Operations Project Authorization Form

Approved at August 1, 2018 EPAC

Link to Meeting Minutes

Date Prepared: 06/27/2018	**Project Title: Key Facility Battery Monitoring**
Company/ies: Eversource CT/WMA	**Project ID Number: TBD**
Organization: Telecommunications Engineering	**Class(es) of Plant: Distribution Substation, System Control**
Project Initiator: [redacted]	**Project Category: System Reliability**
Project Manager: [redacted]	**Project Type: Specific**
Project Sponsor: [redacted]	**Project Purpose: Monitor Batteries (Key Facilities)**
Estimated in service date: 12/31/2018	**If Transmission Project: PTF? N/A**
Eng. /Constr. Resources Budgeted? No	**Capital Investment Part of Original Operating Plan? Yes**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan? No**
Total Request: $591,800	

Financial Requirements:

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

This project for $591.8K will retrofit fourteen battery plants used to provide backup power to Telecom equipment at Key Facilities with a battery monitoring system that will alarm on abnormal conditions and eliminate the manual monthly/quarterly inspections. Currently these sites are manually inspected monthly/quarterly per the Eversource Maintenance Program. This improvement will monitor batteries at Key Facilities for power interruptions, slow progressive failure modes and future maintenance needs of the DC power systems. Cell voltage and temperature, float voltage, individual jar and string voltage, float and ripple current, impedance and thermal runaway will all be monitored at each site location.

The addition of battery monitoring will enhance the reliability of the DC power systems at these fourteen battery installations in Connecticut and Western Massachusetts and eliminate monthly/quarterly inspections. In addition, it will minimize the possibility of DC power loss and failures including battery chargers, battery cells and rectifiers. Fixed sensors will allow more accurate and consistent readings than portable hand held cellcorder battery analyzers and allow field personnel to perform non-intrusive testing without causing a disruption to DC service.

All installations will be completed prior to the end of 2018. Project costs are shown below.

Project Costs Summary

	Prior Authorized	2018	2019	2020	Totals
Capital Additions - Direct	$ -	$ 406.0	$ -	$ -	$ 406.0
Less Customer Contribution	-	-	-	-	-
Removals net of Salvage ____%	-	-	-	-	-
Total - Direct Spending	$ -	$ 406.0	$ -	$ -	$ 406.0
Capital Additions - Indirect	-	173.2	-	-	173.2
Subtotal Request	$ -	579.2	$ -	$ -	579.2
AFUDC	-	12.6	-	-	12.6
Total Capital Request	$ -	$ 591.8	$ -	$ -	$ 591.8
O&M	-	-	-	-	-
Total Request	$ -	$ 591.8	$ -	$ -	$ 591.8

Note: Dollar values are in thousands

Financial Evaluation

Note: Dollar values are in thousands

Direct Capital Costs	2018	2019	2020+	Total
Straight Time Labor	$ 175	$ 0	$ 0	$ 175
Overtime Labor	$ 0	$ 0	$ 0	$ 0
Outside Services	$ 90	$ 0	$ 0	$ 90
Materials	$ 120	$ 0	$ 0	$ 120
Other, including contingency amounts (describe)	$ 21	$ 0	$ 0	$ 21
Total	$ 406	$ 0	$ 0	$ 406

Indirect Capital Costs	2018	2019	2020+	Total
Indirects/Overheads (including benefits)	$ 173.2	$ 0	$ 0	$ 173.2
Capitalized interest or AFUDC, if any	$ 12.6	$ 0	$ 0	$ 12.6
Total	$ 185.8	$ 0	$ 0	$ 185.8

Total Capital Costs	$ 591.8	$ 0	$ 0	$ 591.8
Less Total Customer Contribution	$ 0	$ 0	$ 0	$ 0
Total Capital Project Costs	$ 591.8	$ 0	$ 0	$ 591.8
Total O&M Project Costs	$ 0	$ 0	$ 0	$ 0

Note: Explain unique payment provisions, if applicable

A $21K contingency has been added for vendor labor and material should any unforeseen problems be encountered during installations.

Future Financial Impacts:

Provide below the estimated future costs that will result from the project:
Note: Dollar values are in thousands:

Future Costs	Year 20__	Year 20__	Year20__	Year 20__+	Total Future Project Costs
Capital	$ -	$ -	$ -	$ -	$ -
O&M	-	-	-	-	-
Other	-	-	-	-	-
TOTAL	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Describe the estimated future Capital, O&M and/or Other costs noted above:

What functional area(s) will these future costs be funded in?_____N/A_____
A representative from the respective functional area is required to be included as a project approver.

If this is other than a Reliability Project, please complete the section below;

Provide below the estimated financial benefits that will result from the project:
Note: Dollar values are in thousands:

Future Benefits	Year 20__	Year 20__	Year20__	Year 20__+	Total Future Project Benefits
Capital	$ -	$ -	$ -	$ -	$ -
O&M	-	-	-	-	-
Other	-	-	-	-	-
TOTAL	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Describe the estimated future Capital, O&M and/or Other benefits noted above:

What functional area(s) will these benefits be reflected in?_____N/A _____
A representative from the respective functional area is required to be included as a project approver.

Asset Retirement Obligation (ARO) and/ or Environmental Cleanup Costs (Environmental Liabilities):

Is there an ARO associated with this project? If yes, please provide details: No

Are there other environmental cleanup costs associated with this project? If yes, please provide details: No

Technical Justification:

Project Need Statement

Battery monitoring is needed to enhance the reliability of Eversource's telecommunications at Key Facility locations. This improvement will monitor sites for power interruptions, slow progressive failure modes and future maintenance needs of the DC power systems.

- The addition of battery monitoring will enhance the reliability of fourteen DC power systems at Key Facilities in Connecticut and Western Massachusetts.
- Installing battery monitoring will eliminate the need for monthly/quarterly inspections. Monthly inspections check water levels in flooded batteries. Quarterly inspections consist of voltage and impedance measurements for both Valve-Regulated Lead-Acid (VRLA) and flooded batteries. A visual inspection is also performed during the quarterly inspection.
- Minimize the possibility of DC power loss and failures including battery chargers, batteries cell and rectifiers
- Allows field personnel to perform non-intrusive testing without causing a disruption to DC service
- Obtain more accurate and consistent readings than hand held cellcorder battery analyzers

Project Objectives

Install existing and proven technology to meet the specific needs of Key Facilities in CT and WMA and eliminate the need for monthly/quarterly inspections.

The objectives of the Key Facility Battery Monitoring Project are to monitor the following functions:

- Cell Voltage and Temperature
- Float voltage, individual jar and string voltage
- Float and ripple current
- Ohmic value
- Thermal runaway

Project Scope

The vendor shall provide a complete system for the monitoring of lead acid (Flooded) or valve-regulated lead-acid (VRLA) batteries as defined below. Each system shall consist of a means for monitoring battery voltages, ohmic value (defined as Resistance, Impedance or Conductance), temperature and current. The system shall consist of all the necessary hardware, software, cabling and other components to permit the safe and reliable collection and display of battery data and fault conditions.

Battery vendor shall provide:

- Site specific monitoring design and drawings for each battery type and location
- All necessary hardware, software, cabling and associated components
- Installation of Real Power Alber Systems battery monitoring equipment on fourteen sets of batteries located in CT and WMA

The supplier of the system shall be factory trained, certified and able to provide on-site user training. The training shall commence immediately upon successful installation of the system and shall include such topics as:

- Operation
- Diagnosis
- Trending
- Alarm-status
- Data retrieval
- Interpretation of battery data and use of data to troubleshoot batteries.

EVERSOURCE shall provide:

- Site access for all vendor installations
- Telecom Services support during installation
- Both Substation Technical and Field Communications will be responsible for the monthly health checks, on all monitored battery plants, with enterprise software provided by the manufacturer (IT assistance and cost will be necessary and has been included in this estimate). This function will be tracked and recorded in Cascade with test results attached to each work order.

Background / Justification

Mission-critical services and critical communications facilities require reliable, uninterrupted power. Battery plant must power all communications equipment at the site for at least 8 hours (per NPCC Directory 8). The battery charger is the weak link in most power systems because it powers all the equipment while the batteries sit on a float charge. The batteries and their chargers should be monitored in real time to obtain their rated service life and their longest possible run time. Remote battery monitoring can predict impending battery cell and charger failures and increase site availability.

This same approach is being taken in Eversource Transmission substations. Currently Alber Systems have been installed in 75 of 110 proposed substation locations in Connecticut and Western Massachusetts. New Hampshire has also selected Alber Systems for use in substations

and has completed several installations. In addition, Eastern Massachusetts has chosen to build out with Alber Systems.

Business Process and / or Technical Improvements:

The addition of Real Power Alber Systems battery monitoring to Key Facilities will eliminate monthly/quarterly inspections:

- Flooded batteries require monthly site visits to check the water level of individual cells.
- Quarterly inspections consist of voltage and impedance measurements for both Valve-Regulated Lead-Acid (VRLA) and flooded batteries.
- A visual inspection is also performed during the quarterly inspection for both types of batteries.

Alternatives Considered with Cost Estimates

Real Power Alber was selected because it is the standard being used across Eversource. See Attachment 1 Cost Comparison.

Project Schedule

Milestone/Phase Name		Estimated Completion Date
Purchase Order Issued	Start Date: 9/03/2018	9/07/2018
Vendor to Design and Procure Materials	Start Date: 9/15/2018	10/01/2018
Installations	Start Date: 10/1/2018	12/31/2018

Regulatory Approvals

No regulatory approvals are required.

Risks and Risk Mitigation Plans

No risks have been identified. [redacted] will be the last site scheduled for battery monitoring this year due to the Telecom shelter move currently in progress.

Attachment 1

Alternative Cost Comparison

(Sheet 1 of 1)

Projected cost of installing monitoring on [redacted] of Flooded batteries.

Flooded Sets [redacted]					
Vendor	Hardware	Installation and Training	Software	Total	[redacted]
Phoenix Broadband Technologies	$2,700	$1,500	$540	$4,740	
Real Power, Alber Systems	$9,200	$6,000	N/C	$15,200	
Eagle Eye Solutions	$3,995	$1,350	N/C	$5,345	
BTECH	$9,477	$2,310	N/C	$11,787	

Projected cost of installing monitoring on [redacted] of VRLA batteries.

VRLA Sets [redacted]					
Vendor	Hardware	Installation and Training	Software	Total	[redacted]
Phoenix Broadband Technologies	$2,425	$1,500	$540	$4,465	
Real Power, Alber Systems	$5,200	$4,000	N/C	$9,200	
Eagle Eye Solutions	$5,180	$725	N/C	$5,905	
BTECH	$10,168	$2,310	N/C	$12,478	

"Critical Energy Infrastructure Information – Do Not Distribute"

References

N/A

Attachments (One-Line Diagrams, Images, etc.)

N/A

Project Checklist – Transmission and Substation

INSTRUCTIONS: It is the responsibility of the initiator to contact the area disciplines to determine if the project considerations contained in this list are applicable to their project. They should fill out the checklist and determine a transition plan for the purpose of project execution.

Checklist for Studies and Processes of a Transmission & Substation Capital Project					
Project Name : Key Facility Battery Monitoring					**PAF No: TBD**
Facility Type: ☒ BPS	☒ BES	☒ PTF	☒ non-PTF	☒ CIP	☒ Distribution
PLANNING					
Is a NX-9 required?					No
Is an ISO-NE PAC presentation required?					No
Is a PPA required?					No
Is a TCA Application Required?					No
PLANNING/PROTECTION & CONTROLS					
Are RAS/SPS/UVLs affected?					No
OPERATIONS					
Outage Required?		☐ Primary Equipment (Power Transfer)	☒ Secondary Equipment (P&C only)	☐ Outage Not Required	
Do SCLL Conditions Exist?					No
Has an outage schedule been approved?					Yes
Are Operations & Maintenance procedures/training required?					Yes
STANDARDS					
Does the project include standard equipment and designs?					Yes
SUBSTATION ENGINEERING					
Does this impact Revenue Metering					No
Is preliminary short circuit/ breaker duty analysis required?					No
Are there any changes to the baseline audible noise?					No
Is there an impact to the existing ground grid?					No
Is a Transient Over Voltage (TOV) analysis required?					No
P&C ENGINEERING					
OP-22 - Are PMUs and DDR required?					No
If BPS, is an NPCC Directory #4 presentation required?					No

Checklist for Studies and Processes of a Transmission & Substation Capital Project	
Project Name : Key Facility Battery Monitoring	**PAF No: TBD**
TRANSMISSION LINE ENGINEERING	
Are there any changes that affect the baseline EMF?	No
Are there any changes that affect the baseline EMI?	No
Is there an impact to the existing ground grid?	No
SITING	
Is a Siting filing required?	No
PERMITTING	
Is there any permitting required?	No
Siting & Construction Services (Outreach)	
What is the level of outreach expected?	None
INITIATOR	
Has a field constructability review been completed?	Yes
INVESTMENT RECOVERY	
Does the project require development of an Investment Recovery plan?	No
COST ESTIMATING	
How was the cost estimate prepared?	Other (specify below)
Who prepared the estimate?	[redacted]
Was the estimate reviewed by Eversource Estimating?	No

Cost Estimate Backup Details

Note: Dollar values are in thousands

Key Facility Battery Monitoring CT			
State	Site	Battery Qty.	Dollars
CT	[redacted]	[redacted]	45.5
CT			45.5
CT			45.5
CT			45.5
CT			30.3
CT			30.3
CT			30.3
CT			38
CT			38
CT			75.9
CT			38
CT			38
		Sub Total	500.8

Key Facility Battery Monitoring WMA			
State	Site	Battery Qty.	Dollars
WMA	[redacted]	[redacted]	45.5
WMA			45.5
		Sub Total	91
		Total	591.8

*Estimate is based off of 2017 quote.

Workorder Request Form

INPUT AREA

Operating Company / Year: 2018	CL&P / 2018

NOTE: although very rare, when operating company labor is required for a NUSCO project, all labor should be noted under NUSCO

Project ID: (if unknown, can be obtained from the Project Manager)

Workorder:	

Workorder Title:
Key Facilities Battery Monitoring CT & MA

Workorder Purpose and Description:

Add battery monitoring to Key Facilities in CT & WMA to enhance the reliability of the DC Power System and minimize the possibility of DC power loss and catastrophic failure.

Estimated in-service date:	
Requestor: R. E. Mello	

COST ELEMENT	**Capital**	**Removal**	**Total**
DIRECT COSTS			
L01 - NUSCO Labor	75,000	-	75,000
Operating Company Resources	100,000	-	100,000
L01- Total Labor	**175,000**	**-**	**175,000**
OS0 - Outside Services / Contractor	90,000	-	90,000
M00 - Material/Supplies	120,000	-	120,000
EE0 - Employee Expense		-	-
V00 - Vehicles		-	-
FP0 - Fees/Payments	-	-	-
J00 - Rents/Leases	-	-	-
A01 - Contingency	21,000	-	21,000
Total Directs (excl Labor)	**231,000**	**-**	**231,000**
TOTAL DIRECT COSTS	**406,000**	**-**	**406,000**
INDIRECTS - LOADERS			
ZB - NonProductive NUSCO	13,883	-	13,883
ZB - NonProductive (Operating Co)	18,510	-	18,510
ZF - Gen Svc Co Ovrhd - NUSCO Staff	59,178	-	59,178
ZE - Payroll Benefits	77,868	-	77,868
ZI - E&S OH Rate		-	-
ZH - Small Tools	-	-	-
ZC - Stores Loaders	-	-	-
ZD - Lobby Stock	-	-	-
ZJ - AS&E - Admin Salaries & Expense	3,791	-	3,791
Total Indirect Loaders	**173,229**	**-**	**173,229**
TOTAL COSTS W/LOADERS	**579,229**	**-**	**579,229**
Cumulative Project Cost	**579,229**	**-**	**579,229**
ZK - AFUDC	12,627	-	12,627
TOTAL Workorder	**591,857**	**-**	**591,857**

			Rev. 1
note: no E&S applied to Telecom			