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PROJECT NO. 55999

REPORTS OF THE ELECTRIC	**§**	**PUBLIC UTILITY COMMISSION**
	§	
RELABILITY COUNCIL OF TEXAS	**§**	**OF TEXAS**

ELECTRIC RELIABILITY COUNCIL OF TEXAS, INC.'S
2023 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 2023 program year pursuant to 16 TEXAS ADMINISTRATIVE CODE § 25.507(g). This rule requires ERCOT to report its findings on ERS performance to the Public Utility Commission of Texas by April 15 of each calendar year. The report must "contain, at a minimum, the number of MW procured in each period, the total dollar amount spent, and the number and duration of deployments and the circumstances that led to each deployment."[1] ERCOT's evaluation of ERS is contained in Attachment A to this report and the underlying data are included in the presentation in Attachment B.

[1] 16 TAC § 25.507(g).

Dated: April 15, 2024

Respectfully submitted,

/s/ Matthew Arth

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ERCOT Annual Report Pursuant to 16 TAC § 25.507(g)
Regarding Emergency Response Service for
Program Year December 1, 2022, through November 30, 2023

Protocol Revisions Affecting ERS

Since the creation of Emergency Response Service (ERS) in 2007 and up through the end of the 2023 program year, the Electric Reliability Council of Texas, Inc. (ERCOT) Board of Directors (ERCOT Board) has approved more than 35 Protocol revisions that pertain to ERS. The following Nodal Protocol Revision Request (NPRR) related to ERS was fully implemented during the 2023 ERS program year:

- NPRR1142, *ERS Changes to Reflect Updated PUCT Rule Changes re SUBST. R. 25.507*, This NPRR increases the annual budget for ERS, allows ERCOT the flexibility to contract ERS for up to 24 hours in an ERS Standard Contract Term, and makes other administrative changes to the ERS program. Even though NPRR1142 became effective on August 26, 2022, only the provision that allowed ERCOT to spend an additional $25 million to fund a renewal contract term was implemented during the 2022 program year. The remaining provisions were not implemented until the beginning of the 2023 program year.

Procurement History and Analysis

ERCOT's ERS program allows ERCOT to procure ERS for defined Standard Contract Terms (SCTs) across each program year. Within each SCT ERCOT procures ERS for any of eight ERS Time Periods, as described on slide 3 of Attachment B. In each SCT, ERCOT may procure Weather-Sensitive and Non-Weather-Sensitive ERS according to two different response times—thirty minutes (ERS-30) and ten minutes (ERS-10). ERS may be provided by a Load (ERS Load) or by a generator (ERS Generator), collectively referred to as ERS Resources. The total capacity procured in megawatts (MW) for each SCT and Time Period for the 2023 program year is included in Attachment B on slides 24 to 27.

The ERS procurement methodology used during the 2023 program year has been in place since 2014, although slight adjustments to the procurement process have been made since that time. The procurement of ERS is administered in accordance with the ERS Procurement Methodology document posted to the ERS page on the ERCOT website.[1] Under 16 TEXAS ADMINISTRATIVE CODE (TAC) § 25.507(b)(2), for the 2023 program year ERCOT was authorized to spend a maximum of $75 million per year on ERS. That increase was applied in the December 2022 through March 2023 SCT. The total expenditure for ERS procurement in the 2023 program year was $52,330,299.80 (slide 28, Attachment B). Subsection 25.507(b)(2) also now allows ERCOT to spend up to an additional $25 million for ERS contract renewals in the case of exhaustion of the terms of any SCT. No exhaustion occurred during the 2023 program year.

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[1] *See* Emergency Response Service Procurement Methodology (Sept. 15, 2023), available at: http://www.ercot.com/services/programs/load/eils.

ERCOT allocates the spend limit over all ERS Time Periods in the ERS program year by performing a risk assessment that considers the expected risk of deploying ERS in each ERS Time Period. To do this, ERCOT assigns a risk-weighting factor to each ERS Time Period (see slide 5, Attachment B). Various elements are taken into consideration by ERCOT in the determination of risk-weighting factors, including seasonality, forecasted operating reserves, forecasted Load, Resource outage information, and seasonal net load profiles (e.g., slide 4, Attachment B). The risk-weighting factors are determined by ERCOT and included in the Request for Proposal (RFP) for each SCT.

With respect to the risk-weighting factors assigned to each ERS Time Period during the 2023 program year, the highest values (100) were assigned to ERS Time Periods with forecasted peak load hours during the winter period December 2022 through March 2023 and the summer period of June through September 2023, as those are typically the hours with the highest risk of ERCOT deploying this service. The next highest risk factor (80) during the 2023 program year was assigned to ERS Time Periods with forecasted higher net load ramp periods, which were during the December 2022 through March 2023 SCT.[2] Because load ramp issues have the potential to result in short-term capacity insufficiencies, they create a notable risk for the ERCOT System.

Slide 21 of Attachment B includes an 8-year history of ERS clearing prices by ERS Time Period, while slide 22 includes a chart showing the average clearing prices for ERS associated with the risk-weighting factors.

Weather-Sensitive ERS was implemented in 2014 to 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 has primarily occurred during certain ERS Time Periods in the June through September SCT. In recent years however, ERCOT has expanded their participation to other SCTs and all Time Periods. For the 2023 ERS program year, Weather-Sensitive ERS was procured in each of the four SCTs, with the highest amount (47.20 MW) procured in the June through September SCT (see slides 24-27, Attachment B).

Attachment B provides additional details regarding ERCOT's procurement of ERS during the 2023 program year, including:

- Descriptions of SCTs and Time Periods (see slide 3, Attachment B).
- Capacity procurements by Time Period and by SCT, including the amount of MW procured and not procured (see slides 11-16, Attachment B).
- Number of procured ERS Resources (see slide 19, Attachment B).
- Cumulative number of unique sites submitted to ERCOT for Resource identification (see slide 20, Attachment B).
- Detailed tables with capacity procurements by Time Period and by SCT for each ERS service type, including clearing price in dollars-per-MW-per-hour (see slides 24-27, Attachment B); and

[2] The typical impact of wind and photo-voltaic solar generation on ERCOT net Load, which contributes to higher net load ramp periods, is shown on slide 4 of Attachment B.

- Summary of final settlement costs of ERS, adjusted to account for payment reductions due to availability, event performance, and testing results (see slides 28-29, Attachment B).

ERS Deployments

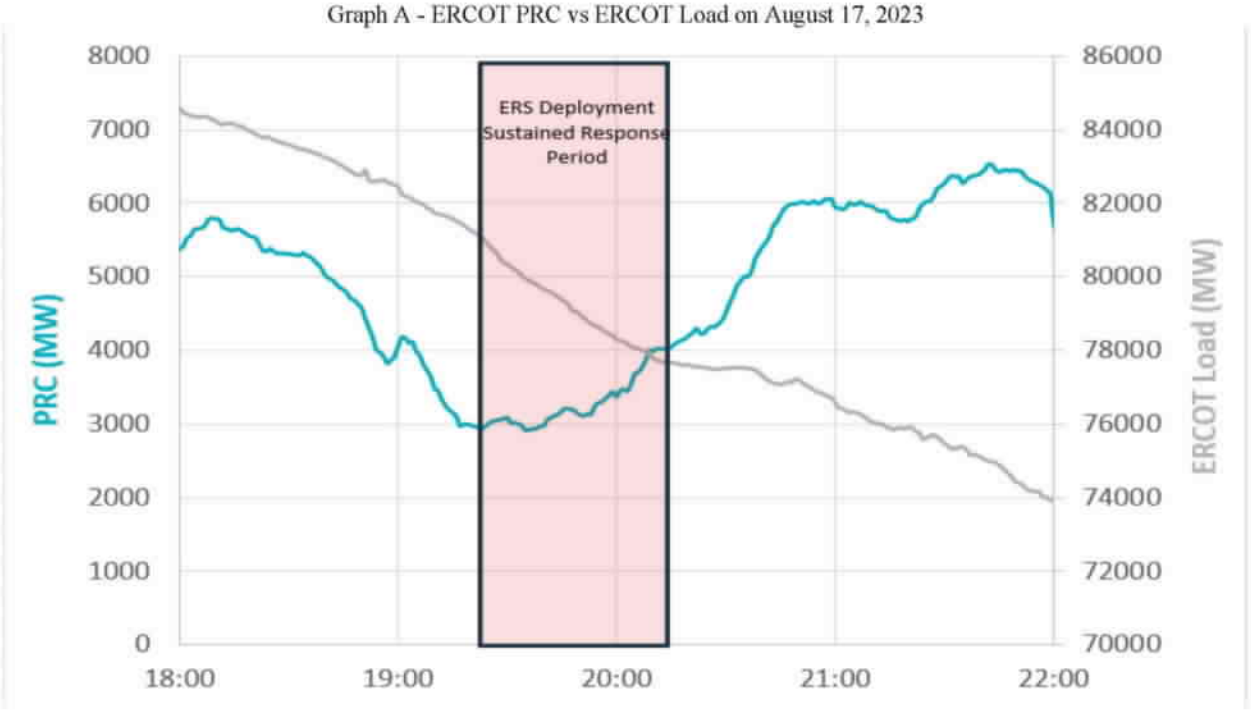
There have been nine deployment events since the inception of ERS. Three of the nine events occurred during winter periods and the other six were during summer periods. The two most recent deployments occurred during the 2023 ERS Program year on August 17 and September 6, 2023. Historically ERS deployment events during the summer periods would occur over the peak hours from 3:00 to 7:00 p.m. In the case of the 2023 deployment events, they both occurred later in the day when the System Load was still high but other Resources, such as wind and solar, were ramping down. Table 1 below provides the deployment and recall times for these two events.

Table 1 – Deployment and Recall Times for the 2023 ERS Deployment Events

ERS VDI Deployment Times for 2023					
Program	**Contract Term**	**Deployment Date**	**Deployment Time**	**Recall Date**	**Recall Time**
ERS-10 & ERS-30	JunSep23	8/17/2023	19:21:33	8/17/2023	20:12:06
ERS-10 & ERS-30	JunSep23	9/6/2023	19:17:21	9/6/2023	20:46:46

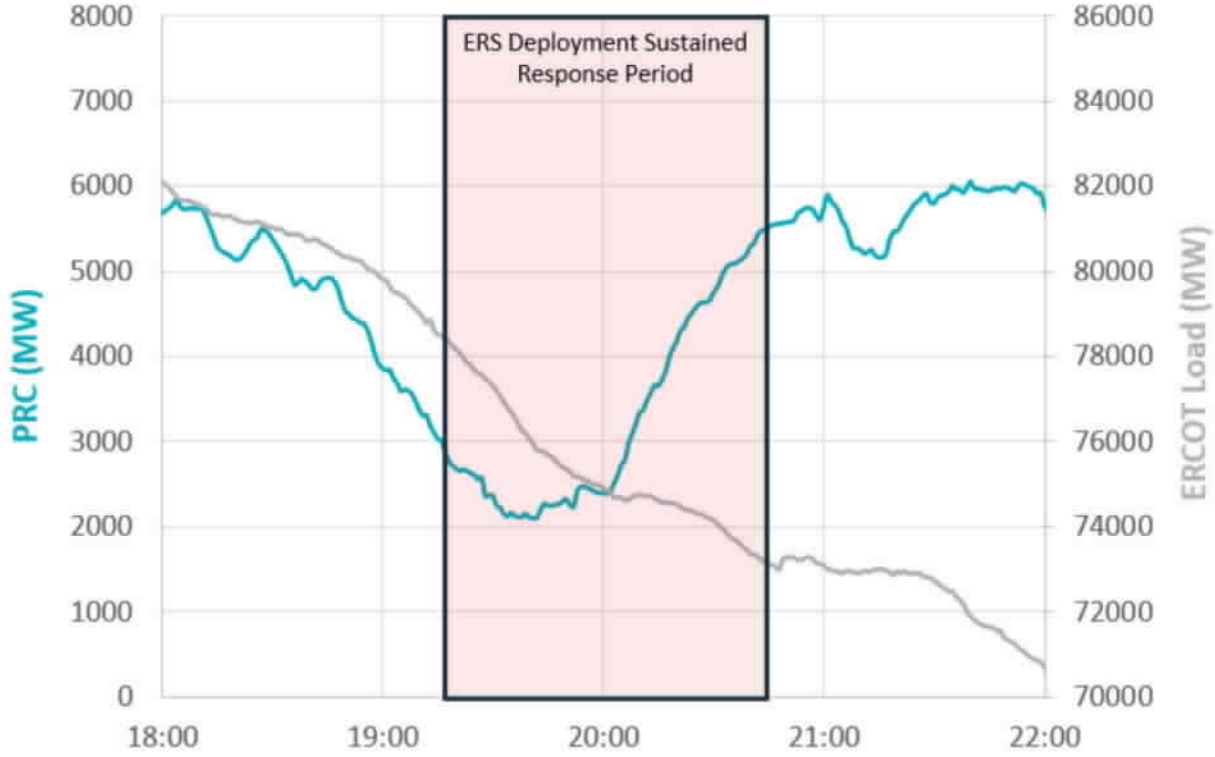
The deployment for the August 17th event was triggered when the Physical Responsive Capability (PRC) first dropped below 3000 MW. (See Graph A below). Both ERS-10 and ERS-30 Resources were deployed, however ERS-30 was not deployed long enough to cover a 30-minute ramp and one full interval as required for evaluation per Protocol § 8.1.3.1.4, *Event Performance Criteria for Emergency Response Service Resources*, paragraph (2)(b). Only the ERS-10 Resources were evaluated during this event (see slides 7-8, Attachment B).

Graph A - ERCOT PRC vs ERCOT Load on August 17, 2023



As with the August event, on September 6th the PRC fell below the 3000 MW deployment threshold after the System Load had peaked for the day. This deployment also corresponded with the day that the ERCOT reserves were at their lowest during the summer of 2023 (see Graph B).

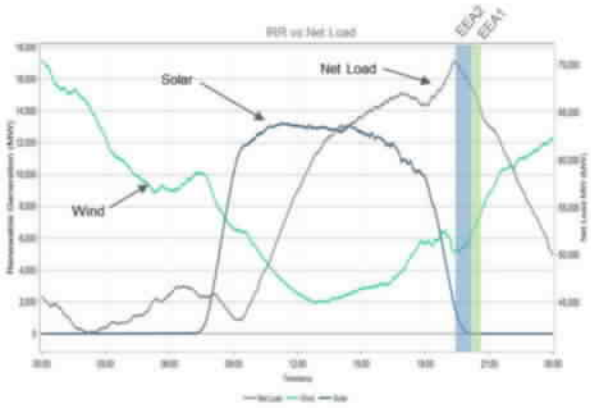
Graph B - ERCOT PRC vs ERCOT Load on September 6, 2023



The System experienced high demand with low wind and an earlier solar ramp than was the case for the August event. There was also a transmission constraint coming out of South Texas that required generation in the south to be curtailed to relieve the overload. Due to declining system frequency, ERS and other ERCOT resources were deployed to address these conditions. The following summary from the Summer 2023 Operational and Market Review was presented to the ERCOT Board of Directors on October 17, 2023. Additional information on the September 6, 2023 event is also available in *ERCOT's Final Report Addressing September 6, 2023 Emergency Event*, which was filed with the Public Utility Commission of Texas (Commission) in Project No. 54444.[3]

September 6th – Emergency Operations

- Reserves were very tight during this period due to high demand, low wind in north and west, and earlier solar ramp compared to August
- Use of all available generation resulted in the overload of a high-risk transmission constraint from South Texas to rest of ERCOT
- ERCOT appropriately balanced the overload of the transmission constraint against the risk of going into EEA and began to manually curtail generation in South Texas to relieve the overload



- Even though frequency-responsive reserves appeared to remain above 2,000 MW, frequency began to decline, reaching a low of 59.77 Hz by 7:25 pm (ERCOT is investigating this incorrect response or reporting by Resources)
- EEA2 was declared at 7:25 pm and Load Resources were deployed
- ERCOT moved to EEA1 at 8:27 pm and to normal operations at 8:37 pm

Key Takeaway: High net load and the need to manage a high-risk transmission constraint led to the need to declare EEA2 and deploy Load Resources

Item 6
ERCOT Public

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Performance

ERS Resources are represented at ERCOT by a Qualified Scheduling Entity (QSE) that is operationally and financially responsible for the performance of its ERS Resources. ERCOT believes 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

[3] *CY 2023 Reports of the Electric Reliability Council of Texas*, Project No. 54444, Electric Reliability Council of Texas, Inc.'s Final Report Addressing September 6, 2023 Emergency Event (Nov. 22, 2023).

America—provides integrity to the ERS product. The performance metrics and payment reduction penalties are based on availability, unannounced testing, and, when applicable, event performance.

Availability. The effectiveness of Non-Weather Sensitive ERS is ensured to a large degree by incentives that encourage QSEs and ERS Resources to maintain a certain level of availability for deployment. For a QSE's portfolio of Non-Weather Sensitive ERS Resources, the QSE must achieve a SCT portfolio-level availability factor of at least 95% across committed ERS Time Periods. Portfolio-level availability is calculated for each ERS Contract Period within the SCT after the end of the SCT by applying time- and capacity-weighted availability factors across the ERS Resources in each QSE's portfolio, while Resource-level availability factors are calculated using aggregated, site-level interval meter data for each ERS Resource. A QSE whose portfolio consists of Non-Weather Sensitive ERS Resources may receive a payment reduction for availability less than 100%. Any QSE whose portfolio of Non-Weather Sensitive ERS Resources that fails to achieve an aggregate availability factor of greater than 95% for an ERS Contract Period may be subject to additional payment reductions for portfolios that include any individual ERS Resource that fails to achieve an availability factor of 85% or higher. 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.

During the program year, ERS-10 had a single SCT with one failure; in that case, the QSE's availability factor score was 89.7. For ERS-30, three of the four SCTs had a QSE failure. The average availability factor for the failing QSEs across all SCTs was 92.8. See Table 2 below for detailed information for ERS-10 and ERS-30 specified for each SCT.

Table 2 – Availability Results for ERS-10 and ERS-30

ERS Program	SCT	Number of QSEs in SCT	Number of QSEs that Failed	Score of Failed resource
ERS 10	2022 Dec-Mar23	4	0	N/A
ERS 10	Mar-Apr23	4	1	89.7
ERS 10	Jun-Sep23	5	0	N/A
ERS 10	Oct-Nov23	3	0	N/A
ERS 30	2022 Dec-Mar23	15	1	91.2
ERS 30	Mar-Apr23	15	1	94
ERS 30	Jun-Sep23	16	1	93.2
ERS 30	Oct-Nov23	16	0	N/A

Testing. All ERS Resources, regardless of service type, are subject to periodic unannounced testing. Each Non-Weather Sensitive ERS Resource is subject to at least one annual unannounced test, whereas each Weather-Sensitive ERS Resource is tested at least once, but no more than twice, each month during the SCT for which it is obligated to provide the service. ERCOT conducts these

tests by issuing a VDI and an XML instruction to each QSE, just as ERCOT would do in an actual deployment event. Failed test performance may result in payment reductions to the QSE. For Weather-Sensitive ERS, all tests are considered events and event performance is the sole determinant of ERS payment for Weather-Sensitive portfolios.

During the 2023 ERS program year ERCOT tested 494 ERS Resources over the four SCTs. Table 3 below provides a breakdown of the number of ERS Resources tested and the number of test failures for each SCT. As a result of the test failures and in accordance with the newly-implemented Suspension and Reinstatement Procedures posted on the ERS webpage on ERCOT.com, a total of 14 ERS Resources comprised of 103 ESIIDs were suspended.

Table 3 – ERS Testing Summary for 2023 ERS Program Year

SCT	Resources Tested	Resources Failed
DecMar23	241	104
AprMay23	125	39
JunSep23	128	16
OctNov23	0	0

Event Performance. If ERS is deployed due to an event other than a test instruction, the QSE portfolio-level performance during the event becomes the primary factor for determining ERS payments. QSEs must achieve a SCT portfolio-level event performance factor of at least 95% to meet its performance requirements for the SCT. SCT portfolio-level event performance factors are calculated after the end of the SCT and are time- and capacity-weighted for all deployment events during the SCT. For each event, any QSE whose portfolio of Non-Weather Sensitive ERS Resources achieves less than 95% for either their event performance factor or their interval performance factor for the first full interval of the Sustained Response Period may be subject to additional performance factor reductions which could result in a reduced ERS payment to the QSE, as specified in ERCOT Protocols. Any QSE whose portfolio of Weather-Sensitive ERS Resources fails to achieve 90% for their ERS Contract Period event performance factor may be subject to performance factor reductions for individual ERS Resources based on criteria specified in the ERCOT Protocols that could result in additional reductions to the QSE's ERS payment. The two deployment events that occurred during the program year, both in the Jun-Sep23 SCT, are described below.

1. ***Event Performance August 17, 2023***

   On August 17, 2023, Non-Weather Sensitive ERS-10 and ERS-30 were deployed during Time Period 5. As noted above, only ERS-10 had sufficient data for analysis. During this deployment event, ERS-10 had an obligation of 28.935 MW.

   The ERS-10 fleet outperformed during this event. Throughout the obligated intervals, the ERS-10 fleet provided an average response of 33.255 MW, exceeding its obligation by 15%. The fleet's response peaked at 33.591 MW during the 15-minute interval ending at 19:45 (refer to slides 7-8, Attachment B). Among the five QSEs carrying an ERS-10 obligation during this event, four successfully performed. However, the single QSE that

failed to meet expectations represented only 1% of the ERS-10 Fleet obligation; its event performance factor was 57.8%.

2. ***Event Performance September 6, 2023***

The second ERS deployment took place on September 6, 2023, also during Time Period 5, and entailed the deployment of both Non-Weather Sensitive ERS-10 and ERS-30. This event extended for a duration allowing for an event analysis on both ERS-10 and ERS-30. The total MW obligation for the entire ERS fleet was 1023.97 MW, comprising an ERS-10 obligation of 28.935 MW and an ERS-30 obligation of 995.035 MW. The ERS fleet successfully passed the event with a performance score of 99.5%. The fleet's response peaked at 1068.827 MW during the 15-minute interval ending at 20:45 (refer to slides 9-10, Attachment B).

There were 14 QSEs carrying an ERS obligation during this event. Among the 14 QSEs representing ERS-30 resources, seven successfully performed during the event.Four of those QSEs provided an average of 80 MW beyond their obligation. The remaining seven QSEs providing ERS-30 were carrying 70.6% of ERS-30 obligation and attained a weighted-average score of 91%.

Furthermore, among the 14 QSEs, five represented ERS-10 Resources and four of them successfully performed during the event. The single QSE that did not meet expectations achieved an event performance factor of 76.8%.

Through the end of the 2023 program year, payment reductions to QSEs due to availability, unannounced testing, or event performance totaled $5,150,708.87 (see slide 29, Attachment B).

Benefits

The Commission has recognized that a central purpose of ERS is to enable additional Demand Response participation in the ERCOT market.[4] ERCOT's experience with ERS in the 2023 program year reflects that ERS is successfully meeting this Commission goal in several ways.

First, while the number of ERS Resources has declined slightly due to increases in the size of aggregated resources, the number of unique sites has steadily increased through the duration of the program (see slides 19 and 20, Attachment B).

Second, since ERCOT adopted its current ERS Procurement Methodology, the average unit cost-per-MW of ERS has remained relatively constant, with a slight downward trend occurring in the past few years. This can be attributed to a modest increase in the overall capacity participating in the service. In the 2023 program year, the unit cost per MW of ERS ranged from a low of $0.29

[4] *See PUC Rulemaking to Amend ERCOT Emergency Interruptible Load Service*, Project No. 34706, Order Adopting Amendment to §25.507 as Approved at the November 1, 2007, Open Meeting at 4-5 (Nov. 8, 2007).

per megawatt hour (MWh) during low-risk time periods during the Dec22-Mar23 SCT to a high of $52.90 per MWh during the highest risk time period during the Jun-Sep23 SCT (see slide 21, Attachment B).

Finally, ERS continued to demonstrate its value by providing additional tools for ERCOT operators to use during system events such as the events that occurred on August 17 and September 6, 2023. During these events, ERS Resources provided an average of 1,038 MW of dispatchable Demand Response assisting in the recovery of the ERCOT System.

ERCOT Emergency Response Service (ERS)

Report to the Public Utility Commission of Texas
for the 2023 ERS Program Year

Project No. 55999

Table of Contents

Standard Contract Terms & Time Periods

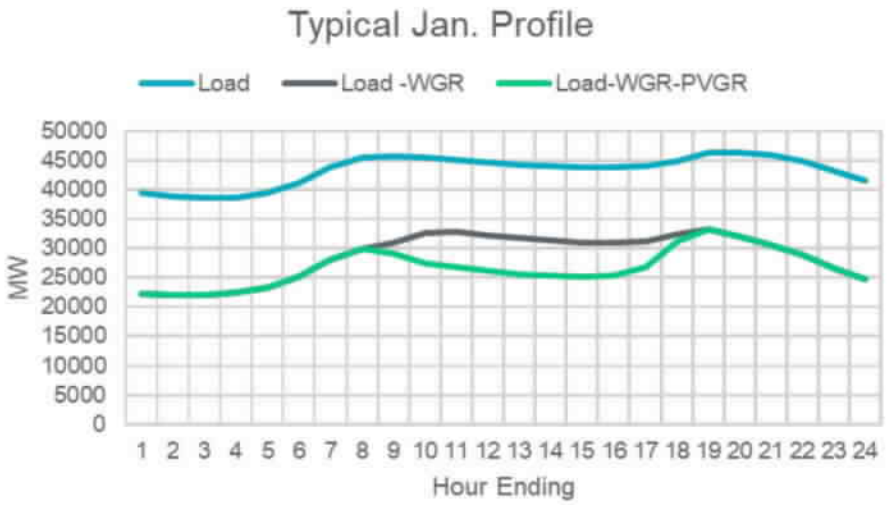
ERS was procured four times during the 2023 program year:

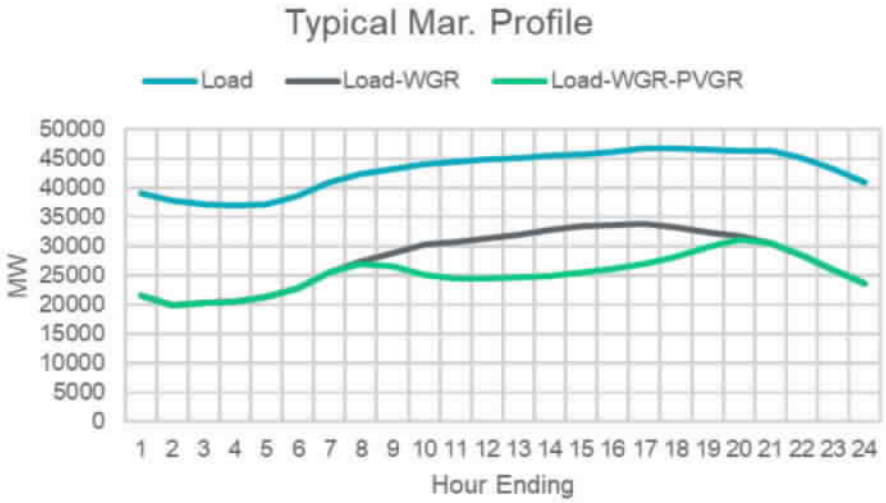
- December through March
- April through May
- June through September
- October through November

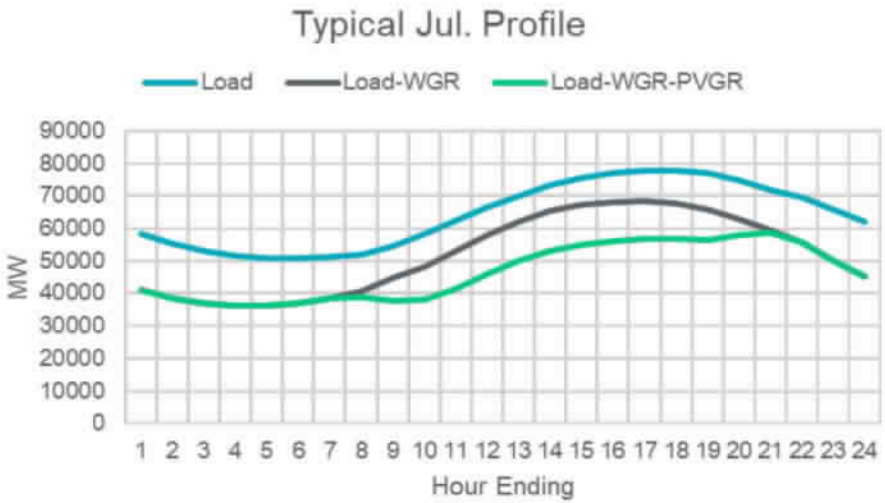
Participants may offer to provide ERS for one or more Time Periods:

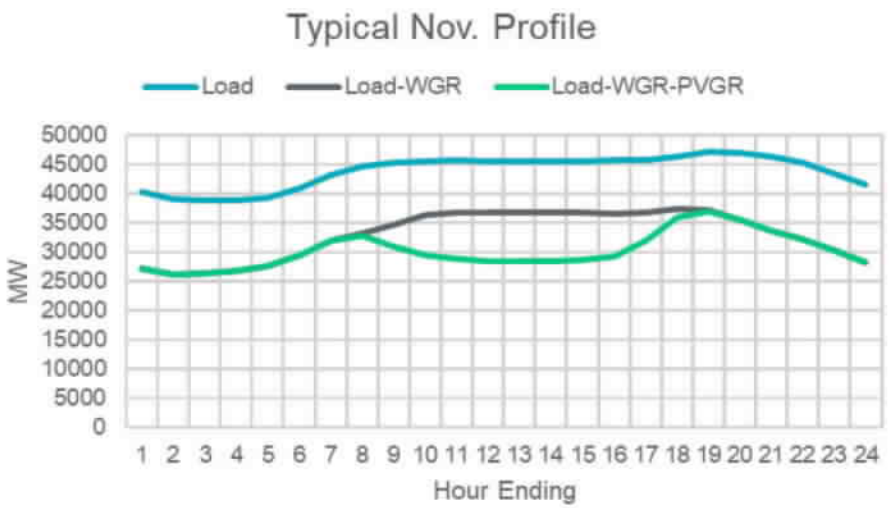
Time Period	Time Period Hours
Time Period 1	Hours Ending 0600 - 0800 (5:00:00 a.m. to 9:00:00 a.m.) Monday through Friday except ERCOT Holidays.
Time Period 2	Hours Ending 1000 - 1300 (9:00:00 a.m. to 1:00:00 p.m.) Monday through Friday except ERCOT Holidays.
Time Period 3	Hours Ending 1400 - 1600 (1:00:00 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

Net Load Profile





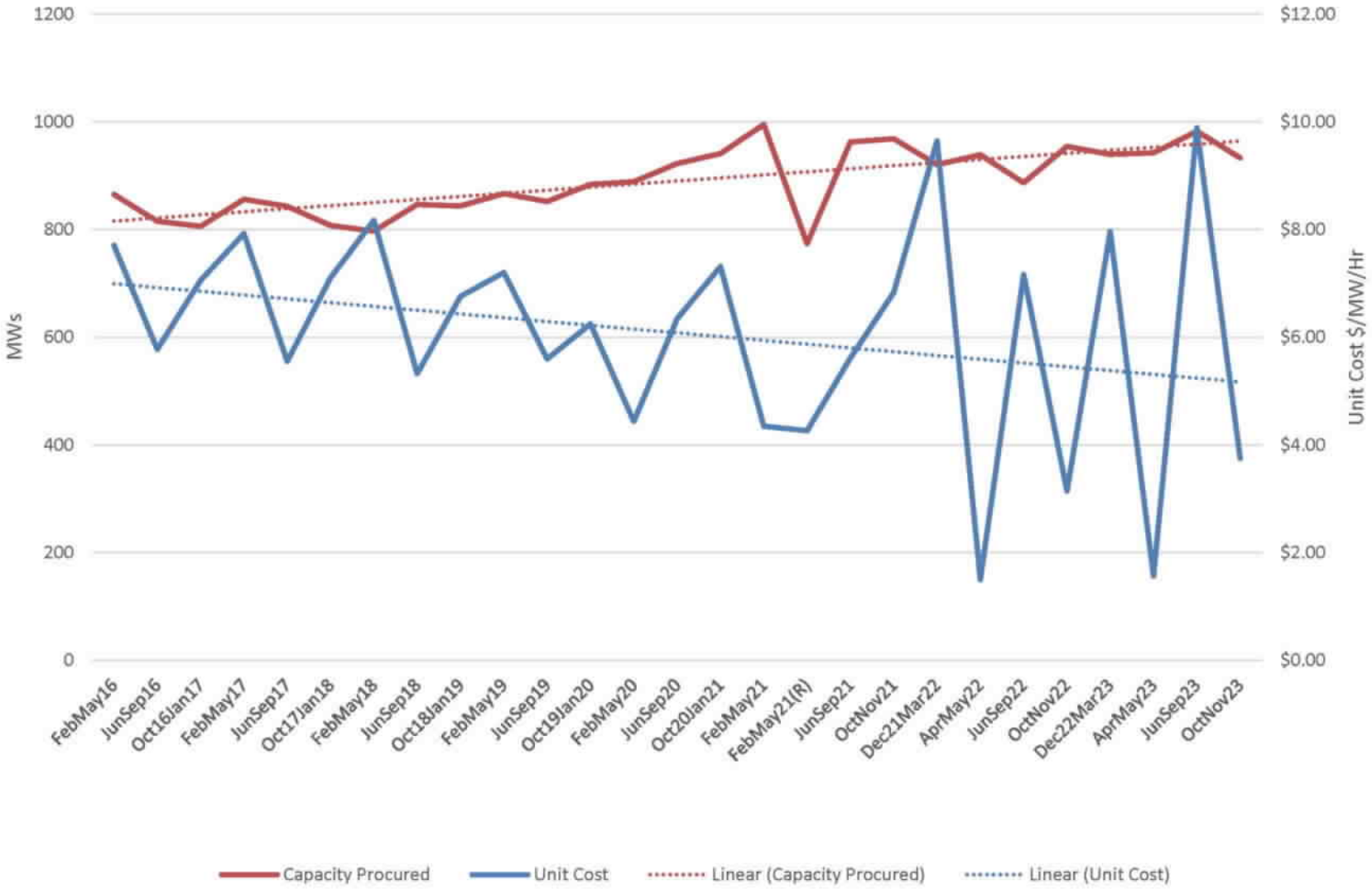




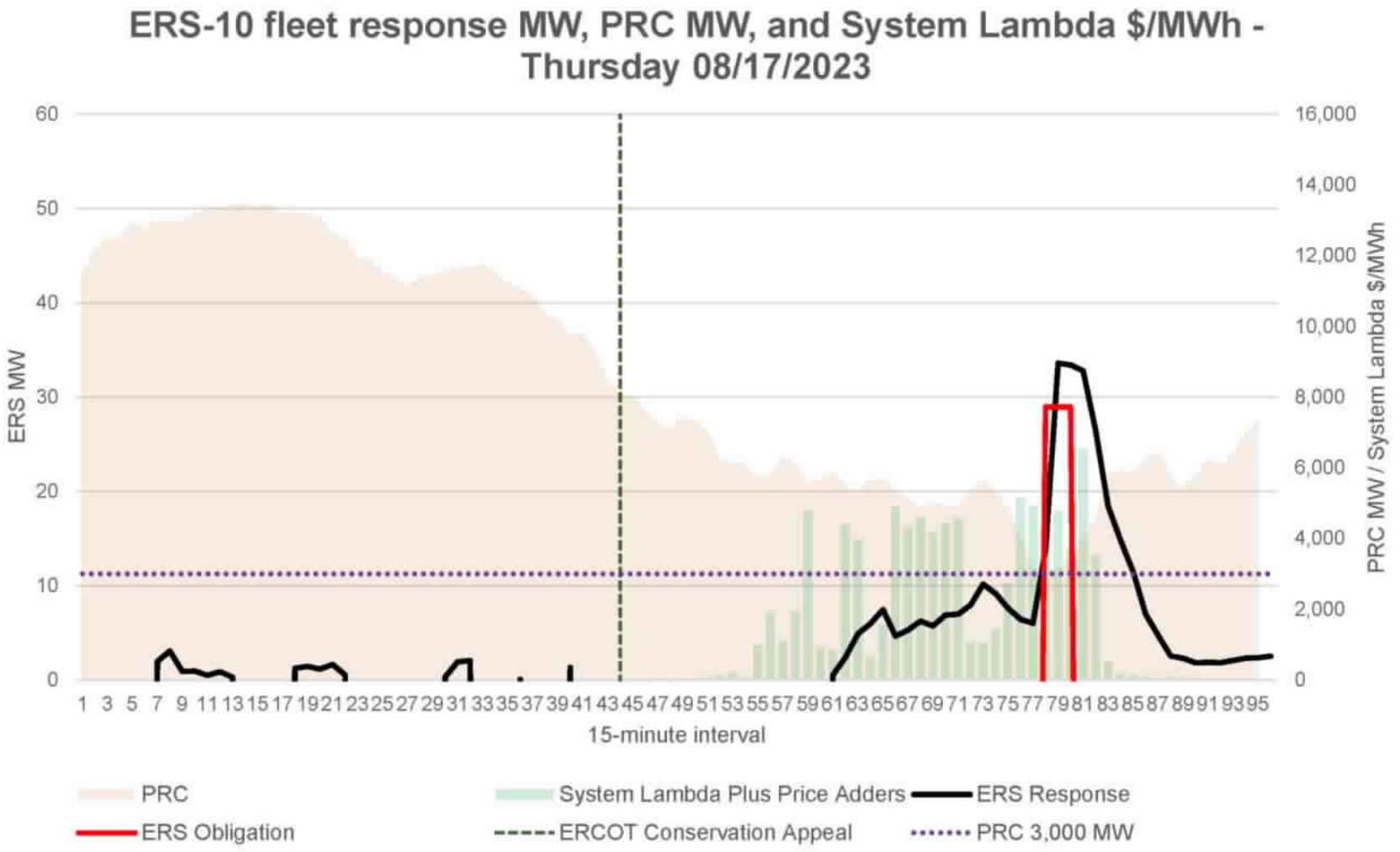
2023 Risk Weighting Factors

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)
DecMar23	TP1	H	100	332	$ 80	2,656,000	20.11%	15,079,029	567.7
	TP2	L	18	332	$ 80	478,080	3.62%	2,714,225	102.2
	TP3	L	18	249	$ 80	358,560	2.71%	2,035,669	102.2
	TP4	H	80	249	$ 80	1,593,600	12.06%	9,047,417	454.2
	TP5	M	50	249	$ 80	996,000	7.54%	5,654,636	283.9
	TP6	L	1	152	$ 80	12,160	0.09%	69,037	5.7
	TP7	L	1	228	$ 80	18,240	0.14%	103,555	5.7
	TP8	L	10	1112	$ 80	889,600	6.73%	5,050,566	56.8
AprMay23	TP1	L	15	168	$ 80	201,600	3.25%	1,729,832	128.7
	TP2	L	1	168	$ 80	13,440	0.22%	115,322	8.6
	TP3	L	1	126	$ 80	10,080	0.16%	86,492	8.6
	TP4	L	15	126	$ 80	151,200	2.44%	1,297,374	128.7
	TP5	L	10	126	$ 80	100,800	1.62%	864,916	85.8
	TP6	L	1	76	$ 80	6,080	0.10%	52,170	8.6
	TP7	L	1	114	$ 80	9,120	0.15%	78,254	8.6
	TP8	L	1	560	$ 80	44,800	0.72%	384,407	8.6
JunSep23	TP1	L	10	340	$ 80	272,000	4.80%	2,451,407	90.1
	TP2	L	10	340	$ 80	272,000	4.80%	2,451,407	90.1
	TP3	H	100	255	$ 80	2,040,000	35.97%	18,385,554	901.3
	TP4	H	100	255	$ 80	2,040,000	35.97%	18,385,554	901.3
	TP5	L	10	255	$ 80	204,000	3.60%	1,838,555	90.1
	TP6	L	1	148	$ 80	11,840	0.21%	106,708	9.0
	TP7	L	1	222	$ 80	17,760	0.31%	160,062	9.0
	TP8	L	1	1113	$ 80	89,040	1.57%	802,475	9.0
OctNov23	TP1	L	15	168	$ 80	201,600	27.83%	1,816,925	135.2
	TP2	L	1	168	$ 80	13,440	1.86%	121,128	9.0
	TP3	L	1	126	$ 80	10,080	1.39%	90,846	9.0
	TP4	L	15	126	$ 80	151,200	20.87%	1,362,694	135.2
	TP5	L	15	126	$ 80	151,200	20.87%	1,362,694	135.2
	TP6	L	10	76	$ 80	60,800	8.39%	547,962	90.1
	TP7	L	10	114	$ 80	91,200	12.59%	821,942	90.1
	TP8	L	1	561	$ 80	44,880	6.20%	404,482	9.0

Emergency Response Service Trends

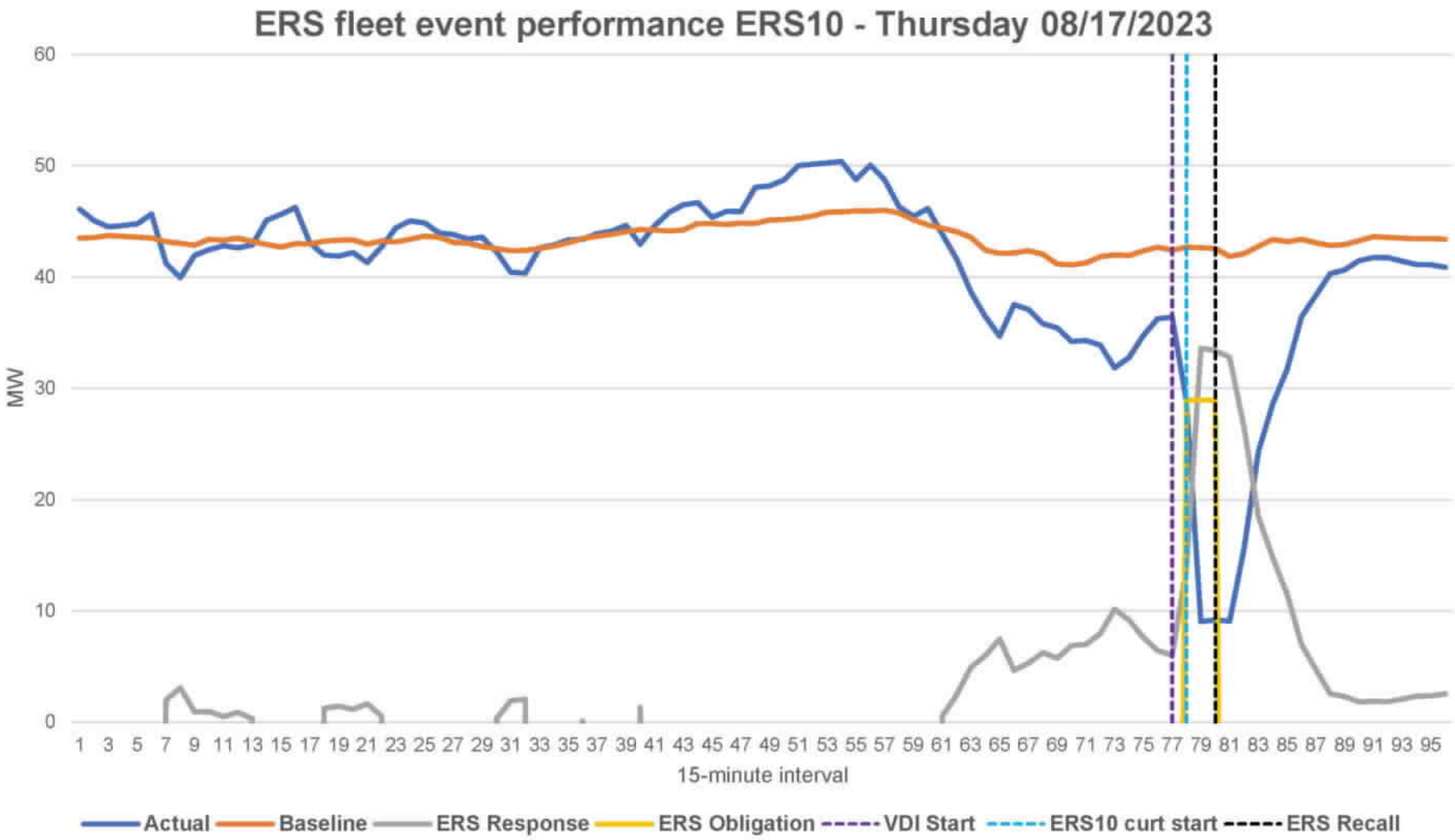


August 17, 2023 ERS Deployment Event

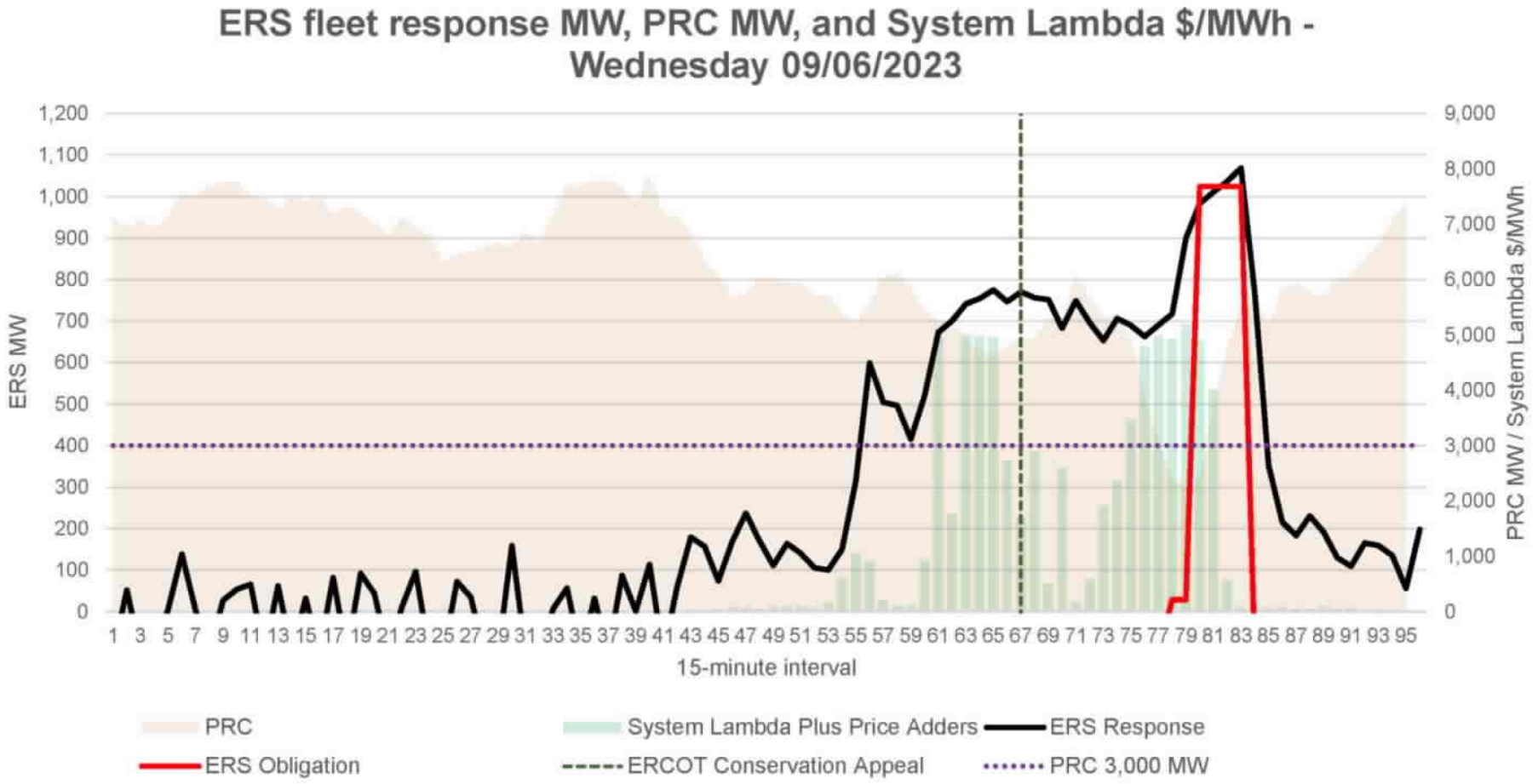


Note: The ERS fleet performance depicted above is a representation of the aggregate megawatts for ERS Resources and does not reflect how they will be assessed for performance during each individual ERS deployment event.

August 17, 2023 ERS Deployment Event

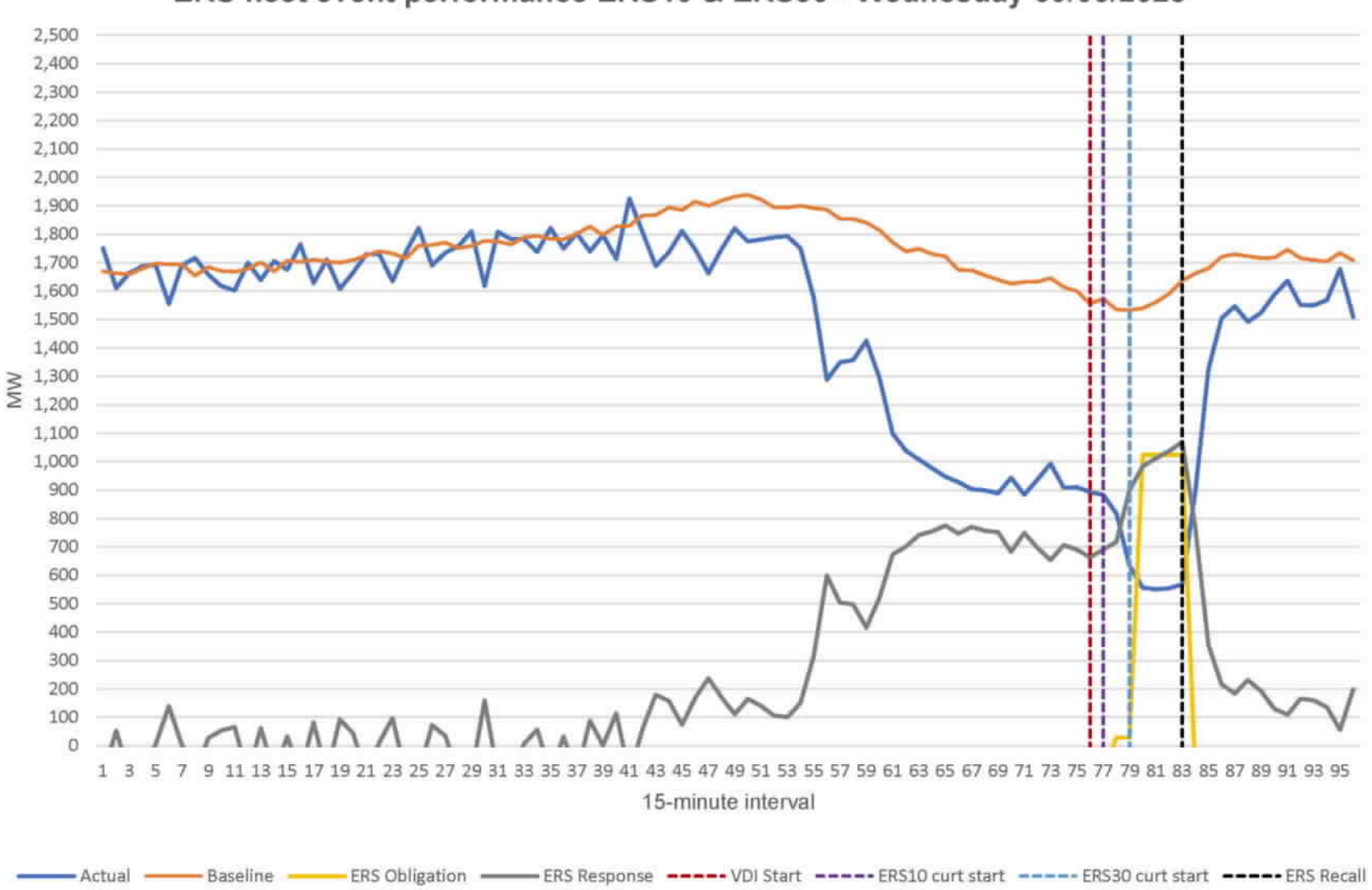


September 6, 2023 ERS Deployment Event

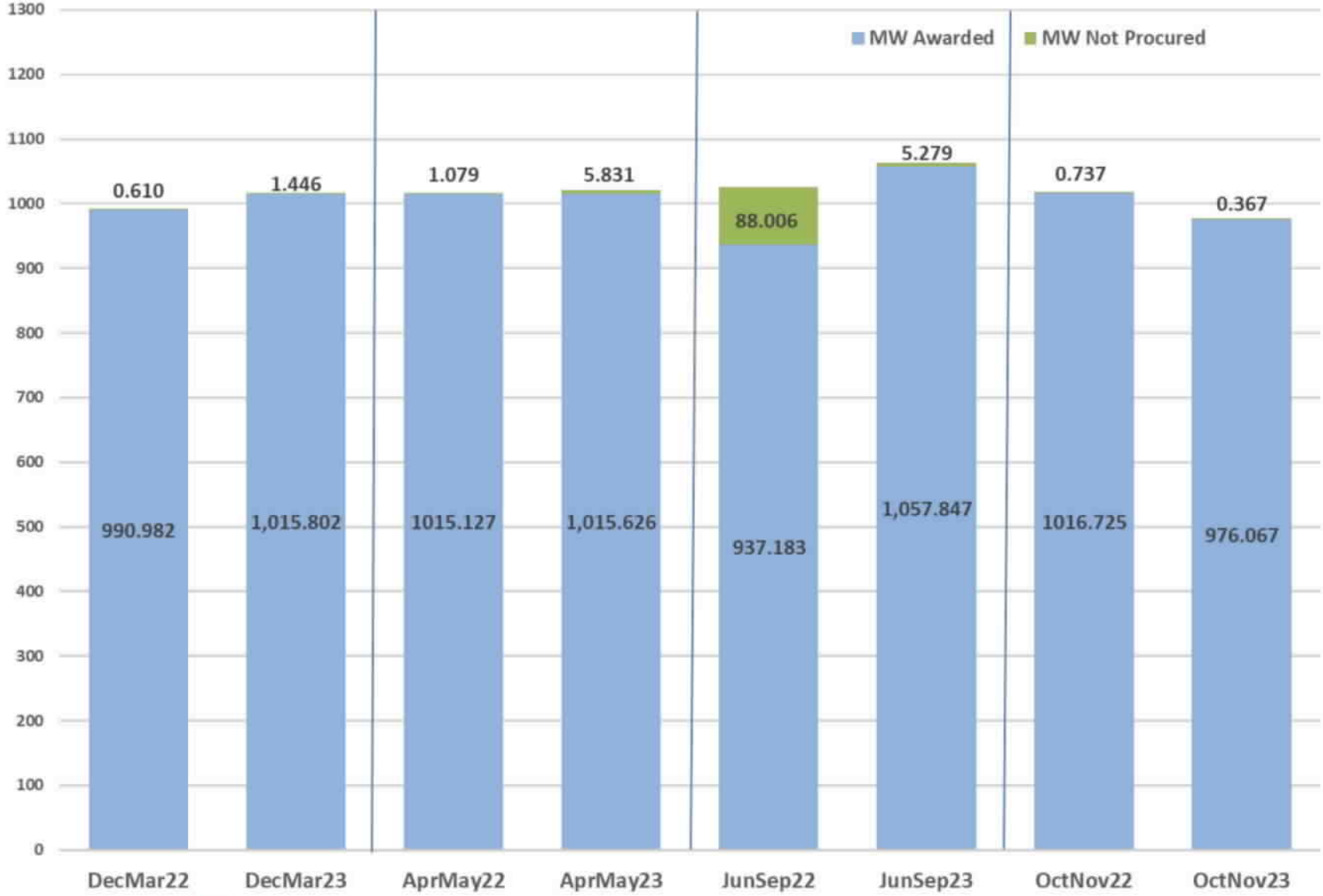


Note: The ERS fleet performance depicted above is a representation of the aggregate megawatts for ERS Resources and does not reflect how they will be assessed for performance during each individual ERS deployment event.

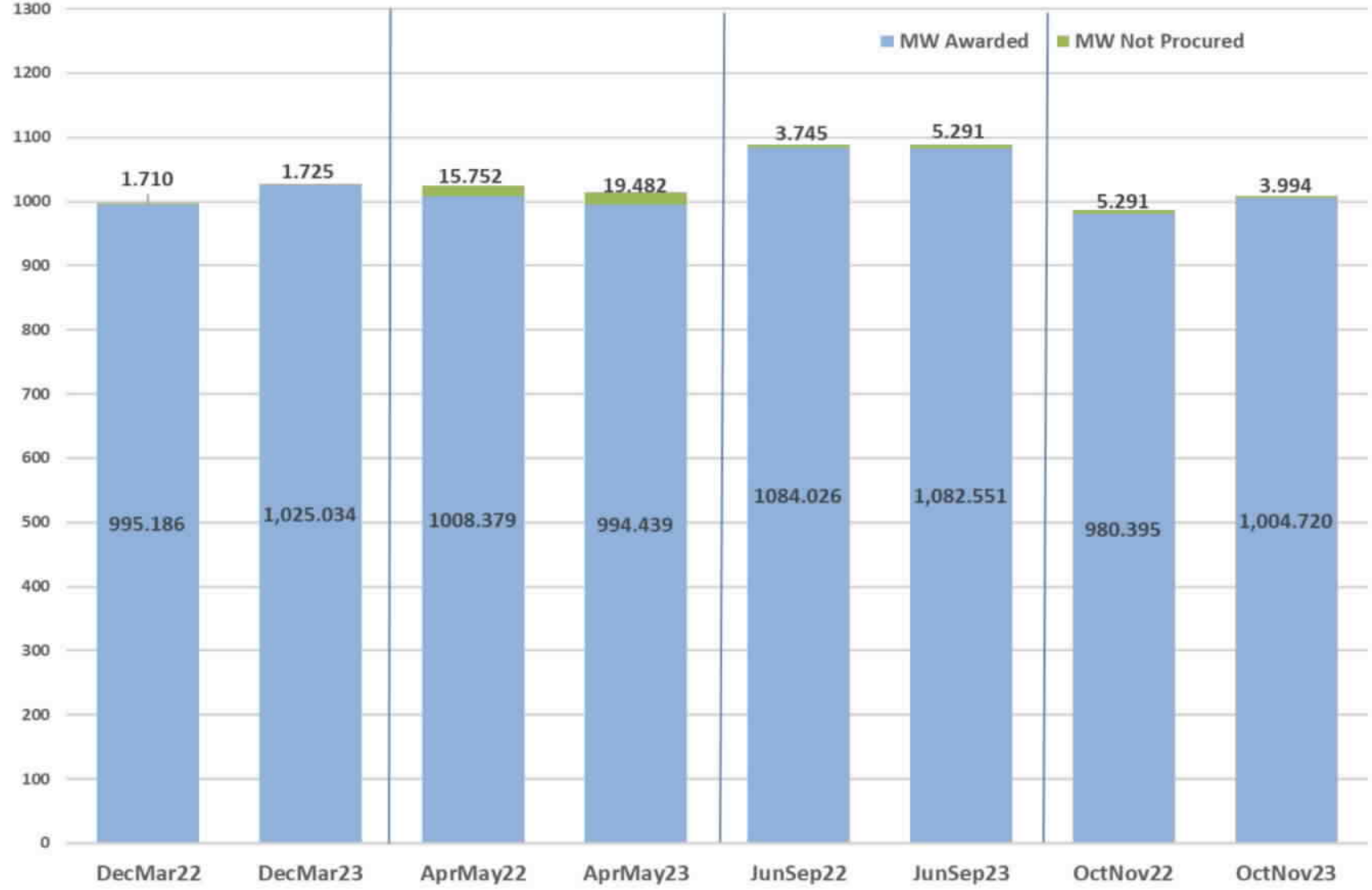
September 6, 2023 ERS Deployment Event



ERS Capacity Procurement Trends (Time Period 1)



ERS Capacity Procurement Trends (Time Period 2)

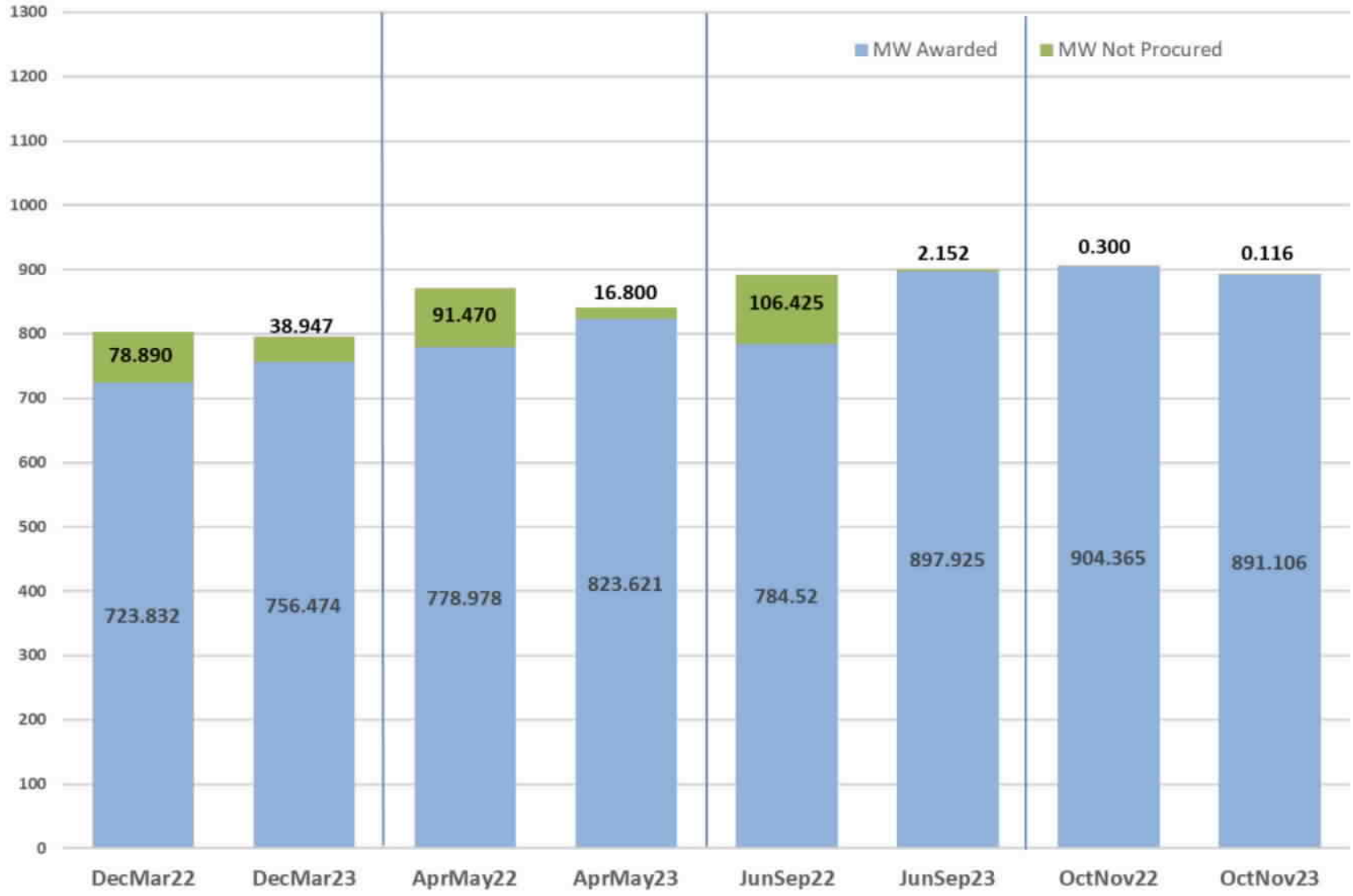


ERS Capacity Procurement Trends (Time Period 3)

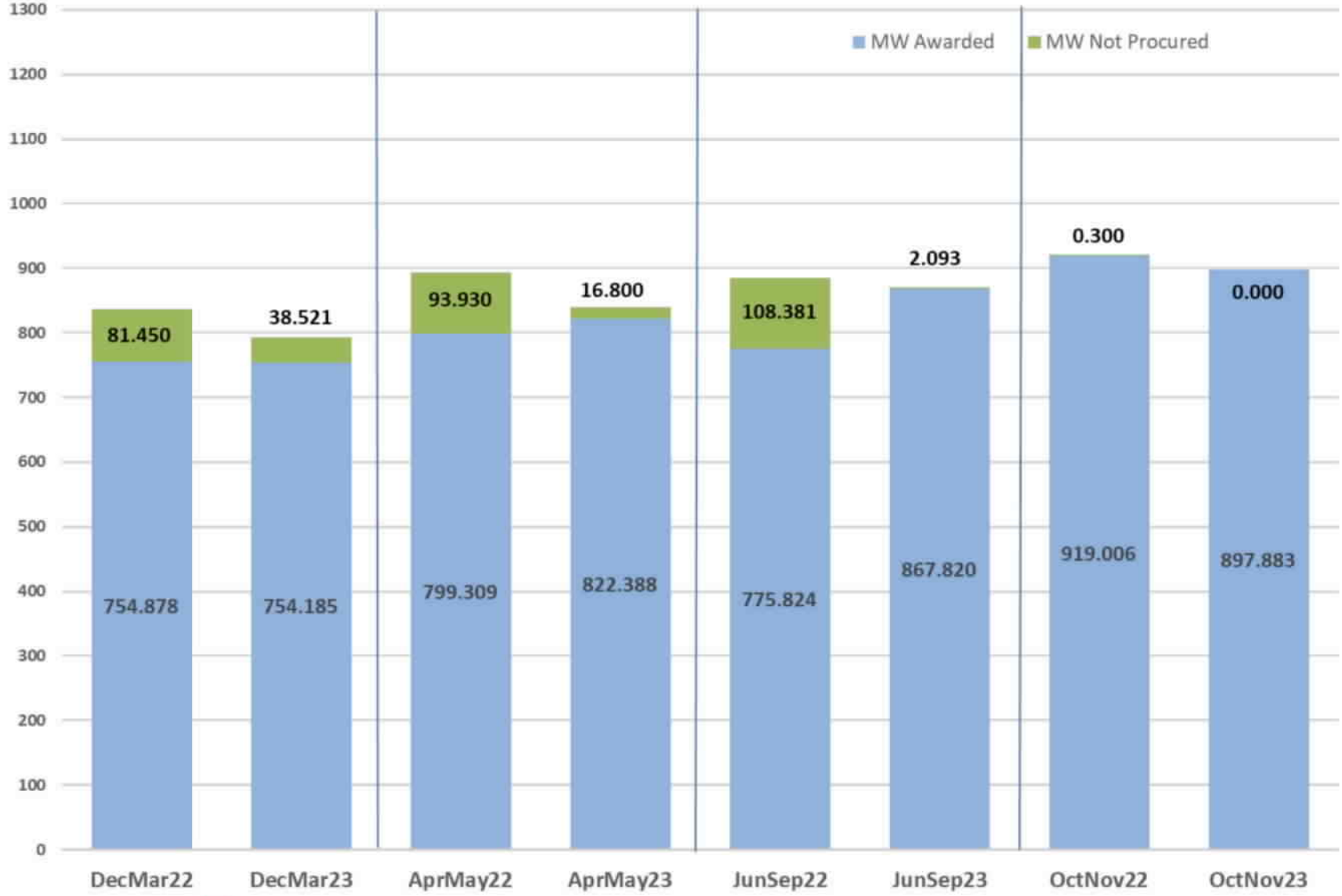
ERS Capacity Procurement Trends (Time Period 4)

ERS Capacity Procurement Trends (Time Period 5)

ERS Capacity Procurement Trends (Time Period 6)

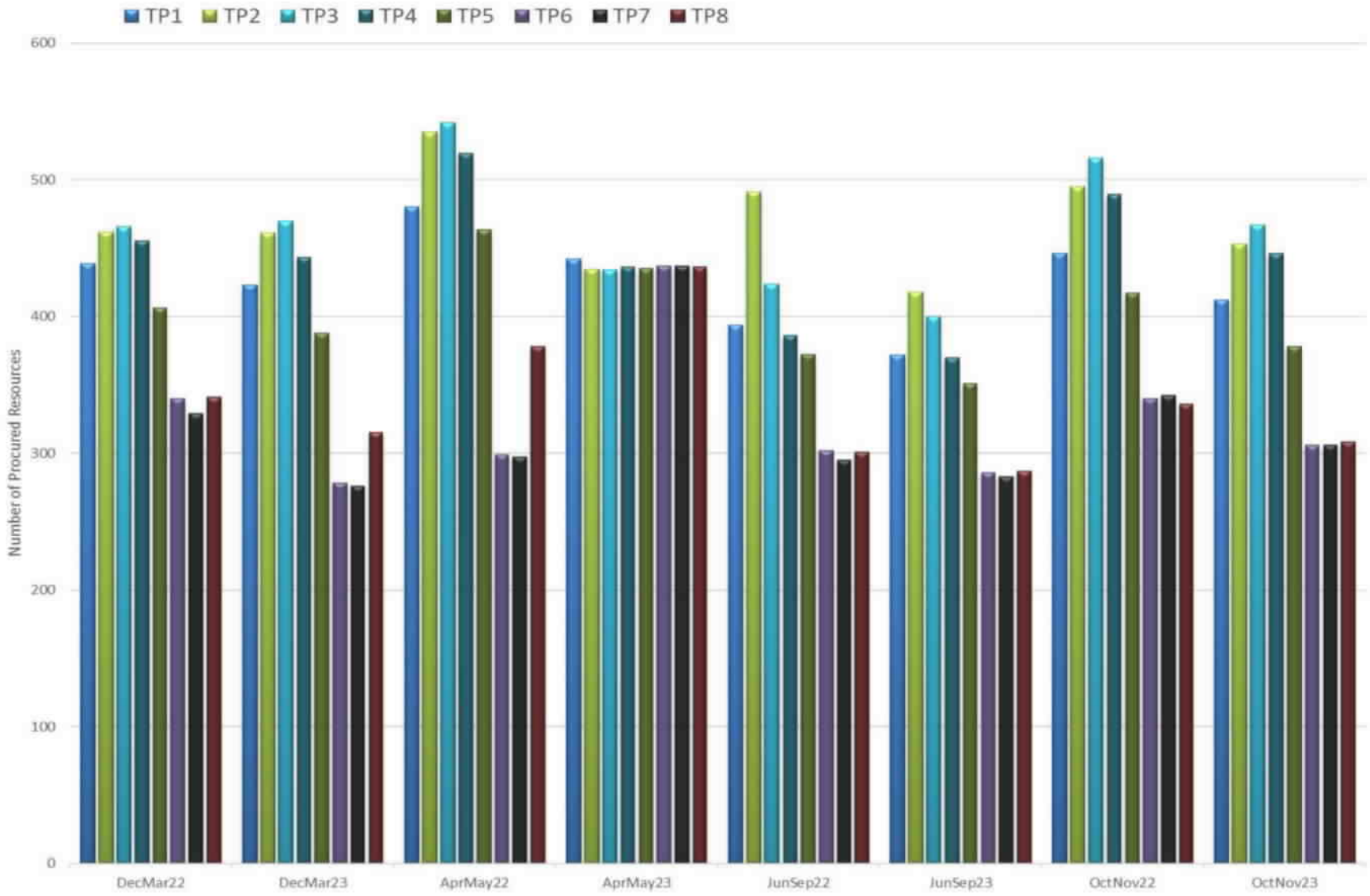


ERS Capacity Procurement Trends (Time Period 7)

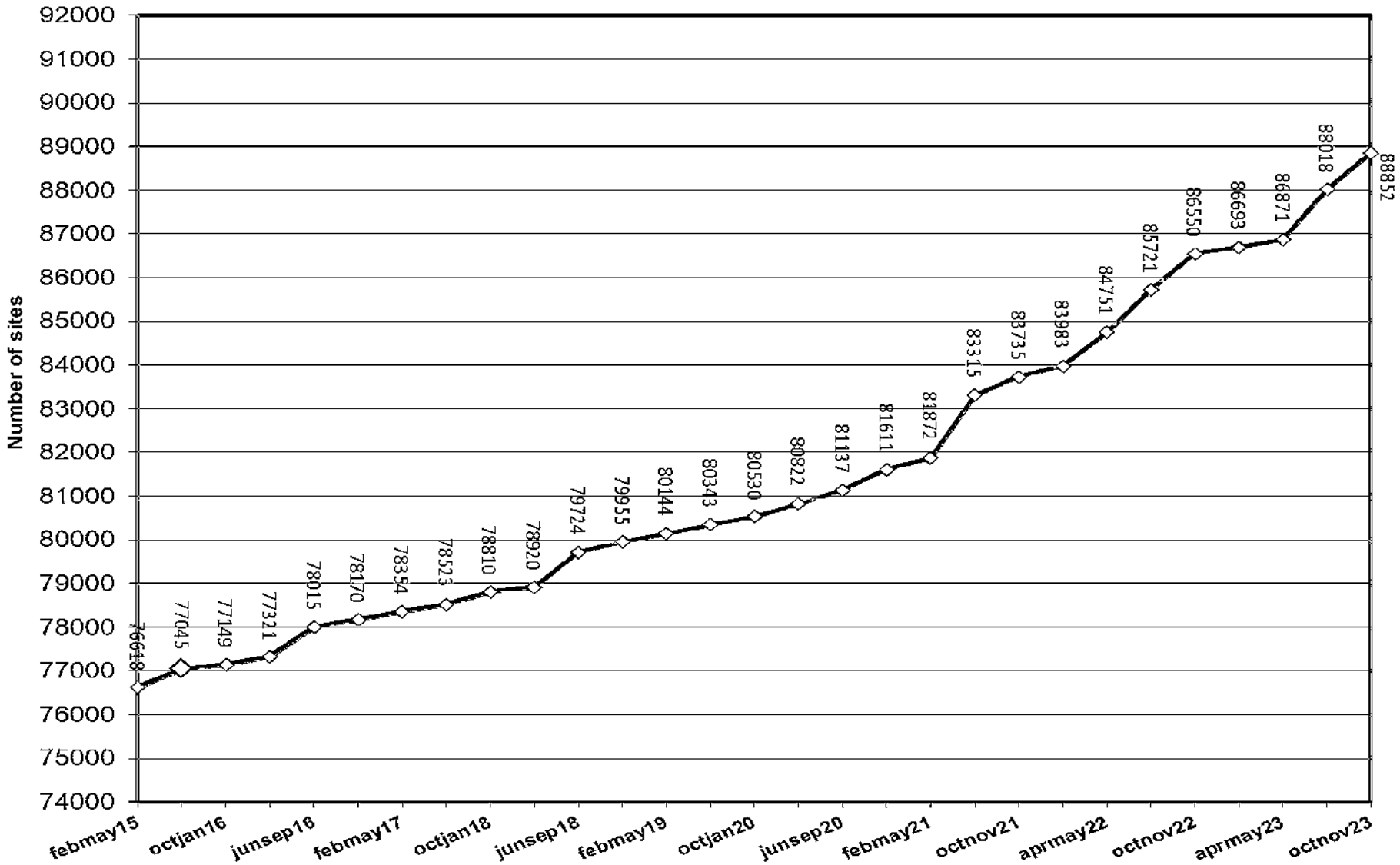


ERS Capacity Procurement Trends (Time Period 8)

ERS Procurement Trends (Number of Resources)



Cumulative Number of Sites (Unique) Participating in the ERS Resource Identification Process



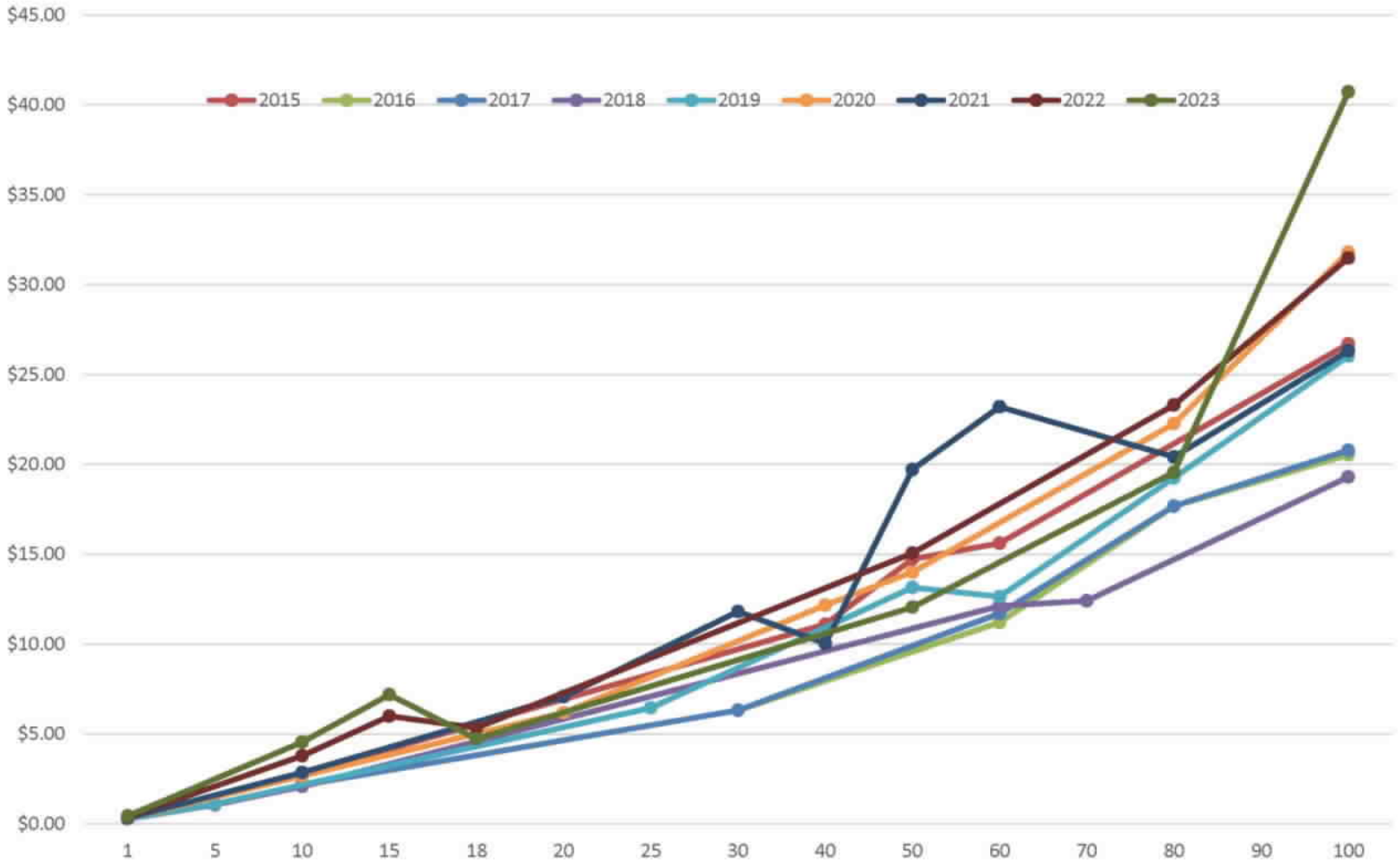
History of ERS Clearing Prices

	Feb-May 16	Jun-Sep 16	Oct 16-Jan 17	Feb-May 17	Jun-Sep 17	Oct 17-Jan 18	Feb-May 18	Jun-Sep 18	Oct 18-Jan 19	Feb-May 19	Jun-Sep 19	Oct 19-Jan 20	Feb-May 20
TP1	$19.87	$2.12	$17.63	$20.45	$2.05	$17.57	$20.72	$2.01	$14.63	$20.70	$0.30	$18.26	$21.71
TP2	$10.75	$1.98	$6.32	$11.33	$1.95	$6.34	$11.95	$1.85	$11.90	$11.58	$0.28	$0.24	$0.26
TP3	$1.86	$21.21	$2.07	$1.96	$21.06	$2.20	$2.00	$21.08	$0.27	$1.04	$29.05	$0.24	$0.27
TP4	$18.84	$22.32	$17.14	$19.93	$21.68	$17.18	$20.26	$21.77	$17.34	$18.93	$32.84	$17.78	$10.41
TP5	$11.67	$2.08	$18.26	$12.08	$2.06	$18.29	$12.29	$1.99	$12.92	$12.43	$0.30	$11.55	$5.45
TP6	$2.25	$2.36	$2.52	$2.27	$2.30	$2.53	$2.38	$2.25	$1.06	$0.24	$0.31	$13.19	$0.32
TP7	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	$6.07	$0.32
TP8	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	$0.27	$0.31

	Jun-Sep 20	Oct 20-Jan 21	Feb-May 21	Jun-Sep 21	Oct-Nov 21	Dec 21-Mar 22	Apr-May 22	Jun-Sep 22	Oct-Nov 22	Dec 22-Mar 23	Apr-May 23	Jun-Sep 23	Oct-Nov 23
TP1	$2.76	$21.70	$20.41	$2.37	$19.71	$29.57	$4.54	$3.25	$7.23	$24.55	$6.50	$4.89	$8.75
TP2	$2.53	$0.29	$0.27	$2.27	$0.42	$5.30	$0.30	$2.74	$0.51	$4.73	$0.25	$4.13	$0.60
TP3	$29.37	$0.28	$0.27	$24.31	$0.42	$5.38	$0.30	$29.69	$0.49	$4.73	$0.26	$44.71	$0.60
TP4	$34.23	$22.18	$10.03	$28.32	$23.20	$23.30	$4.44	$35.19	$6.54	$19.55	$3.70	$52.90	$8.25
TP5	$2.73	$14.00	$5.34	$2.38	$11.81	$15.06	$3.02	$3.25	$7.23	$12.05	$2.52	$4.89	$8.75
TP6	$0.32	$13.33	$0.31	$0.27	$8.82	$0.41	$0.39	$0.37	$5.50	$0.29	$0.31	$0.48	$6.50
TP7	$0.32	$6.65	$0.31	$0.27	$4.41	$0.38	$0.37	$0.37	$5.41	$0.29	$0.31	$0.48	$6.40
TP8	$0.31	$0.34	$0.32	$0.27	$0.50	$3.34	$0.34	$0.37	$0.56	$2.49	$0.29	$0.48	$0.65

**Note: N/A represents Standard Contract Terms prior to the addition of TP7 and TP8.*

Average Clearing Price ($/MW/hr) vs Time Period Risk Factors



2023 ERS Procurement Results

ercot

December-March 2023 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	1,015.802	$8,279,395.78	1.446	$24.55	$49.64
TP2	1,025.034	$1,609,672.39	1.725	$4.73	$14.00
TP3	1,030.813	$1,214,060.63	1.628	$4.73	$14.00
TP4	1,040.987	$5,067,521.35	1.441	$19.55	$38.86
TP5	985.758	$2,987,722.09	1.914	$12.05	$24.82
TP6	756.474	$33,345.37	38.947	$0.29	$14.00
TP7	754.185	$49,866.71	38.521	$0.29	$1.50
TP8	898.988	$2,489,189.89	2.837	$2.49	$14.00

Non-Weather Sensitive ERS-10 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	35.732	0
TP2	35.505	0
TP3	34.655	0
TP4	31.203	0
TP5	31.815	0
TP6	33.872	0
TP7	31.621	0
TP8	32.638	0

Weather Sensitive ERS-10 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)

Non-Weather Sensitive ERS-30 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	973.070	1.446
TP2	989.529	1.725
TP3	996.158	1.628
TP4	1002.794	1.441
TP5	958.943	1.914
TP6	722.602	38.947
TP7	722.564	38.521
TP8	866.350	2.837

Weather Sensitive ERS-30 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
	7	0
	7	0
	5	0

Final Cost for this Standard Contract Term: $19,994,410.31

April-May 2023 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	1015.626	$1,109,063.59	5.831	$6.50	$14.00
TP2	994.439	$41,766.44	19.482	$0.25	$14.00
TP3	989.965	$32,431.25	19.463	$0.26	$14.00
TP4	1006.293	$469,133.80	20.695	$3.70	$14.00
TP5	974.912	$309,554.06	20.893	$2.52	$14.00
TP6	823.621	$19,404.51	16.800	$0.31	$1.50
TP7	822.388	$29,053.19	16.800	$0.31	$1.50
TP8	913.856	$148,410.21	18.300	$0.29	$3.50

Non-Weather Sensitive ERS-10 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	28.671	0
TP2	29.553	0
TP3	29.157	0
TP4	24.159	0
TP5	25.748	0
TP6	28.178	0
TP7	25.018	0
TP8	26.431	0

Weather Sensitive ERS-10 Minute

Capacity Procured (MWs)	Capacity Not Procured (MWs)

Non-Weather Sensitive ERS-30 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	977.955	5.831
TP2	964.886	19.482
TP3	960.808	19.463
TP4	973.134	20.695
TP5	940.164	20.893
TP6	795.443	16.800
TP7	797.37	16.800
TP8	887.425	18.300

Weather Sensitive ERS-30 Minute

Capacity Procured (MWs)	Capacity Not Procured (MWs)
9	0
9	0
9	0

Final Cost for this Standard Contract Term: $2,072,481.63

June-September 2023 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	1057.847	$1,758,776.42	5.279	$4.88	$14.00
TP2	1082.551	$1,520,118.11	5.291	$4.13	$14.00
TP3	1022.362	$11,656,000.28	4.825	$44.71	$59.26
TP4	858.041	$11,574,544.07	4.425	$52.90	$72.38
TP5	1023.97	$1,276,839.39	5.066	$4.89	$14.00
TP6	897.925	$63,788.59	2.152	$0.48	$14.00
TP7	867.82	$92,474.90	2.093	$0.48	$14.00
TP8	973.279	$519,964.57	3.612	$0.48	$14.00

Non-Weather Sensitive ERS-10 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	28.842	0
TP2	28.834	0
TP3	28.303	0
TP4	27.643	0
TP5	28.935	0
TP6	28.901	0
TP7	28.483	0
TP8	28.688	0

Weather Sensitive ERS-10 Minute

Capacity Procured (MWs)	Capacity Not Procured (MWs)

Non-Weather Sensitive ERS-30 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	1029.005	5.279
TP2	1053.717	5.291
TP3	946.858	4.825
TP4	784.198	4.425
TP5	995.035	5.066
TP6	869.024	2.152
TP7	839.337	2.093
TP8	944.591	3.612

Weather Sensitive ERS-30 Minute

Capacity Procured (MWs)	Capacity Not Procured (MWs)
47.2	0
46.2	0

Final Cost for this Standard Contract Term: $24,273,626.14

October-November 2023 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	976.067	$1,434,818.49	0.367	$8.75	$14.00
TP2	1,004.720	$101,275.78	2.63	$0.60	$14.00
TP3	1,025.780	$77,548.97	2.516	$0.60	$14.00
TP4	1,003.532	$1,043,171.51	0.25	$8.25	$14.00
TP5	961.304	$1,059,837.68	0.255	$8.75	$14.00
TP6	891.106	$440,206.38	0.116	$6.50	$14.00
TP7	897.883	$655,095.44	0	$6.40	$6.40
TP8	869.181	$316,946.85	1.5	$0.65	$3.50

Non-Weather Sensitive ERS-10 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	21.211	0
TP2	20.608	0
TP3	20.736	0
TP4	20.635	0
TP5	21.057	0
TP6	20.756	0
TP7	21.745	0
TP8	20.547	0

Weather Sensitive ERS-10 Minute

Capacity Procured (MWs)	Capacity Not Procured (MWs)

Non-Weather Sensitive ERS-30 Minute

	Capacity Procured (MWs)	Capacity Not Procured (MWs)
TP1	954.856	0.367
TP2	984.112	2.63
TP3	995.786	2.516
TP4	970.290	0.25
TP5	938.907	0.255
TP6	870.350	0.116
TP7	876.138	0
TP8	848.634	1.5

Weather Sensitive ERS-30 Minute

Capacity Procured (MWs)	Capacity Not Procured (MWs)
9.258	0
12.607	0
1.340	0

Final Cost for this Standard Contract Term: $5,119,393.54

2023 ERS Procurement Overview

Expenditure Limit for 2023	$75,000,000.00
Amount Spent (Final)	$52,330,299.80
Unspent (Final)	$22,669,700.20

2023 ERS Cap	DecMar23 Total (Final)	AprMay23 Total (Final)	JunSep23 Total (Final)	OctNov23 Total (Final)
$75,000,000.00	**$19,994,410.31**	**$2,072,481.63**	**$25,144,014.32**	**$5,119,393.54**

Settlement Summary (2 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
DecMar22	$ 2,294,402.62	$ 2,268,958.50	$ 25,444.12	$ 23,395,188.02	$ 22,477,153.07	$ 918,034.95	$ 97,156.00	$ 47,606.44	$ 49,549.56
AprMay22	$ 691,887.62	$ 672,196.12	$ 19,691.50	$ 1,345,415.88	$ 1,300,674.37	$ 44,741.51	$ 23,884.80	$ 13,542.68	$ 10,342.12
JunSep22	$ 694,569.05	$ 616,010.09	$ 78,558.96	$ 17,284,465.65	$ 14,554,047.30	$ 2,730,418.35	$ 631,898.76	$ 465,550.35	$ 166,348.41
OctNov22	$ 121,303.29	$ 114,381.76	$ 6,921.53	$ 4,235,111.93	$ 4,030,772.65	$ 204,339.28	$ 38,628.15	$ 2,570.85	$ 36,057.30
Total 2022	**$ 3,802,162.58**	**$ 3,671,546.47**	**$ 130,616.11**	**$ 46,260,181.47**	**$ 42,362,647.39**	**$ 3,897,534.08**	**$ 791,567.71**	**$ 529,270.32**	**$ 262,297.39**
DecMar23	$ 729,117.01	$ 707,620.17	$ 21,496.84	$ 20,895,525.10	$ 19,261,424.57	$ 1,634,100.53	$ 106,132.10	$ 25,365.57	$ 80,766.53
AprMay23	$ 58,783.98	$ 57,576.43	$ 1,207.55	$ 2,083,161.60	$ 2,014,584.44	$ 68,577.16	$ 16,881.48	$ 320.76	$ 16,560.72
JunSep23	$ 840,510.63	$ 834,396.78	$ 6,113.85	$ 26,460,651.25	$ 23,460,061.50	$ 3,000,589.75	$ 1,161,344.46	$ 849,556.04	$ 311,788.42
OctNov23	$ 113,101.60	$ 113,101.69	$ (0.09)	$ 5,000,517.23	$ 4,999,200.90	$ 1,316.33	$ 15,282.23	$ 7,090.95	$ 8,191.28
Total 2023	**$ 1,741,513.22**	**$ 1,712,695.07**	**$ 28,818.15**	**$ 54,439,855.18**	**$ 49,735,271.41**	**$ 4,704,583.77**	**$ 1,299,640.27**	**$ 882,333.32**	**$ 417,306.95**