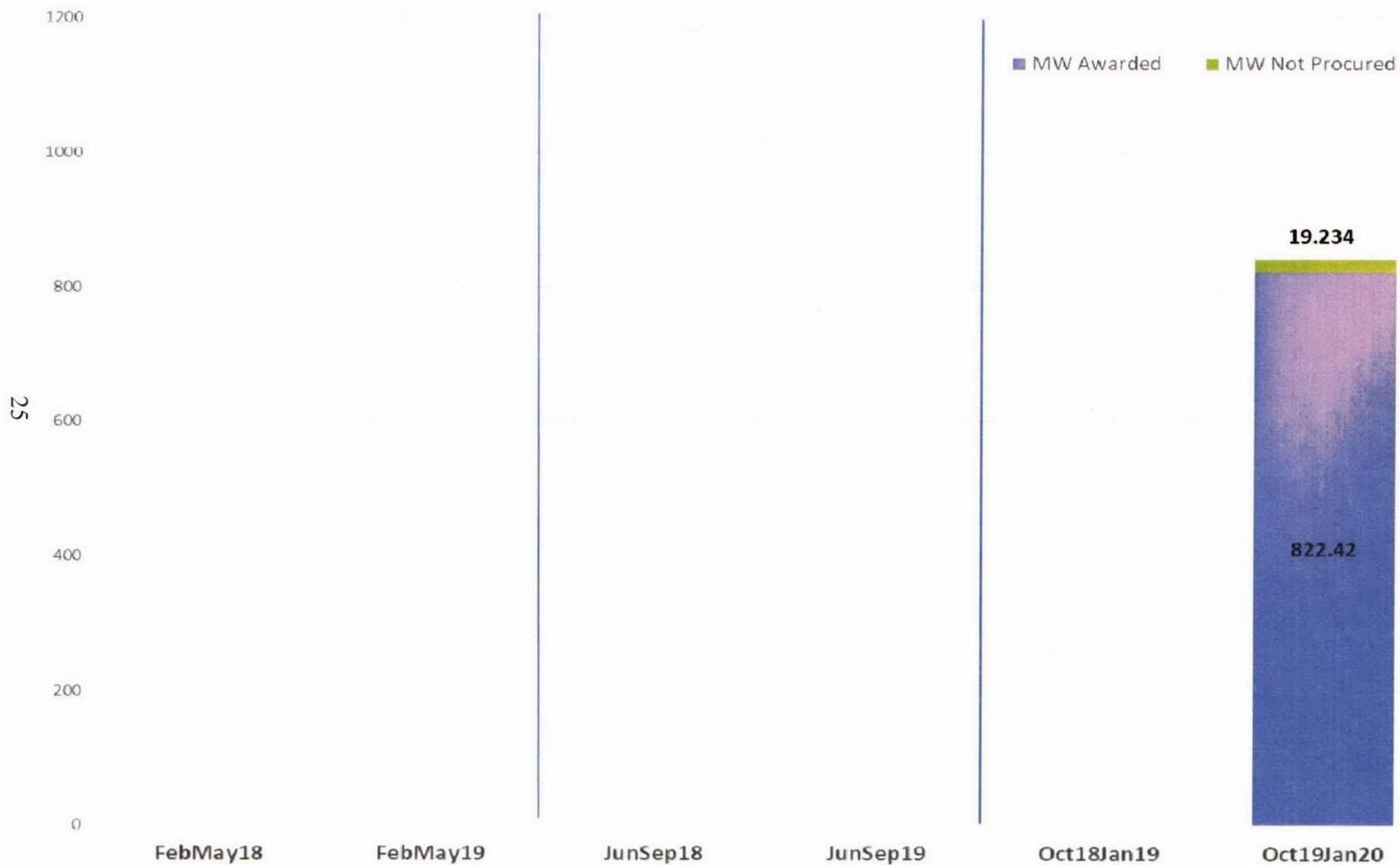
ERS Capacity Procurement Trends (Time Period 6)



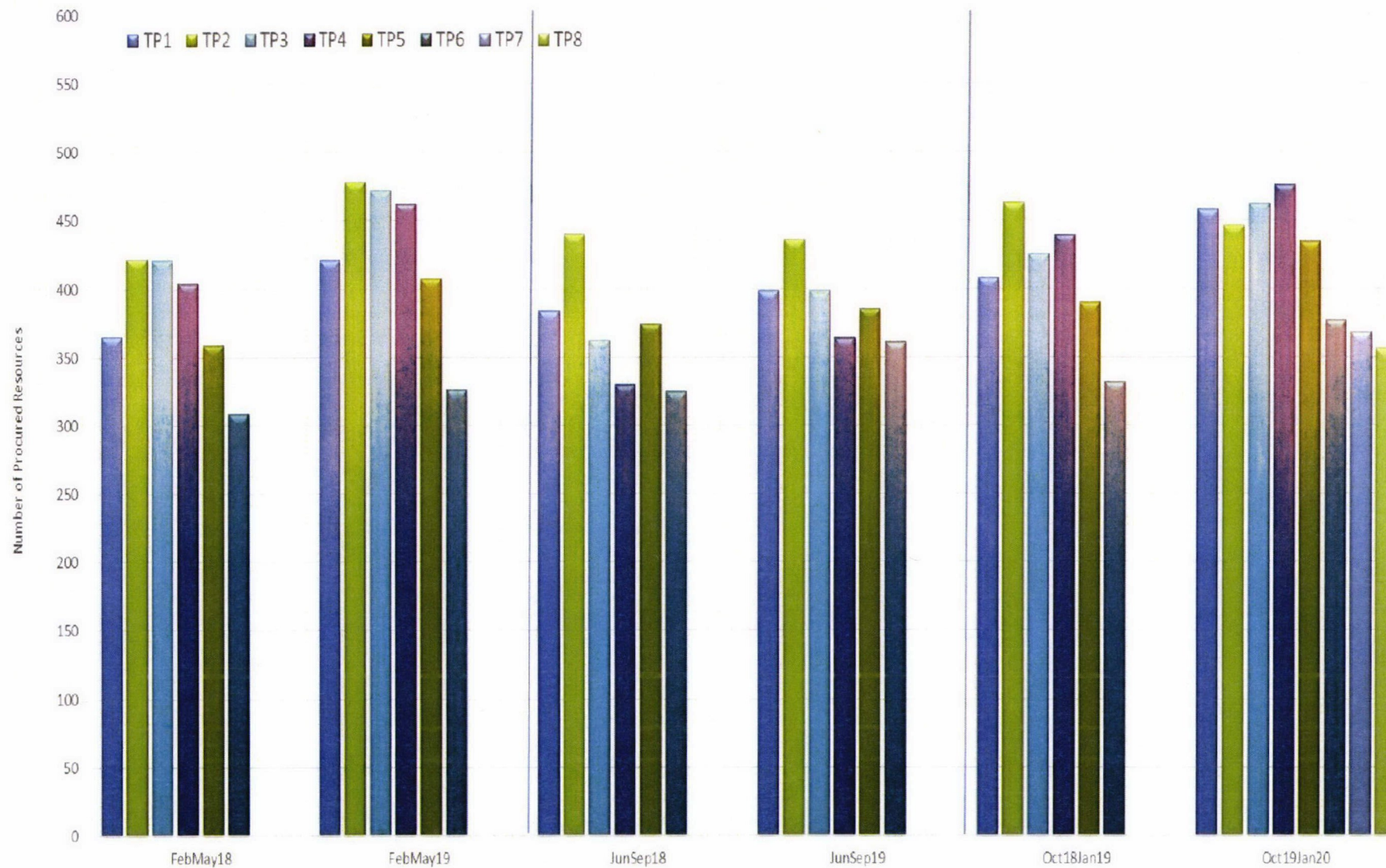
ERS Capacity Procurement Trends (Time Period 7)



ERS Capacity Procurement Trends (Time Period 8)

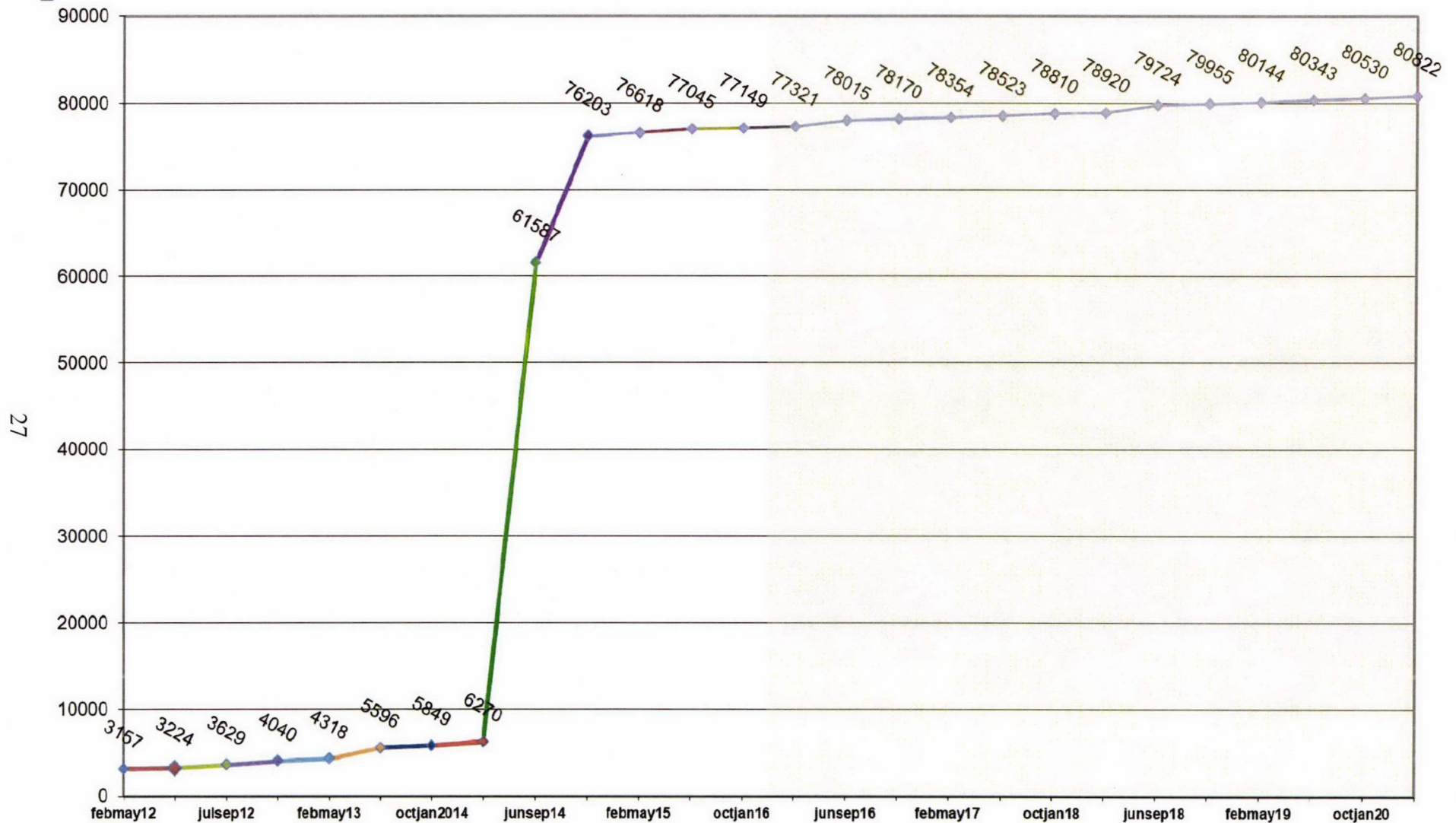


ERS Procurement Trends (Number of Resources)

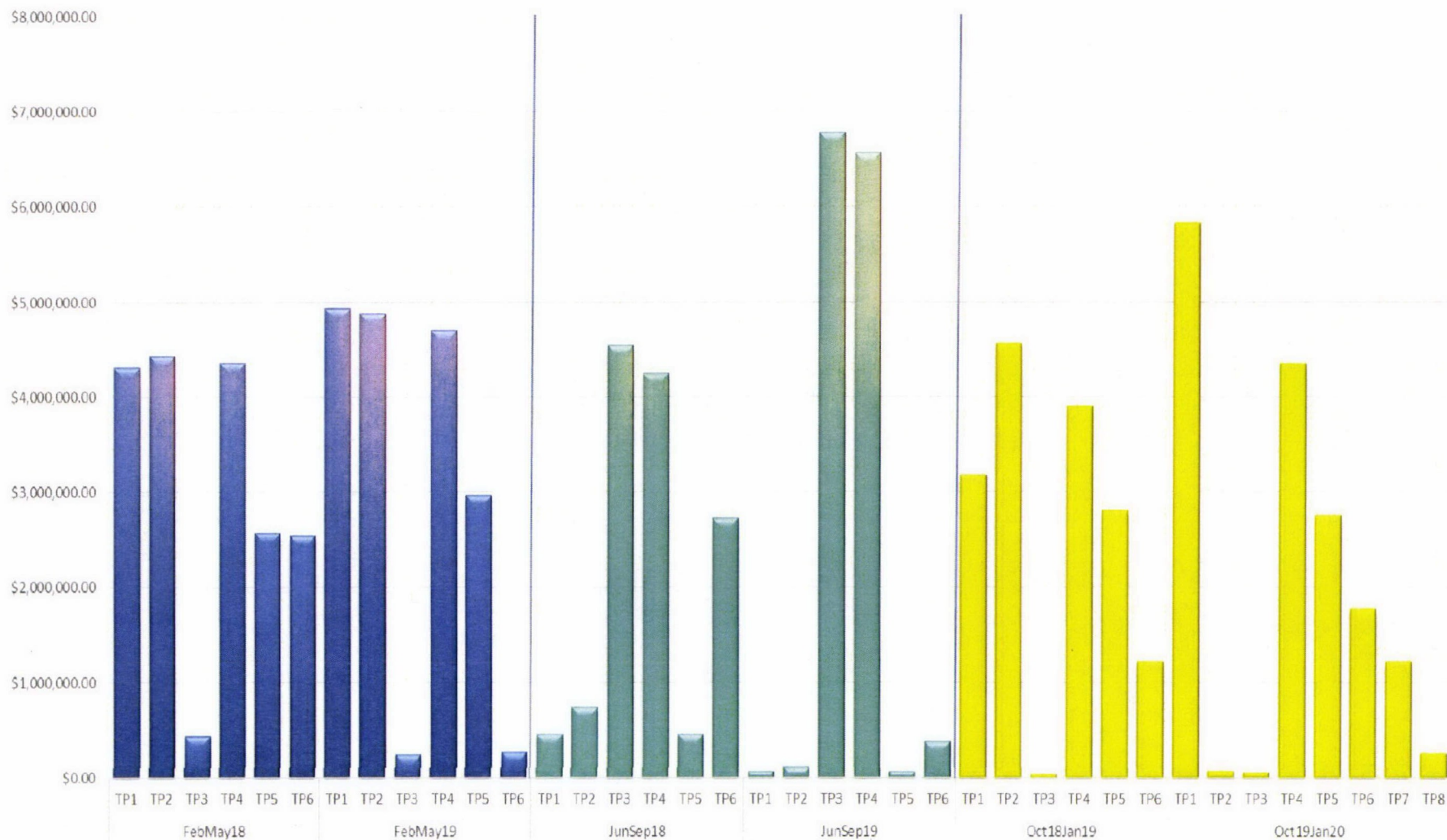


26

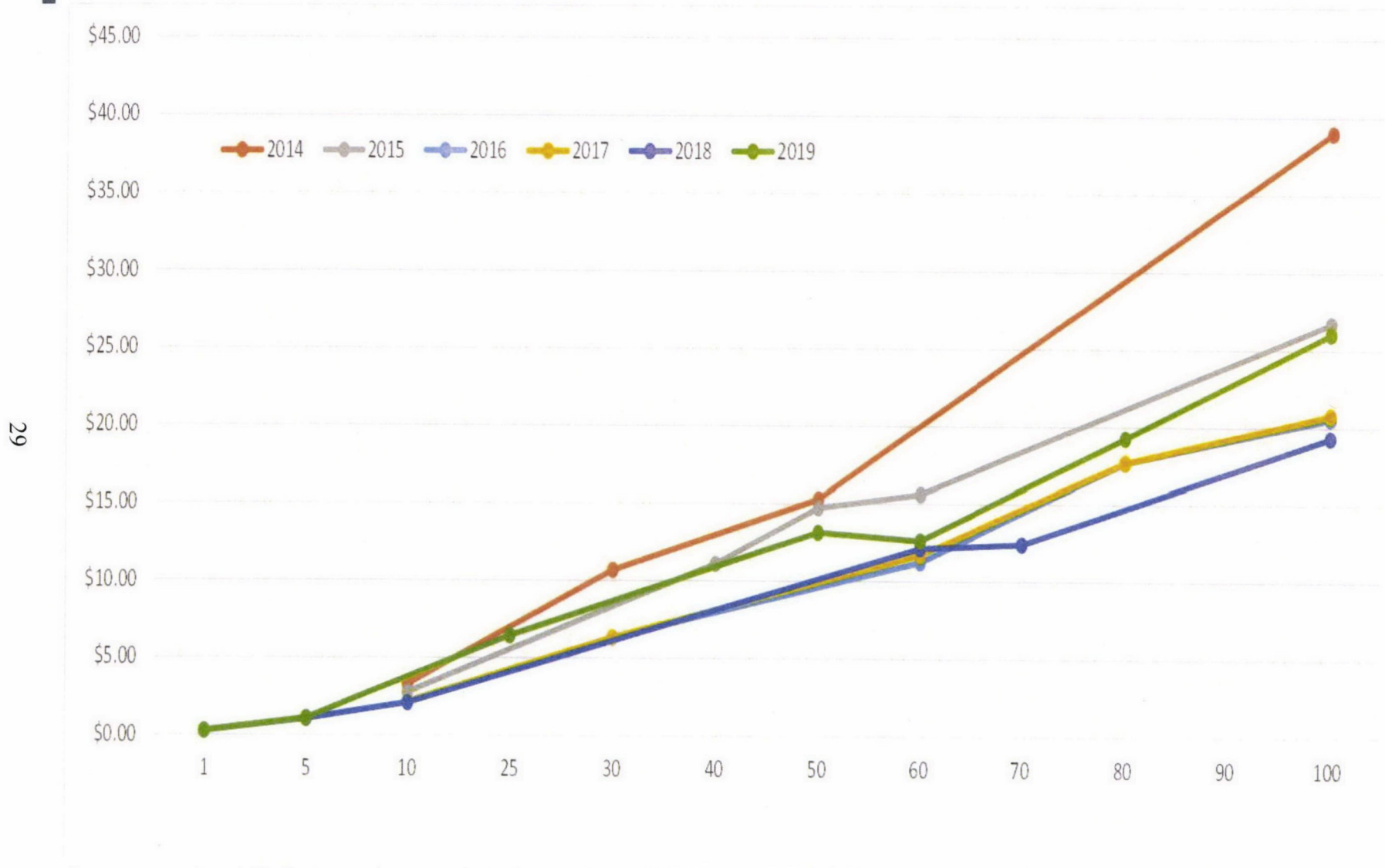
Cumulative Sites (Unique) Participating in ERID Process



28



Average Unit Cost (\$/MW/hr) vs Time Period Risk Factors



2019 ERC Project Report

February-May 2019 Standard Contract Term

Values for the combined offer stack

	Capacity Procured (MWs)	Projected Procurement Cost	Capacity Not Procured (MWs)	Clearing Price	Highest Offer Received (\$)
TP1	933.755	\$5,190,744.05	0.45	\$21.80	\$24.60
TP2	990.705	\$5,157,857.91	1.1	\$12.25	\$17.00
TP3	901.899	\$252,982.67	73.165	\$1.10	\$17.00
TP4	973.403	\$4,959,390.94	0.99	\$19.98	\$23.74
TP5	935.203	\$3,107,352.25	0.69	\$13.03	\$14.85
TP6	780.982	\$279,982.05	36.105	\$0.25	\$14.00

Non-Weather Sensitive ERS-10 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	139.220	0.45
TP2	144.226	0.2
TP3	139.642	0.21
TP4	140.366	0.29
TP5	137.976	0.45
TP6	131.848	0.385

Weather Sensitive ERS-10 Minute

Capacity Procured (MWs)	Capacity Not Procured (MWs)
0	0
0	0
0	0
0	0

Non-Weather Sensitive ERS-30 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	786.588	0
TP2	846.479	0.9
TP3	757.357	72.955
TP4	825.464	0.7
TP5	797.227	0.24
TP6	649.134	35.72

Weather Sensitive ERS-30 Minute

Capacity Procured (MWs)	Capacity Not Procured (MWs)
7.947	0
4.9	0
7.573	0
0	0



Final Cost for this Standard Contract Term: \$17,972,096.03

June-September 2019 Standard Contract Term

Values for the combined offer stack

	Capacity Procured (MWs)	Projected Procurement Cost	Capacity Not Procured (MWs)	Clearing Price	Highest Offer Received (\$)
TP1	881.946	\$66,675.12	47.303	0.30	14.00
TP2	941.934	\$110,771.44	58.985	0.28	14.00
TP3	925.972	\$6,825,339.61	0.82	29.25	32.88
TP4	793.033	\$6,610,849.97	0	33.08	33.08
TP5	894.061	\$67,591.01	48.522	0.30	14.00
TP6	812.144	\$377,646.96	38.075	0.31	14.00

Non-Weather Sensitive ERS-10 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	88.698	0.125
TP2	94.161	0.325
TP3	92.915	0.12
TP4	78.073	0
TP5	83.571	0.225
TP6	78.128	0.225

Weather Sensitive ERS-10 Minute

Capacity Procured (MWs)	Capacity Not Procured (MWs)
0	0
0	0

Non-Weather Sensitive ERS-30 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	793.248	47.178
TP2	847.773	58.66
TP3	806.657	0.7
TP4	688.560	0
TP5	810.490	48.297
TP6	734.016	37.85

Weather Sensitive ERS-30 Minute

Capacity Procured (MWs)	Capacity Not Procured (MWs)
26.4	0
26.4	0



Final Cost for this Standard Contract Term: \$13,963,479.76

October 2019-January 2020 Standard Contract Term

Values for the combined offer stack

	Capacity Procured (MWs)	Projected Procurement Cost	Capacity Not Procured (MWs)	Clearing Price	Highest Offer Received (\$)
TP1	961,401	\$ 6,224,110.07	1,776	\$ 19.50	\$ 24.37
TP2	917,126	\$ 79,166.32	34,065	\$ 0.26	\$ 14.00
TP3	922,641	\$ 59,731.78	27,337	\$ 0.26	\$ 14.00
TP4	982,756	\$ 4,649,418.64	0,753	\$ 19.00	\$ 23.34
TP5	956,495	\$ 2,929,457.24	2,008	\$ 12.30	\$ 15.14
TP6	839,861	\$ 1,881,288.64	1,230	\$ 14.00	\$ 15.14
TP7	835,311	\$ 1,293,061.43	0,000	\$ 6.45	\$ 6.45
TP8	822,420	\$ 272,369.06	19,234	\$ 0.29	\$ 2.00

Non-Weather Sensitive ERS-10 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	98,302	1,102
TP2	91,000	1,312
TP3	90,957	1,393
TP4	99,729	0
TP5	96,584	1,129
TP6	68,648	1.13
TP7	68,391	0
TP8	68,833	0.1

Weather Sensitive ERS-10 Minute

Capacity Procured (MWs)	Capacity Not Procured (MWs)
0	0
0	0
0	0
0	0

Non-Weather Sensitive ERS-30 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	857,599	0,674
TP2	826,126	32,753
TP3	831,684	25,944
TP4	877,527	0,753
TP5	859,911	0,879
TP6	771,213	0.1
TP7	766,920	0
TP8	753,587	19,134

Weather Sensitive ERS-30 Minute

Capacity Procured (MWs)	Capacity Not Procured (MWs)
5.5	0
5.5	0
0	0
0	0



Final Cost for this Standard Contract Term: \$16,306,416.56

2019 ERS Procurement Overview

Expenditure Limit for 2019	\$50,000,000.00
Amount Spent (Final)	\$48,241,992.35
Unspent (Final)	\$1,758,007.65

2019 ERS Cap	FebMay19 Total (Final)	JunSep19 Total (Final)	Oct19Jan20 Total (Final)
\$50,000,000	\$17,972,096.03	\$13,963,479.76	\$16,306,416.56

34

Settlement Summary (3 year look back)

Standard Contract Term	10M projected cost	10M Final	reduction amount	30M projected cost	30M Final	reduction amount	WS projected cost	WS Final	reduction amount
FebMay17	\$ 6,676,346.50	\$ 6,622,079.93	\$ 54,266.57	\$ 12,850,377.39	\$ 12,544,030.25	\$ 306,347.14	\$ 9,710.04	\$ 9,564.40	\$ 145.64
JunSep17	\$ 3,661,877.87	\$ 3,632,614.75	\$ 29,263.12	\$ 9,946,863.73	\$ 9,579,410.83	\$ 367,452.90	\$ 99,962.88	\$ 88,936.83	\$11,026.05
Oct17Jan18	\$ 4,147,990.11	\$ 4,078,739.01	\$ 69,251.10	\$ 12,750,162.78	\$ 12,285,664.75	\$ 464,498.03	\$ 47,886.44	\$ 37,590.86	\$10,295.58
Total 2017	\$ 14,486,214.48	\$ 14,333,433.69	\$ 152,780.79	\$ 35,547,403.91	\$ 34,409,105.83	\$ 1,138,298.08	\$ 157,559.35	\$ 136,092.09	21,467.26
FebMay18	\$ 4,235,082.74	\$ 4,080,832.34	\$154,250.40	\$ 14,998,867.37	\$ 14,564,677.62	\$ 434,189.75	\$ -	\$ -	\$ -
JunSep18	\$ 2,332,268.66	\$ 2,330,832.52	\$ 1,436.14	\$ 10,738,995.59	\$ 10,721,782.15	\$ 17,213.44	\$ 127,958.67	\$ 110,551.43	\$17,407.24
Oct18Jan19	\$ 2,910,785.84	\$ 2,830,260.50	\$ 80,525.34	\$ 13,868,382.35	\$ 12,832,424.94	\$ 1,035,957.41	\$ 61,228.94	\$ 20,572.92	\$40,656.02
Total 2018	\$ 9,478,137.23	\$ 9,241,925.36	\$ 236,211.87	\$ 39,606,245.31	\$ 38,118,884.71	\$ 1,487,360.60	\$ 189,187.61	\$ 131,124.35	\$58,063.26
FebMay19	\$ 2,784,834.37	\$ 2,723,917.04	\$ 60,917.33	\$ 16,079,339.99	\$ 15,176,495.55	\$ 902,844.44	\$ 84,135.50	\$ 71,683.44	\$12,452.06
JunSep19	\$ 1,396,131.87	\$ 1,396,132.05	\$ (0.18)	\$ 12,248,073.21	\$ 12,201,543.68	\$ 46,529.53	\$ 414,669.02	\$ 365,804.03	\$48,864.99
Oct19Jan20	\$ 1,700,213.44	\$ 1,678,852.17	\$ 21,361.27	\$ 15,626,762.22	\$ 14,597,120.40	\$ 1,029,641.82	\$ 61,627.50	\$ 30,443.99	\$31,183.51
Total 2019	\$ 5,881,179.69	\$ 5,798,901.26	\$ 82,278.43	\$ 43,954,175.43	\$ 41,975,159.63	\$ 1,979,015.80	\$ 560,432.02	\$ 467,931.46	\$92,500.56

35