Supplement Request Form

Approved at April 03, 2019 EPAC
Link to Meeting Minutes

Date Prepared: 03/12/2019	**Project Title: IEC 61850 Simulator Lab**
Company/Companies: Eversource CT	**Project ID Number: CS00203**
Organization: Strategy & Performance	**Plant Class / (F.P. Type): Distribution**
Project Initiator: [redacted]	**Project Type: Specific**
Project Manager: [redacted]	**Capital Investment Part of Original Operating Plan? Yes**
Project Sponsor: [redacted]	**O&M Expenses Part of the Original Operating Plan? No**
Current Authorized Amount: $950K	**Estimated in service date(s): 04/30/2019**
Supplement Request: $732K	**Other: Originally Approved on 08/22/17 for $950K**
Total Request: $1,682K	

Supplement Justification

The IEC 61850 Simulator Lab project (Distribution) had an original authorized budget of $950K which was approved in PowerPlan on August 22nd, 2017. The original estimated in-service date was March 31, 2018. However, the project is now scheduled to be in-service on April 30, 2019. This supplement requests approval of an additional $732K for an updated total request of $1,682K.

The scope of work included necessary engineering and design to build and commission a Distribution IEC 61850 simulator lab in the Transmission IEC 61850 Simulator lab at the Berlin campus. The design consisted of installing a total of ten (10) primary and backup relay panels containing primary and backup relaying for a 6-feeder double-bus switchgear lineup. All electrical construction has been completed to this point. The project is currently in the Testing & Commissioning phase with an anticipated completion date of April 30, 2019. As of March 19, 2019, the total project spend to date is $1,387K.

The primary drivers for this supplement are due to greater than estimated project costs for engineering, materials and the forecast for Testing activities.

Justification for Additional Resources

The reasons for the project authorization supplement of $732K are summarized below, by the affected cost categories.

Note: Dollar values are in thousands:

Direct Cost Item	Prior Authorized	Updated Estimate	Delta
1. Engineering	$40.1	$177.4	$137.3
2. Test & Commissioning	$94.8	$130.5	$35.7
3. Materials	$250	$296.2	$46.2
4. Construction	$303.8	$296	($7.8)
Subtotal Direct Costs	**$688.7**	**$900.1**	**$211.4**
5. AFUDC*	$13.7	$0	($13.7)
6. Indirects	$247.3	$781.5	$534.2
Total Costs	**$949.7**	**$1,681.6**	**$731.9**

**Per Distribution plant accounting, this project is exempt from accumulating AFUDC charges as it is classified as a General Plant.*

1. **Engineering: $137.3K**

   The engineering support was provided by in-house engineering. The engineering efforts took longer than expected to complete the design due to the following reasons:
   - Development of standard drawings (control schematics and logic diagrams) and a specialized design to accommodate the "simulation" of AC systems that could simulate faults on simulated breaker devices and an electronically operated switch to simulate a station LTC. This effort will pave the road for future Distribution IEC-61850 project.
   - Development of standard relay calculation templates and settings files.

   In addition, there was a significant effort required by Substation Automation for commissioning of new communication-based equipment. This work was not included in the original estimate.

2. **Test & Commissioning: $35.7K**

   The original estimate for testing & commissioning accounted for Eversource CT/WMA Field Engineering (internal) to provide testing and commissioning of the IEC-61850 Simulator lab. After review of the design drawings, it was determined that the original estimate may not be sufficient to support test activities. The forecast has been updated to include additional funds to complete test activities.

3. **Materials: $46.2K**

   The increase in material cost is due to actual material costs being higher than estimated.

4. **Construction: ($7.8K)**

   The decrease in construction cost is due to actual construction costs being lower than estimated.

6. **Indirect Costs: $534.2K**

   This project was originally forecasted at an E&S rate of 18%. Construction began in 2018 when the E&S rate had increased to 90%, which contributed to the overall increase for indirect costs. The original budget did not take this into consideration.

Supplement Cost Summary

Note: Dollar values are in thousands:

	Prior Authorized	Supplement Request	Total
Capital Additions - Direct	$689	$211	$900
Less Customer Contribution			
Removals net of Salvage ____%			
Total Direct Spending	$689	$211	$900
Capital Additions - Indirect	$247	$535	$782
AFUDC	$14	($14)	$0
Total Capital Request	$950	$732	$1,682
O&M			
Total Request	**$950**	**$732**	**$1,682**

Note: Dollar values are in thousands:

Total Supplemental Request by year view:

Request by Year	Prior Years	Year 2019+	Total
Capital Additions - Direct	($59)	$270	$211
Less Customer Contribution			
Removals net of Salvage ____%			
Total Direct Spending	($59)	$270	$211
Capital Additions - Indirect	$167	$368	$535
AFUDC	$23	($37)	($14)
Total Capital Request	$131	$601	$732
O&M			
Total Request	**$131**	**$601**	**$732**

Project Authorization Form

Date Prepared:	06/05/2017	Project Title: T-IEC 61850 Simulator Lab	
Company:	EE-CT	Project ID Number:	CS00203
Organization:	Strategy&Perform	Class(es) of Plant:	Distribution
Project Initiator:	[redacted]	Project Category:	Gen Mod
Project Owner/Manager:	[redacted]	Project Type:	Specific
Project Sponsor:	[redacted]	Project Purpose:	Gen Mod
Estimated in service date:	03/31/2018	If Transmission Project:	N/A
Supplement to Existing Authorization?	ENG	Capital Investment Part of Original Operating Plan?	Yes
Eng./Constr. Resources Budgeted?	Yes	O&M Expenses Part of the Original Operating Plan?	No

Project Authorization

ERM: _____

FP&A: _____

Executive Summary

IEC 61850 is a communication standard for electrical substation automation systems. CT Protection and Controls Engineering has conducted preliminary investigations into the feasibility of implementing IEC 61850 in future distribution substations designs. These investigations have sparked interest in other operating companies and discussions are ongoing in the Substation Design Standardization working group around standardizing on IEC 61850 for Transmission and Distribution portions of green field substations. IEC 61850 creates a significant shift in the way substations are designed and as a result, several stakeholders are impacted including; Engineering, Construction, Test, SCADA, Substation Operations, System Operations, and Training. Transmission lessons point out that companies that have been successful in implementing IEC 61850 started with a simulator prior to implementing IEC 61850 in the field. In advance of future green field projects, CT Engineering plans to commission an extension of the Transmission IEC 61850 simulator to incorporate Distribution relaying. This project will help iron out issues specific to distribution equipment, as well as design and implementation issues associated with the Transmission-Distribution interface.
Distribution will build out and commission a distribution IEC 61850 simulator in existing space in the Transmission IEC 61850 lab in the Berlin NU-East Building that has been reserved for this purpose. The simulator will include all relays typical of a 6 feeder double-bus switchgear lineup.

Project Costs Summary

Note: Dollar values are in thousands

	Prior Authorized*	2017	2018	2019+	Total
Capital Additions Direct	261	592	97	0	$689
Less Customer Contribution		0	0	0	$0
Removals Net of Salvage		0	0	0	$0
Total - Direct Spending	$261	$592	$97	$0	$689
Capital Additions - Indirect	93	134	114	0	$247
Subtotal Request	$354	$725	$211	$0	$936
AFUDC	2	5	8	0	$14
Total Request	$356	$731	$219	$0	$950

Financial Evaluation

Direct Capital Costs	2017	2018	2019+	Total
Straight Time Labor	38	97	0	$135
Overtime Labor	0	0	0	$0
Outside Services	304	0	0	$304
Materials	250	0	0	$250
Other, including contingency amounts	0	0	0	$0
Total	$592	$97	$0	$689

Indirect Capital Costs	2017	2018	2019+	Total
Indirects/Overheads (including benefits)	134	114	0	$247
Capitalized interest or AFUDC, if any	5	8	0	$14
Total	$139	$122	$0	$261

Total Capital Costs	$731	$219	$0	$950

Less Total Customer Contribution	0	0	0	$0

Total Capital Project Costs	$731	$219	$0	$950

Total O&M Project Costs	$0	$0	$0	$0