Kevin T. Boleware
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December 1, 2023

Via Electronic Mail Only
Ms. Lora W. Johnson, CMC, LMMC
Clerk of Council
City Hall - Room 1E0
1300 Perdido Street
New Orleans, LA 70112

Re: *Filing of Entergy New Orleans, LLC's Report Regarding Phase One of the Battery Storage Demand Response Pilot Program and Application for Approval of Phase Two*
(CNO Docket No. UD-22-03 Battery Storage Pilot - Resolution R-22-483)

Dear Ms. Johnson:

On March 9, 2022, Entergy New Orleans, LLC ("ENO") filed its Request for Approval of a Demand Response Battery Storage Pilot Program for Program Year 12 of Energy Smart. Subsequently, on November 3, 2022, the Council of the City of New Orleans ("Council") adopted Resolution R-22-483 approving the request and requiring ENO to submit a report on the results of the pilot program by December 1, 2023.

On behalf of EnergyHub, Honeywell and ADM Associates, ENO submits this electronic filing and requests that you file this submission, Report Regarding Phase One of the Battery Storage Demand Response Pilot Program and Application for Approval of Phase Two, in accordance with Council regulations as modified.

Should you have any questions regarding this filing, please contact my office at (504) 670-3673. Thank you for your assistance with this matter.

Sincerely,

Kevin T. Boleware

Enclosures

cc: Official Service List UD-22-03 *(via electronic mail)*

BEFORE THE

COUNCIL OF THE CITY OF NEW ORLEANS

***IN RE*: RESOLUTION AND ORDER ESTABLISHING A DOCKET AND PROCEDURAL SCHEDULE WITH RESPECT TO THE APPLICATION OF ENTERGY NEW ORLEANS, LLC FOR A BATTERY STORAGE DEMAND RESPONSE PILOT PROGRAM**	))))))))	**DOCKET NO. UD-22-03**

REPORT REGARDING PHASE ONE OF THE BATTERY STORAGE DEMAND RESPONSE PILOT PROGRAM AND APPLICATION FOR APPROVAL OF PHASE TWO

Entergy New Orleans, LLC ("ENO" or the "Company"), pursuant to Council Resolution R-22-483, respectfully submits this Report Regarding Phase One of the Battery Storage Demand Response Pilot Program ("Pilot") and Application for Approval of Phase Two ("Phase Two"), and, in support of this Application, ENO respectfully shows as follows:

BACKGROUND

I.

ENO is an electric and gas utility organized and operating under the laws of the State of Louisiana, with its general office and principal place of business at 1600 Perdido Street, Building 505, New Orleans, Louisiana 70112. The Company is engaged in the manufacture, production, transmission, distribution, and sale of electricity to residential, commercial, industrial, and governmental consumers throughout the City of New Orleans. ENO furnishes electric service to approximately 209,000 customers in Orleans Parish. The Company also provides natural gas service to approximately 108,000 retail gas customers in Orleans Parish.

II.

On July 8, 2016, ENO filed a proposal to implement a Nest thermostat pilot program in Algiers. The pilot included providing approximately 100 Nest thermostats to income qualified, multifamily customers in order to better understand the energy efficiency benefits associated with smart thermostats. As a condition of approval, the Nest Pilot proposal filing had to comply with the requirements in Council Resolution R-15-140. Subsection 2 of the ordering section of Council Resolution R-15-140 states that prior to the implementation of any new pilot program for the Energy Smart program, ENO must file an application with the Council for review and approval that includes: a) incentive costs, non-incentive costs and kWh savings (in some cases where the supporting calculations require, individual measures should be shown within a program) for each individual pilot program proposed; b) Evaluation, Measurement and Verification ("EM&V") spending at 6.5%; c) Lost Contribution to Fixed Costs ("LCFC") including the adjusted gross margin ("AGM") calculation; and d) a program description that includes the objective of the pilot, including results, as appropriate, that will provide data to determine cost-effectiveness should a full implementation of the program be considered.

More recently, in Resolution R-16-106, the Council recommended that proposals for pilot programs should include, at a minimum: (1) the number of customers to be included in order to generate adequate data for evaluation, which customer classes should participate, whether participation is voluntary or mandatory; (2) what data is to be collected and how it will be collected; (3) the duration of the proposed pilot program; (4) draft tariff provisions to implement such a pilot program; and (5) the anticipated costs and rate impact of such a pilot program. The information set forth in this Application, and contained in the attached implementation plan documents, fulfills these requirements for Phase Two.

III.

On December 15, 2022, Council Resolution R-22-523 approved the programs and budgets for Program Years 13 and 14 (“PY13 and PY14”) of Energy Smart, with reserved approval of Energy Smart Program Year 15 (“PY15”). The approved budgets for PY14 and PY15 are shown in the table below.

Energy Smart--Program Year 14 Approved Budget	
Energy Efficiency	
Program Costs + Evaluation, Measurement & Verification (“EM&V”)	$ 24,431,148
Demand Response	
Program Costs + Evaluation, Measurement & Verification (“EM&V”)	$ 2,248,187
Total	**$ 26,679,335**

IV.

In Resolution R-22-483, the Council directed ENO to “[S]ubmit a report to the Council by December 1, 2023, which includes findings related to the Pilot Program and an evaluation of the following:

1. Alternative incentive structures including, but not limited to:
   a) Performance-based incentives to encourage participation in a demand response event, and
   b) allowing customers to export battery power to the grid during normal conditions, similar to the net metering tariff, to increase incentives and promote battery storage adoption
2. Potential inclusion of non-residential customers, particularly small commercial customers already pursuing battery storage.

3. Strategies to create access for multi-family and low-to-moderate income housing and promote battery storage for grid capacity/load reductions, and resiliency."

PILOT PROGRAM—PHASE ONE REPORT

V.

In late 2021, ENO engaged Honeywell, the third-party implementer for the current Energy Smart Large Commercial Automated Demand Response ("ADR") program, to explore various ideas centered around utilizing smart solar battery systems to support the grid. One of the ideas that emerged from that effort was to develop a new program to allow residential customers with existing solar-connected smart battery systems to receive an incentive in exchange for participating in demand response events. Such programs had been implemented in other markets and are often referred to as Bring Your Own Battery, or BYOB, programs. ENO and Honeywell worked together to design a small pilot BYOB program that would benefit participating customers and provide valuable data to ENO regarding the capabilities of distributed battery resources dispatched for demand response purposes. ENO discussed the objectives of the pPilot in its Application for Approval of a Battery Storage Demand Response Pilot Program:

> The Pilot would target 30 residential customers with existing solar-connected smart battery systems and would connect the battery systems to the Enbala Concerto Distributed Energy Resource Management System (DERMS) platform currently being used by Honeywell to administer the Large Commercial DR program. The Pilot would provide an opportunity for ENO to gain direct experience on the potential grid benefits of distributed battery resources and their relative performance when called upon during a demand response event. The Pilot would provide an opportunity for ENO to gauge customer interest and gather customers' feedback on their willingness to participate in an ENO-sponsored battery DR program. Finally, the Pilot would also enable ENO to assess the willingness and ability of multiple battery manufacturers to facilitate connection of their systems to the Honeywell DERMS and learn about the potential requirements or parameters associated with including customer-sited batteries in utility-sponsored programs. [1]

[1] Entergy New Orleans LLC's Request For Approval of a Demand Response Battery Storage Pilot Program for Program Year 12, filed March 9, 2022.

VI.

Following Council approval of the pilot in Resolution No. R-22-483, ENO and Honeywell implemented the Battery Energy Storage System ("BESS") pilot from May through September 2023 ("Phase One"). The implementers were able to enroll 17 participants during the pilot period. ENO called a total of 10 BESS demand response events prior to September 30, 2023. Some of the lessons learned during Phase One are listed below.

- Battery manufacturers ("Original Equipment Manufacturers" or "OEMs") were less likely to participate in smaller scale programs that did not include an incentive for customers to purchase batteries. However, by the end of Phase One, there seemed to be less reluctance by OEMs to participate in smaller scale programs as long as there is an adequate pay-for performance incentive for customers to participate.
- For best results, participating battery systems should be allowed to recharge for a day after an event before the next event is called.
- Participating battery systems provided 4.7kW reduction on average during the events.
- Battery systems can be a reliable resource for load reduction during peak demand periods.

A more detailed review of the BESS pilot program for PY13, including a budget breakdown, has been included with this filing as Exhibits 1 and 2.

PILOT PROGRAM—PROPOSED PHASE TWO

VII.

Pursuant to Council Resolution R-22-483, ENO engaged with EnergyHub, the current third-party DERMS[2] platform provider for the Energy Smart Residential Bring Your Own

[2] "DERMS" stands for Distributed Energy Resource Management System.

Thermostat Demand Response program, to review the solar battery programs they are currently implementing for other utilities across the United States and to discuss the lessons learned from the Company's own BYOB pilot. Over the last two years, EnergyHub has positioned itself as a leader in the residential and small commercial BESS utility program space. As such, one of the ideas that emerged from that effort was to expand upon the initial BYOB pilot and propose a Phase Two of the BESS pilot with EnergyHub, given EnergyHub's relationships with many OEMs. EnergyHub's current battery integrations include, but are not limited to, Tesla, Enphase, Generac, Sonnen, Sunpower, and Solar Edge, with additional battery models continuing to be integrated.

VIII.

If approved, Phase Two of the BESS pilot would be implemented during PY14 of Energy Smart during 2024. Phase Two would allow residential and small commercial customers with existing solar-connected smart battery systems or newly installed systems to receive an incentive in exchange for enrolling and participating in demand response events. The expanded program would target up to 140 customers (125 residential customers and 15 small commercial customers, presumably including the 17 customers who participated in Phase One) and would be filled on a first come, first served basis. ENO estimates the current number of its customers with solar connected BESS at approximately 250.

IX.

By partnering with EnergyHub directly to provide a turnkey solution, ENO anticipates that previous challenges associated with OEM integration can be overcome, allowing for greater market participation. A detailed description of Phase Two has been included with this Application as Exhibit 3. Phase Two of the pilot would benefit participating customers, further increase ENO's understanding of solar connected BESS, and provide more tangible results regarding performance metrics of the program.

X.

The anticipated cost of Phase Two is shown in the table below:

Program Costs	$	227,000
EM&V	$	9,466
Total	$	236,466

The anticipated effect of Phase Two on a typical residential customer's and small commercial customer's monthly bill is approximately $0.08 and $0.77, respectively through the Energy Efficiency Cost Recovery ("EECR") Rider. Historically, the Energy Smart program has operated below the approved budget for each program year. As such, it is possible that the typical residential customer's bill will be affected by less than the aforementioned amount. Given that the pilot is a demand response offering, the Lost Contribution to Fixed Costs, as calculated in Energy Smart filings, should be negligible. The projected Total Resource Cost ("TRC") score for Phase Two of the pilot is 0.3.

XI.

In response to the portion of Resolution R-22-483 requesting input on allowing customers to export battery power to the grid during normal conditions as a way to increase incentives and promote battery storage adoption, it is important to note that all BESS participating in the pilot program will be paired with solar photovoltaic ("PV") so that the batteries can be charged, and the solar PV system can operate, during an outage. Under the Council's current net metering policy, there is nothing that precludes a customer from exporting energy stored in a battery system and receiving a 1:1 retail credit, as they would for any excess energy kWh produced by their solar panels and exported to the grid. While there is no way for ENO to determine whether a kWh that is exported to the grid came from a solar PV system or was stored in a BESS, from an economic perspective there would be little reason to export energy from a battery to the grid during normal conditions because (1) the remuneration for that energy would still be a 1:1 full retail rate credit and (2) there are technical losses inherent in the use of a battery storage system (meaning 1 kWh that goes into the battery is < 1 kWh coming out).

PILOT PROGRAM—PHASE THREE
(TO BE CONSIDERED FOR SUBSEQUENT PROPOSAL)

XII.

Based on the experience from Phase One and feedback from EnergyHub described above, the Company anticipates that up-front utility incentives may be necessary to spur broader adoption of battery systems among residential customers (including low-to-moderate income ("LMI") customers) and small commercial customers. When pairing upfront incentives with the currently available 30% federal investment tax credit, the cost barrier associated with solar plus BESS may become sufficiently reduced to support an uptick in BESS adoption for both new net energy metered ("NEM") systems and the retrofit of existing NEM systems to add BESS. Thus far, ENO does not see an effective path forward for encouraging multi-family adoption due to the nature of multi-metered electrical systems and the limited roof space at most multifamily facilities to support solar paired BESS for long term resiliency benefits. The Company will further consider ways to expand the BESS program to multi-family and LMI housing customers in a subsequent Phase Three.

PRAYER FOR RELIEF

WHEREFORE, the Company respectfully requests that this Council issue a Resolution:

1. Acknowledging receipt of the Report on Phase One of the BESS Pilot Program;

2. Approving the Company's proposal for Phase Two of the Battery Storage Demand Response Pilot Program for implementation during Energy Smart Program Year 14;
3. Approving EnergyHub as the Phase Two program implementer;
4. Approving recovery of the cost of Phase Two of the pilot through Rider EECR; and
5. Granting all other general and equitable relief that the law and the nature of this proceeding may permit.

Respectfully submitted,

By: ______________________

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ATTORNEYS FOR
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CERTIFICATE OF SERVICE
Docket No. UD-22-03

I hereby certify that I have served the required number of copies of the foregoing report upon all other known parties of this proceeding, by the following: electronic mail, facsimile, overnight mail, hand delivery, and/or United States Postal Service, postage prepaid.

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New Orleans, Louisiana, this 1st day of December 2023.

Lacresha D. Wilkerson

Exhibit One

ENO 2023 Residential Battery Energy Storage Pilot

1. Description

Following approval of the program in Council Resolution No. R-22-483, the Residential Battery Pilot commenced on April 1, 2023, and ran through the summer season ending September 30, 2023. The program included a limit of eight total events per customer over the season. The target audience was residential customers who had already purchased, or planned to purchase in the near term, a residential battery storage solution as part of their home solar photovoltaic (PV) system. The incentives were designed to encourage participation in the battery storage demand response program, not influence battery storage adoption or convert a PV system customer into a PV + battery storage customer.

The objective of the pilot was to provide an opportunity for ENO to gain direct experience on evaluating the potential grid benefits of distributed battery resources and their relative performance when called upon during a demand response event. The pilot also provided the opportunity for ENO to gauge customer interest and feedback on their willingness to participate in a utility sponsored, customer sited, DR program.

2. Customer Enrollment and Participation

Starting in the first quarter of 2023, Honeywell marketed the program to residents, manufacturers, and installers. Prior to the event season commencing an email was sent, and a physical postcard was mailed to all qualifying battery customers. This was followed up by another letter mailed to any remaining qualified households. Those customers with an Enphase battery who had not already enrolled also received direct Enphase-branded email marketing. A referral incentive was available for customers and trade allies but this incentive was not utilized by anyone.

Over the course of the summer season, the Pilot program enrolled a total of 17 residential customers and concluded after the final event on September 29, 2023. There were ongoing challenges in the area with some of the local installation contractors. Multiple contractors have gone out of business, did not complete the installation or had issues with operation post-installation. In these circumstances, Honeywell worked with the contractor community to refer customers to an alternate contractor to allow for participation in the program.

ENO called ten demand response events this pilot season. The demand shed strategy was for maximum output until the customer reached a 20% state of charge. The actual discharge level was based on the individual battery capacity.

Generally, all customers enrolled at the time each event was called participated, with a few exceptions. For the event on 6/15, a system setting (Storm Guard Override) caused six customers to opt out and was subsequently corrected to prevent the issue from recurring. For the last two events on 9/27 and 9/29, customers who had reached the program cap of eight events were excluded. Demand shed strategy was for maximum output until the customer reached a 20% state of charge. The actual discharge level was based on the individual battery capacity.

2023 BESS Event Summary

Event number	Event Start Time	Duration	Systems Scheduled	VPPs selected	Scheduled Power (kW)	Scheduled Energy (kWh)	Average Power (kW)	Total Energy (kWh)	Systems Participated
1	6/13/2023 16:00	3 hr	10	All Systems	61.44	145.15	43.29	129.86	10
2	6/15/2023 16:00	2 hr	10	All Systems	61.44	122.88	20.12*	40.25*	10
3	6/29/2023 16:00	2 hr	11	All Systems	65.28	130.56	63.15	126.30	11
4	8/1/2023 17:00	2 hr	11	All Systems	65.28	130.56	61.63	123.26	11
5	8/4/2023 16:00	2 hr	14	All Systems	88.32	176.64	86.36	172.72	14
6	8/8/2023 16:00	2 hr	14	All Systems	88.32	176.64	76.75	153.49	14
7	8/15/2023 16:00	2 hr	15	All Systems	92.16	184.32	71.94	143.87	15
8	8/23/2023 16:00	2 hr	15	All Systems	92.16	184.32	76.16	152.31	15
9	9/27/2023 16:00	2 hr	13	VPP 27 Sept	80.64	161.28	72.39	144.77	13
10	9/29/2023 16:00	2 hr	8	VPP 28 Sept	46.08	92.16	41.85	83.70	8

*StormGuard feature forced sites to automatically opt out. A software update corrected the problem.

Resident Event Performance

Site Number	Event Day June 13	Event Day June 15	Event Day June 29	Event Day Aug 1	Event Day Aug 4	Event Day Aug 8	Event Day Aug 15	Event Day Aug 23	Event Day Sept 27	Event Day Sept 29	Total Season kW	Events Paricipated
1	2.08	2.359	3.718	3.068	2.351	0.208	3.641	3.018			20.443	8
2	5.973	7.309	7.291	7.331	7.399	7.459	7.272	7.3			57.334	8
3	8.865	0	11.196	11.193	11.171	11.208	11.239	11.18	11.246		87.298	8
4	5.645	7.519	7.328	7.32	7.338	7.231	7.364	7.291			57.036	8
5	2.795	2.937	3.784	3.042	3.705	1.976	2.897	3.598			24.734	8
6	2.981	0	3.732	3.734	3.738	3.436	3.726	3.687	3.736		28.77	8
7	5.993	0	7.485	7.448	7.475	7.449	7.484	7.467	7.524		58.325	8
8	0.309	0	3.724	3.736	3.734	3.745	3.71	3.721	3.77		26.449	8
9			3.687	3.734	3.716	3.682	3.681	3.699	3.054	3.708	28.961	8
10	5.775	0	7.495	7.502	7.489	7.502	7.481	7.479	7.497		58.22	8
11	2.87	0	3.709	3.523	3.55	0.411	0.439	0.425	3.708	3.752	22.387	8
12					3.67	3.692	3.715	3.71	3.724	3.76	22.271	6
13					13.562	11.26	1.122	5.723	10.319	10.686	52.672	6
14					7.463	7.487	7.784	7.459	7.464	6.692	44.349	6
15							0.381	0.399	2.202	3.771	6.753	4
16									4.416	5.714	10.13	2
17									3.725	3.766	7.491	2
Systems Participated	10	10	11	11	14	14	15	15	13	8		
Average Power kW	43.286	20.124	63.149	61.631	86.361	76.746	71.936	76.156	72.385	41.849		

3. Key Takeaways—Program Performance

- Consistent and reliable participation among program participants. No voluntary opt-outs.
- No other demand response program has this level of consistent and predictable demand shed.
- Incentive levels were sufficient to drive customer adoption.
- Safeguards in-place ensured customer confidence of system emergency availability.

4. Conclusion

Though limited in scope and duration, the program proved to be a reliable way to shed customer load. It was observed that events lasting longer than two hours resulted in diminished returns and few battery systems were able to participate for the entire three-hour event. An alternative shed strategy could be considered that would lower the discharge rate to ensure even performance across the entire event timeline. Feedback from participating customers was positive and incentives proved to be attractive enough to encourage enrollment and participation.

One barrier to achieving the goal of 30 customer enrollments was the difficulty in securing major OEM participation in the pilot program. Some OEM's indicated the program was too small and short in duration to invest the necessary resources that would allow their customers to participate. Feedback received from manufacturers was that extending program length, increasing the number of customer enrollments allowed, and providing upfront incentives to assist with purchase and installation of a system could yield greater participation.

Recent federal legislation provides additional tax credits for battery storage adoption. This, combined with the increased number of manufacturers, reductions in system cost, and a longer-term utility storage program, could help spur additional system installations and greater participation in subsequent battery storage demand response programs, which would in turn enhance resiliency and provide needed grid stability throughout New Orleans.

EXHIBIT 2 - PY13 BATTERY ENERGY STORAGE SOLUTIONS PILOT EVALUATION MEMO

SUBMITTED TO: ENTERGY NEW ORLEANS

SUBMITTED DATE: DECEMBER 1, 2023

SUBMITTED BY: ADM ASSOCIATES, INC.

ACRONYMS/ABBREVIATIONS

Table 1 Commonly Used Acronyms and Abbreviations

Acronym	Term
EM&V	Evaluation, Measurement, and Verification
EUL	Estimated Useful Life
FR	Free-rider
kW	Kilowatt
kWh	Kilowatt-hour
M&V	Measurement and verification
NEB	Non-Energy Benefit
MW	Megawatt
MWh	Megawatt-hour
NTG	Net-to-Gross
PY	Program Year
QA	Quality Assurance
QC	Quality Control
SO	Spillover
TRM	Technical Reference Manual

SAVINGS TYPES

Table 2 Types of Savings Referenced in this Evaluation Report

Savings Types	Definition
Energy Savings (kWh)	The change in energy (kWh) consumption that results directly from program-related actions taken by participants in a program.
Demand Reductions (kW)	The time rate of energy flow. Demand usually refers to electric power measured in kW (equals kWh/h) but can also refer to natural gas, usually as Btu/hr., kBtu/hr., therms/day, etc.
Other Fuels (Natural Gas & Propane)	Other fuel savings, such as propane and natural gas, which are estimated based on dual fuel savings that are not incentivized by the utility that participated in the project.
Water (Gallons)	Water savings that are reported in association with the installation of water saving devices.
Expected / Ex Ante Gross	Latin for "from something done beforehand" gross savings. The change in energy consumption and/or peak demand that results directly from program-related actions taken by participants in a program, regardless of why they participated.
Verified / Ex Post Gross	Latin for "from something done afterward" gross savings. The energy and peak demand savings estimates reported by the evaluators after the gross impact evaluation and associated M&V efforts have been completed.
Net / Ex Post Net	The energy and peak demand savings estimates reported by the evaluators after application of the results of the net impact evaluation. Typically calculated by multiplying the ex post gross savings by a NTG ratio.
Annual Savings	Energy and demand savings expressed on an annual basis, or the amount of energy and/or peak demand a measure or program can be expected to save over the course of a typical year. The New Orleans TRM provides algorithms and assumptions to calculate annual savings and are based on the sum of the annual savings estimates of installed measures or behavior change.
Lifetime Savings	Energy savings (kWh) expressed in terms of the total expected savings over the useful life of the measure. Typically calculated by multiplying the annual savings of a measure by its EUL. The TRC Test uses savings from the full lifetime of a measure to calculate the cost-effectiveness of programs.

1 PROGRAM OVERVIEW

The residential Battery Energy Storage System (BESS) pilot offering allowed customers to earn an incentive for enrollment and by participating in peak demand events. During these events, Entergy New Orleans, LLC (ENO) accessed stored energy from a home battery system to help provide more reliable power to the grid. The program allowed customers the ability to opt out without penalties. Participation was free with an eligible battery system. The program was limited to the first 30 customers who enrolled and met system qualifications. Customers qualified if they had a compatible solar photovoltaic system-connected BESS.

Customers received a one-time enrollment incentive of $300 and annual participation incentive of up to $250 based on the ratio of actual participation in up to 8 peak demand events.

The program was first introduced in Program Year 13 (PY13), or 2023.

2 PROGRAM SUMMARY

The tables below report ex ante gross, ex post gross, ex post net energy savings (kWh) (both annual and lifetime), demand reductions (kW), participation, incentive spend, and ex post net NEBs, by measure, where applicable.

Table 3 PY13 Residential Battery Pilot Energy Savings (kWh)

Measure	Ex ante Gross Savings (kWh)	Realization Rate (kWh)	Ex post Gross Savings (kWh)	NTG	Ex post Net Savings (kWh)
BESS pilot	0	N/A	0	N/A	0
Total	0	N/A	0	N/A	0

Sums may differ due to rounding.

Table 4 PY13 Residential Battery Pilot Demand Reductions (kW)

Measure	Ex ante Gross Demand (kW)	Realization Rate (kW)	Ex post Gross Demand (kW)	NTG	Ex post Net Demand (kW)
BESS pilot	86.21	N/A	80.27	100%	80.27
Total	86.21	N/A	80.27	100%	80.27

Sums may differ due to rounding.

Table 5 PY13 Residential Battery Pilot Lifetime Savings Summary

Measure	EUL	Ex post Gross Lifetime Energy Savings (kWh)	Ex post Net Lifetime Energy Savings (kWh)
BESS pilot	1	0	0
Total	1	0	0

Sums may differ due to rounding.

Table 6 PY13 Residential Battery Pilot Participation and Incentive Summary

Measure	Participation (Count of Measures)	Incentive Spend ($)
BESS pilot	17	$8,725.00
Total	17	$8,725.00

Sums may differ due to rounding.

Table 7 PY13 Residential Battery Pilot NEB Summary

Measure	Ex post Net ARCs ($)	Ex post Net Water Savings (gallons)	Ex post Net Avoided Arrearages
BESS pilot	$0	0	$0
Total	$0	0	$0

Sums may differ due to rounding.

3 EM&V METHODOLOGY

The Evaluators employed the following approaches to complete impact evaluation activities for the program.

- Method 1: MISO Calculated Baseline using Interval (AMI) Data
- Method 2: Comparison of Battery Discharge Amounts on Event and Baseline Days Using Sampled Telemetry Data

The first approach allowed the Evaluators to estimate peak demand impacts from batteries discharged during demand response events because the AMI data contained all imported and exported kWh values and included kWh from battery discharge to the grid.

A list of advantages and disadvantages for each method is shown in the table below.

Table 8 EMV Method Advantages and Disadvantages

Method	Advantages	Disadvantages
1) Interval (AMI) Data	▪ Accounts for any potential behavioral changes due to the demand response events. ▪ Utilizes a census of demand response event days and times.	▪ Missing interval data for one customer. ▪ Potentially introduces noise from consumption and solar generation unrelated to battery discharge. ▪ Small Pilot size of 17 customers makes assigning the correct MISO baseline more difficult due to greater usage variation.
2) Telemetry Data from Portal	▪ Does not introduce noise from unrelated solar generation and consumption data into the estimates.	▪ Sampling telemetry data introduces some uncertainty by not accounting for all demand response event days and time. ▪ Does not account for potential behavioral changes due to the demand response events.

For Method 1, the Evaluator followed the Calculated Baseline approach outlined in the Midcontinent Independent System Operator, Inc. (MISO) Business Practices Manual (BPM)[1]. The following impact evaluation steps were taken to determine the suitability of the MISO Calculated Baseline approach:

- Developed an Unadjusted Consumption (UC) Baseline, a Symmetric Multiplicative Adjustment (SMA) Baseline, and a Weather Sensitive Adjustment (WSA) Baseline for each program participant. Loads were calculated utilizing hourly AMI data.
- Determined days that will serve as proxy days for testing the suitability of the baseline approach. Proxy days represent days like demand response event days in terms of load shape and temperature profiles.
- Estimated bias (uncertainty) and error on proxy days for each model to assess baseline performance. Bias is assessed by examining the average percent error of the baseline predictions relative to the actual usage on proxy days. In a similar manner, error is assessed through various metrics such as Root Mean Squared Error (RRMSE) using baseline predictions and actual usage on proxy days.
- Selected the baseline model with the lowest absolute bias.

3.1 Gross Impact Methodologies

For most demand response programs, energy savings are estimated by comparing a participant's load shape during a demand response event with a baseline load shape. This baseline load is assumed to be a good estimate of the counterfactual load—that is, the load that would have manifested had there not been an event called that day. The Evaluators initially believed the interval AMI data would not include kWh amounts from battery discharge to the grid, and this would have prevented solely using AMI data to analyze peak load impacts. However, the Evaluators compared imported and exported kWh values with participant telemetry data provided via the implementer portal and determined that the AMI interval data accounted for kWh from battery discharge to the grid, as well as all kWh imported or exported to the grid (e.g., exported solar kWh, or imported battery charging kWh). Therefore, the Evaluators were successful in utilizing AMI data to estimate peak load impacts and constructed net kWh values for each participant by taking the difference between imported and exported kWh values.

The following equation defines the net kWh utilized to estimate peak load impacts for Method 1.

$$Net\ kWh_{it} = Imported\ kWh_{it} - Exported\ kWh_{it}$$

For Method 2, the Evaluators compared battery discharge amounts on event and baseline days during event hours to determine the peak load reduction. Telemetry data could not be downloaded for the analysis, however, a portal from Enphase was available which provided 15-minute values of battery charge/discharge kW for all participants during the summer. The Evaluators sampled participant discharge data during event hours on event and baseline days to hit 90/10 confidence and precision. Baseline days were selected as the first non-event, non-holiday weekday prior to the peak demand event.

[1] MISO Demand Response Business Practices Manual: BPM-026.

3.1.1 DATA SOURCES

Data used for this evaluation include the following:

- 15-minute interval meter data (AMI) for each participant.
- A full schedule of DR program events for each participant, including the date and time of the event and which customers participated in the event.
- Program tracking data that identifies which customers participated in the program.
- An implementer portal with 15-minute charge/discharge kW amounts for each participant during the summer.

3.1.2 MISO CALCULATED BASELINE APPROACH (CUSTOMER BASELINES)

The following details the general requirements for the MISO Calculated Baseline Approach. The Evaluators developed Customer Baselines (CBLs) in accordance with this approach. For a demand resource, the Consumption Baseline is a profile of hourly demand based on an averaged sample of historical data which may be adjusted for factors that reflect specific, on-the-day conditions, such as temperature.

The default consumption baseline is designed as follows:

- Separate hourly demand profiles for non-holiday weekdays and for weekends/holidays
- The “weekday” hourly profile is based on the average of the ten (10), but not less than five (5), most recent weekdays that are not holidays or other non-standard “event” days
- The “weekend/holiday” hourly profile is based on the average of the four (4), but not less than two (2), most recent weekend days or holidays that are not “event” days
- An “event” day is one during which there was, for the resource in question, a real- time energy or ancillary services dispatch, or a scheduled outage
- The maximum look-back window is limited to 45 days; and
- If the 45-day window contains insufficient days to meet the minimum number of days described above, the profiles are constructed based on the available days within the 45-day window that qualify, supplemented by the largest (MW) matching “event” day(s) values for that resource within that same window as necessary to obtain the minimum number of values.

Adjustment mechanisms to the default Consumption Baseline include:

- Symmetric Multiplicative Adjustment (SMA)
  - Adjusts each baseline hourly value (MW) during the event up or down by the ratio of
  - (a) the sum of hourly demands for the three hours beginning four hours prior to the event and (b) the sum of those same three hourly baseline demands
  - The adjustment is limited to a change in any individual baseline hour of plus or minus 20 percent.
  - If multiple events occur during the same day, the SMA is calculated only for the first event, but applied to all events that day.
- Weather Sensitive Adjustment (WSA)
  - Adjusts each baseline hourly value (MW) up or down by a Weather Adjustment Factor

- o The Weather Adjustment Factor is determined by a mathematical relationship derived through a regression analysis that considers the DRR load and historical hourly temperature data.

3.1.3 EVALUATORS MISO MODELS

The following CBL models were developed for each customer in accordance with MISO protocols.

For a 10-of-10 (or 5-of-5) unadjusted baseline, the Evaluators examine the load data from the most recent ten (or five) non-event, non-holiday weekdays relative to the event day and calculate the mean demand usage values of the five highest load days. This baseline is then adjusted for the SMA and WSA models utilizing the method described in Section 3.1.2.

Table 9 Evaluators' MISO CBL Models

Model Type	Baseline Days	SMA	WSA
Unadjusted	10-of-10	No	No
SMA-Adjusted	10-of-10	Yes	No
WSA-Adjusted	10-of-10	No	Yes
Unadjusted	5-of-5	No	No
SMA-Adjusted	5-of-5	Yes	No
WSA-Adjusted	5-of-5	No	Yes

3.1.4 BASELINE AND PROXY DAY DEVELOPMENT

The Evaluators defined proxy days as non-event, non-holiday, non-weekend days which display average temperature (F), maximum temperature (F), and Cooling Degree Days (CDD) that fall within the range of corresponding values seen on demand response event days. The Evaluators used these defined proxy days to determine the ability of CBL models to predict actual usage for each customer.

3.2 Net Impact Methodologies

In demand response programs, it is typically assumed that there are neither spillover nor free-ridership effects (customers are not expected to curtail without participating). Although customers can find workarounds to make up for lost productivity due to demand response events, they are compensated only if they reduce their load during the peak demand window, the primary program goal. As such, the net-to-gross ratio for this program is assumed to be 100%.

4 EVALUATION FINDINGS

The results of the impact evaluation for Method 1 (AMI) and Method 2 (Sampled Telemetry) are provided in the following sections.

A list of demand response event dates and times are shown in the table below.

Table 10 Event Dates and Times

Event Dates	Event Times (CDT)
6/13/2023	1600-1900
6/15/2023	1600-1800
6/29/2023	1600-1800
8/1/2023	1700-1900
8/4/2023	1600-1800
8/8/2023	1600-1800
8/15/2023	1600-1800
8/23/2023	1600-1800
9/27/2023	1600-1800
9/29/2023	1600-1800

4.1 EM&V Method 1 (AMI) Impact Results

EM&V Method 1 used interval data and allowed the Evaluators to estimate peak demand impacts from batteries discharged during demand response events because the AMI data contained all imported and exported kWh values. Critically, these values included kWh from battery discharge to the grid. In addition, exported kWh values account for any solar output sent to the grid while imported kWh accounts for recharging batteries after demand response events[2].

Imported kWh values were positive when the customer was receiving energy from the grid, while exported kWh values were positive when the customer was providing kWh to the grid. In general, participants were either importing or exporting during a given interval, such that imported kWh was positive and exported kWh was zero or vice versa, however, because intervals spanned 15 minutes, it was possible for a participant to have positive values for both imported and exported kWh values during a given interval.

[2] All import and export values are in aggregate such that the Evaluators cannot determine individual contributions from consumption, solar generation, or battery charge and discharge.

4.1.1 LOAD SHAPES AND MODEL PERFORMANCE

The figures below provide average load shapes for each program on average proxy days and event days and depict actual kW and baseline kW for the selected baseline model for EM&V Method 1. The figures show that baseline kW is a good match for actual kW during the hours of curtailment on the average proxy day. The Evaluators utilized 64 proxy days due to the small number of participants and the variability of participant loads[3].

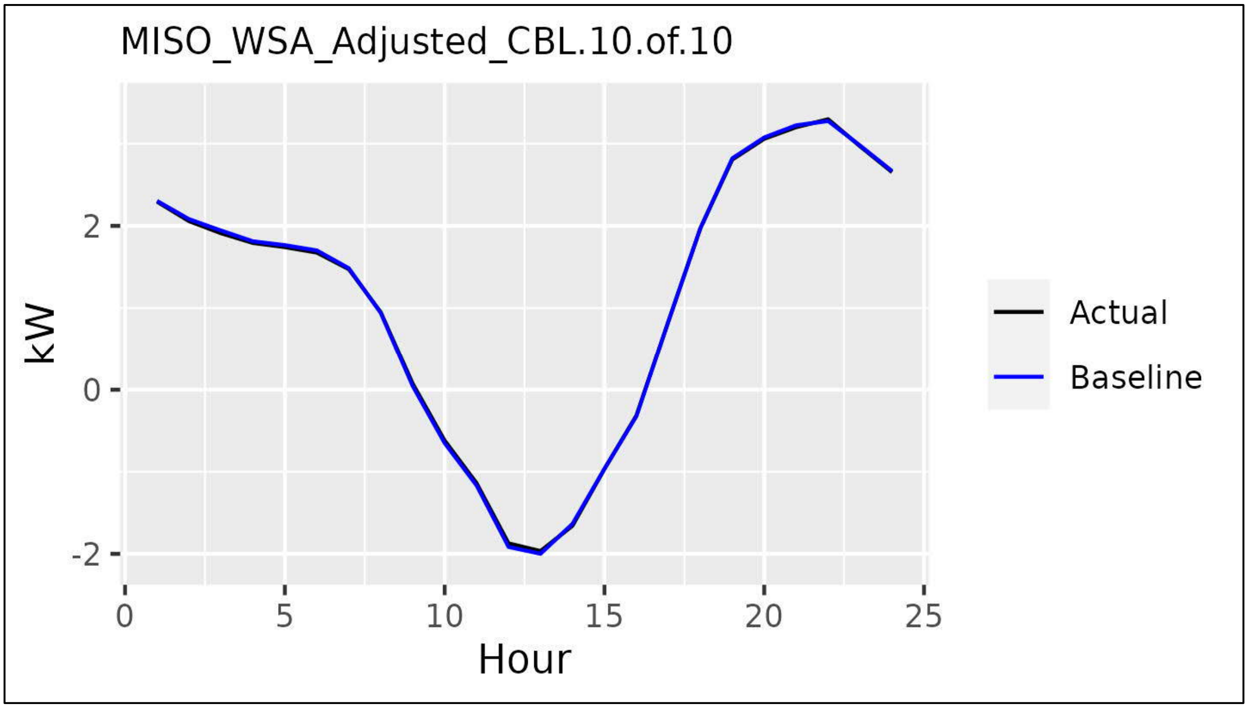

Figure 1 Residential Battery Pilot Average Proxy Day Load Shape

[3] All participants had solar generation which results in more variable net consumption, all else equal. In addition, solar generation lowers net consumption during daylight hours which has an impact on bias calculations by bringing net consumption closer to zero.

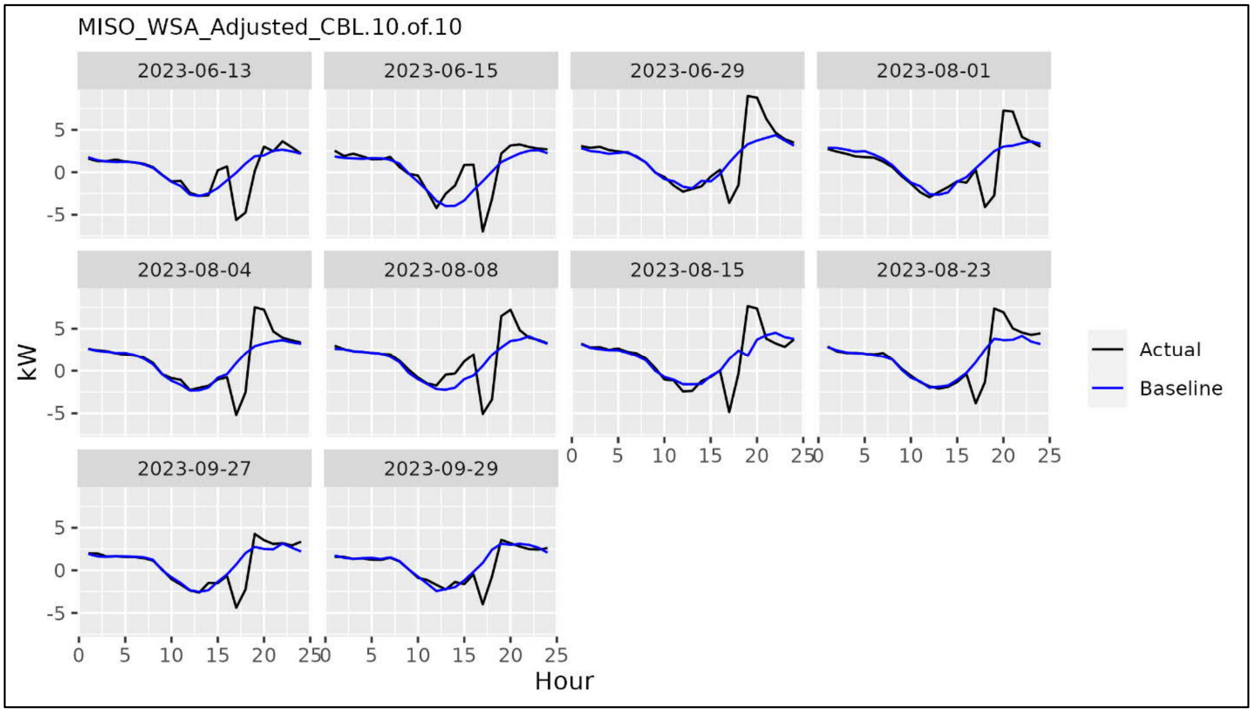

Figure 2 Residential Battery Pilot Event Day Load Shapes

The Evaluators estimated bias and error for the Evaluators MISO models for all participants and when applied on a site-specific basis and selected for the model with the lowest bias. As shown in the table below, the MISO WSA Adjusted CBL 10-of-10 model performed the best and had the lowest bias and error for the Residential Battery Pilot program.

Table 11 Model Fit and Bias

Model	Follow MISO Protocols	RRMSE	RMSE	Bias	Selected Model
MISO_WSA_Adjusted_CBL.10.of.10	X	0.015	0.013	0.37%	X
MISO_SMA_Adjusted_CBL.10.of.10	X	0.072	0.059	-0.49%	
MISO_SMA_Adjusted_CBL.5.of.5	X	0.049	0.040	-0.65%	
MISO_Unadjusted_CBL.10.of.10	X	0.017	0.014	0.74%	
MISO_WSA_Adjusted_CBL.5.of.5	X	0.018	0.015	0.79%	
MISO_Unadjusted_CBL.5.of.5	X	0.014	0.011	0.94%	

4.1.2 IMPACT FINDINGS

Using results from the CBLs, the Evaluators calculated the PY13 kW reduction for EM&V Method 1. Results are shown below in the table below.

Table 12 Total Gross Residential Battery Pilot Demand Reductions

Ex Ante Average Savings per Event per Participant	Number of Participants	Ex Ante Total Program kW Reduction	Average Savings per Event per Participant (kW)	Total Program kW Reduction	Realization Rate
5.071	17	86.21	4.722	80.27	93%

4.2 EM&V Method 2 (Sampled Telemetry) Impact Results

For Method 2, the implementer portal contained telemetry data for all participants from which the Evaluators sampled discharge values. The values from the portal were not available to download which prevented a census of participants and event days from being utilized. However, the portal provided individual participant 15-minute interval data with separate kW values for battery discharge, battery charging, and other values related to solar generation and consumption. The Evaluators sampled the portal telemetry discharge data on event and baseline days to hit 7% precision with 90% confidence.

4.2.1 IMPACT FINDINGS

Using the sampled telemetry data and EM&V Method 2, the Evaluators found a realization rate of 93%. The Evaluators calculated the PY13 kW reduction by applying the realization rate to the average ex-ante savings per event per participant (kW). Results are shown below in the table below.

Table 13 Total Gross Residential Battery Pilot Demand Reductions

Ex Ante Average Savings per Event per Participant	Number of Participants	Ex Ante Total Program kW Reduction	Average Savings per Event per Participant (kW)	Total Program kW Reduction	Realization Rate
5.071	17	86.21	4.716	80.17	93%

4.3 Gross Impact Findings

Using results from EM&V Method 1, the Evaluators calculated the PY13 kW reduction. Results are shown below in the table below.

Table 14 Total Gross Residential Battery Pilot Demand Reductions

Ex Ante Average Savings per Event per Participant	Number of Participants	Ex Ante Total Program kW Reduction	Average Savings per Event per Participant (kW)	Total Program kW Reduction	Realization Rate
5.071	17	86.21	4.722	80.27	93%

The overall verified kW reduction is 80.27 kW.

4.4 Net Impact Findings

For demand response programs, net savings equals gross savings.

Table 15 Total Residential Battery Pilot Net Demand Reduction Results

Gross kW Reduction	Net-to-Gross Ratio	Net Demand Reduction
80.27	100%	80.27

4.5 NON-ENERGY Benefits Findings

There were no NEBs identified in this program.

4.6 Process Findings

There were no process evaluation activities or findings.

5 DATA TRACKING REVIEW

The Evaluators reviewed the advanced metering infrastructure (AMI) data that was provided and found that 16 out of 17 participants had complete AMI data for the summer demand response period. One participant did not appear in the AMI data.

The Evaluators determined that the AMI data was sufficient to analyze program impacts because it contained all imported and exported kWh values, including from battery discharge to the grid, solar generation provided to the grid, imported energy from the grid, etc...

Telemetry battery discharge data was not provided or available for download which prevented analyzing discharge data for all participants on all demand response events. However, the Evaluators were provided with an implementer portal that showed 15-minute usage kW values which permitted sampling of telemetry data.

6 KEY FINDINGS AND CONCLUSIONS

The following are key findings from the PY13 Evaluation of the BESS pilot.

- The Evaluators were successful in utilizing interval AMI data to evaluate impacts because the interval data included all battery discharge and charging kWh amounts, as well as any imported or exported kWh quantities.
- By examining changes in net kW, EM&V Method 1 accounts for any behavioral changes in customer usage due to the demand response events, while EM&V Method 2 only captures the net change of battery discharge. Because both EM&V methods produce very similar estimates of kW impacts, this suggests the demand response events did not have any net impact on customer behaviors.
- Batteries are charged immediately following demand response events.
- 7 out of 17 participants discharge their batteries outside of demand response events, therefore, any baseline must account for routine battery discharge (both EM&V methods account for routine battery discharge).

- The first demand response event had an issue (a Storm Guard setting) that did not allow participation for 6 customers. Subsequent events did not have any issues affecting customer participation. Failed curtailment signals can have an adverse impact on demand response program performance and would affect program impact calculations in future program years.

7 RECOMMENDATIONS

The following are recommendations from the PY13 Mid-Year Evaluation of the BESS pilot.

- The Evaluators recommend working with Enphase to obtain complete telemetry data for EM&V. This will ensure that peak demand impacts can be measured for a census of demand response events and participants in the absence of interval AMI data containing import and export kWh values.

EXHIBIT THREE

EnergyHub

The grid edge management solution for utilities

Entergy New Orleans
Proposed Battery DR Program

Submitted by:
EnergyHub, Inc.

EnergyHub overview

Acting as the technical and business link between utilities and connected device providers, EnergyHub provides utility clients with access to a variety of DER categories and providers for monitoring and control. Since 2012, EnergyHub has deployed over 65 BYOD programs across the country, representing a portfolio of over 1 million DERs under management. This portfolio is enabled by a robust set of DER integrations and proven customer acquisition strategies that ensure our clients meet their program enrollment goals. EnergyHub's turnkey BYOD offering can be deployed as a stand-alone solution and includes DER partner contracting and management, program marketing and enrollment, ongoing program management, and reporting and M&V support. Notably, EnergyHub is the DERMS provider for some of the nation's largest battery energy storage programs in the country, including ConnectedSolutions and Energy Storage Solutions in New England. Utility clients using the DERMS to manage battery programs include APS, Cape Light Compact, Eversource, National Grid, PSEG Long Island, and many more, as illustrated below.

Scope and program design

Category	Details
Timeline	Phase 2 will run calendar year 2024, pending regulatory approval. Demand Response season will be May- Sept 2024.
Partner management	EnergyHub contracts directly with device manufacturers, manages partner relationships, and coordinates all partner activity. Proposed Battery partners include but are not limited to: Tesla, Enphase, Sunrun, Sonnen, Generac, SolarEdge, Q-Cells, SunPower, and Panasonic. Note that the final program design and its incentive structure is impactful in determining which battery partners will participate in the program.
Marketing and Outreach	EnergyHub will work with Entergy New Orleans to coordinate marketing the program with support from battery integrators/installers. EnergyHub recommends a marketing strategy focused on two areas: 1) Program-centric marketing to raise awareness of the program; and 2) Partner-centric marketing with battery providers to deliver enrollments from the installed device base and drive new device sales. EnergyHub will create a standard co-branded marketing program that includes email, web, and partner in-app marketing. This strategy leverages device manufacturer and service provider partnerships to target potential BYOD enrollees and will include the establishment of a microsite for the pilot highlighting all eligible battery providers, directing customers to webpages with enrollment instructions. The program will include emails and in-app widget templates (where applicable) designed to drive enrollments and device sales. Customers will be targeted using utility zip codes.

ENO may create further awareness of the program through program marketing such as bill inserts (print and email), bill messages, envelope messages, direct mail, content newsletters, press releases, and customer email communications. EnergyHub can provide marketing design and copy for these assets with a similar look and feel to the partner-centric outbound marketing materials described above.

Customer enrollment

This pilot is targeting 125 residential and 15 Small C&I customers but will enroll as many as budget will allow.

Customer journey: Participating customers agree to program terms and conditions electronically (either in-app or through a dedicated web portal) as part of the online enrollment process.

Customers with an existing BSS will respond to program marketing and apply (including acceptance of program T&Cs) to enroll via their battery provider. The battery provider will submit enrollment information via API for display and processing in EnergyHub's platform. The battery provider uploads customer T&C approval to an EnergyHub-hosted SFTP server or via EnergyHub-hosted API, as applicable.

Customers purchasing a new BSS will follow a similar process, accepting T&Cs and providing enrollment information via the battery provider at the point of sale/installation.

Entergy New Orleans processes applications using the EnergyHub DERMS enrollment module. Once approved in the EnergyHub platform, customer sites are automatically available for DR dispatch.

For ongoing customer engagement, EnergyHub will send pre-season emails with details regarding program participation and customer opt-out instructions. Customers can always opt out of events. Opt-out options are vendor-specific, and include phone, email, or setting the backup reserve of the battery to 100%.

Program administration: The DERMS platform automatically consolidates all customer enrollments into a single interface and serves as the system of record for all DER program enrollments. ENO can access customer enrollment history, review applications, and track and

	report on enrollment status over the life of the program. The DERMS stores all customer and device data for the entire program term.
DR dispatch and management	Entergy New Orleans will use EnergyHub's Mercury platform for program dispatch and management. The platform provides near real-time access to device data, DR dispatch tools, and event reports. Device data includes battery UUID, timestamp, connectivity status, grid connected status, mode, site demand, solar production, and battery energy, power, and state of charge. The EnergyHub DERMS provides a user interface for utility operators to configure, schedule, and execute DR events. The DERMS offers the flexibility to preconfigure events and then adjust event settings on the fly as needed. EnergyHub also has extensive experience and data to inform ENO's program design and control approach, and will help ENO define control strategies that achieve the program's load control goals. DR events called in the DERMS automatically dispatch DERs without action required by the customer. The customer is able to opt out of the event, if desired, at the device itself or in the vendor app or web portal (opt out options are vendor- and device-specific). For batteries, dispatch notice varies by partner capabilities. Some battery partners require 24 hours advance notice for dispatch while others can be dispatched within minutes. Although some batteries are technically capable of dispatch within minutes, best practice is to call events with at least 4-6 hours of notice so that partners can signal for batteries to charge from solar leading up to the event to maximize performance.
Suggested program design	Incentive: Pay-for-performance targeting $2/kWh per kWh delivered. Capped at $600 per enrolled residential customer and $1,800 per enrolled small commercial customer, per season (year). Program Period: Calendar Year 2024 Number of events: Capped at 30 events Event window: Flexible Event notifications: Day-ahead

	Event opt-outs: Maximum 3 Event duration: 1 – 3 hours but actual duration will be impacted by each battery's kW output specifications and state of charge upon dispatch. Approximately 80% of battery capacity is made available for DR dispatch. Program availability: Monday-Friday (non-holidays) Customer eligibility: Entergy New Orleans residential and small C&I customers with a qualifying solar plus storage system and utility-approved interconnection.
Pilot budget and cost effectiveness	• **Program costs:** $227,000 • **EM&V:** $9,466 • **Total costs:** $236,466 • **Total estimated benefits PY 2024:** 53,347 kWh • **Total Resource Cost ratio:** 0.3