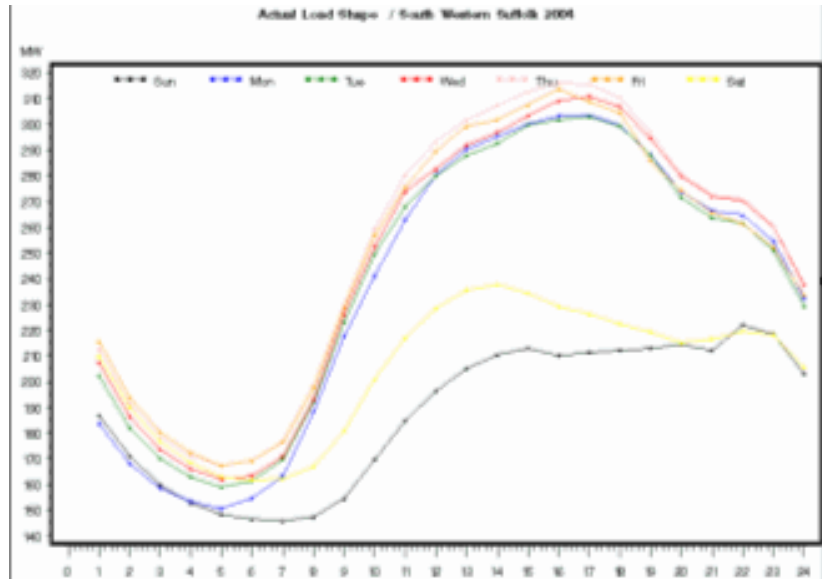


K015: SHORT RANGE SYSTEM PEAK LOAD FORECASTING

PROJECT SUMMARY AND RATIONALE:

The Short Range System Peak Load Forecasting project is concentrated on load forecasting during the summer months. This is because the demand, energy prices, and their volatilities are significantly higher during the summer months. The approach to accomplish this is based on the use of statistical learning algorithms for the Long Island Control Area (LICA), the utilization of weather conditions for different Long Island locations, and the use of adaptive algorithms for short-term forecasting. During summer peak hours, the wholesale prices of electricity are significantly higher than during normal hours of operation. They may be hundreds of times higher than the price during off-peak hours



This project is based on the results of the previous projects conducted for LIPA. The preliminary analysis indicates that the LICA load model for 2004, built with the use of one weather station, has the Mean Absolute Percentage Error (MAPE) equal to 2.34%. The use of three weather stations (Islip, Farmingdale, and LaGuardia) and the implementation of advanced statistical techniques that estimate electric loads for three large parts of Long Island reduce the modeling MAPE to 1.18%. More accurate load models lead to more accurate calculations, more accurate forecasts, and more accurate analysis of monthly usage.

The short range system peak load forecasting project deals with the development and implementation of advanced electric load forecasting methods and software. It deals with two types of forecasts: (i) short-term forecasts with a horizon of up to seven days, and (ii) next year peak forecasts. This project also develops software tools to analyze monthly usage.

After the load model is completed, it can be used for short-term load forecasting for the following year. In order to conduct short-term load forecasting, statistical adaptive procedures can be implemented to adjust for load changes that have occurred since the past year. The preliminary analysis indicates that these methods lead to more accurate short-term forecasts than the forecasts currently used by LIPA. When different forecasting techniques use different methods and produce forecasts with comparable errors, it has been shown that their averaging reduces the forecasting error. Therefore, in cases when forecasts and the current LIPA short-term forecasts have comparable errors, their averaging leads to better forecasts.

Accurate load forecasting is extremely important for LIPA because the results of these forecasts are used for important business decisions including power purchasing and generation, equipment utilization, and area planning. Accurate forecasts and appropriate actions based on these forecasts reduce the probability of blackouts and system overloads. They also reduce the generating and purchasing costs of fuel and power. Long-term forecasts improve utilization of capital expenditures.

This project was authorized by Electric Operations. The contract was executed and subsequently approved by the NYS OSC/AG on June 18, 2007.

RELATIONSHIP TO LIPA’S MISSION:

Applicability of LIPA’s Objectives

- Promote a Healthy Environment through leadership in efficiency and renewables.
- Balance the objectives of the electric resource plan with the impact on customer bills.
- √ Maintain high reliability of the bulk electric system.
- √ Maintain high reliability of the distribution system.
- √ Position LIPA to respond rapidly to change in order to manage risk.

The forecasting model will be used to reduce costs and improve reliability to the LIPA system. Benefits of improved load forecasting include the ability to improve purchasing and generation decisions, improved equipment reliability and more accurate load switching.

Geo Management, Inc. was selected as the sole source vendor. It builds upon work done by the vendor previously and uses new and complicated algorithms to make these.

SCHEDULE:

Project Duration:	28 Months
Start Date:	8/26/2007
Planned Completion Date:	7/31/2009
Amended Completion Date:	06/30/2010

The project was put on hold in late 2008 by Electric Operations to allow the scope of work to be reviewed and revised. Work re-commenced in mid-2009.

SUMMARY OF COSTS:

	Budget	Planned	Variance	LIPA HISTORICAL & PLANNED EXPENDITURES	
				Year	Dollars
LIPA	\$212,500	\$212,500	\$0	2007	\$19,000
Other Funding				2008	\$55,000
None				2009	\$85,000
Cumulative		\$212,500		2010	\$52,500
Leveraging		1 : 1			

Contract was revised in 2009 to reduce scope and budget and extend work into 2010.

PROJECT RESULTS (to date):

During the past year (2009), the contract with Geo Management (GMI) was amended. Since June (2009), GMI has been implementing the system development and implementation of the feeders’ overloading prediction software. Monthly forecasting updates on the 41 selected feeders have been documented. 72-hour and 7-day forecasts were projected for 90% or 100% overloading potential. Accuracies were greatly improved when an adaptive regression procedure was implemented.

GMI also conducted real-time system load forecasts on a daily basis (weekdays only). Based on LIPA actual past loads and weather forecasts, GMI ran forecast calculations and produced on-going 7-day forecasts.

In earlier years, Geo Management partitioned LICA hourly load data. They processed the data and built the first versions of the models to be used for the summer of 2008 hourly load forecasts for 48 hours ahead. The models use the actual weather data for Farmingdale, Islip, and JFK. Additionally, GMI organized and summarized the model statistics from 2003 through 2007. For each year they built three models were built using: one (Farmingdale), two (Farmingdale and Islip), and three stations (Farmingdale, Islip and JFK). They calculated the additive-multiplicative sub-model for each partitioned region iteratively. In each iteration step GMI applied their algorithm to adjust the three partitions so as to balance the total hourly loads. Previous technical reports indicated that this algorithm reduced the model error of each partitioned region but did not change the model error for the total load. The model error for the total load is reduced after each iteration step. Since using two or three stations do not differ significantly from using only one station, GMI presented the model results using one station (Farmingdale).

REMAINING ACTIVITIES:

The development and installation of the feeder overload prediction software will be done in the remaining period.

DELIVERABLES:

	<u>Planned</u>	<u>Actual</u>
• Pilot short-term forecasting system	01/2008	01/2008
• Phase I of the system development and implementation of the feeders’ overloading prediction software	11/30/2009	11/30/2009
• Phase II of the system development and implementation of the feeders’ overloading prediction software	06/30/2010	- -

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N051: HYBRID SERVICE TRUCK

PROJECT RATIONALE:

With the increased reliance on foreign countries for our fuel supplies, fleet managers have been turning to hybrid technology to reduce the use of fuel.

While hybrid passenger automobiles in the United States increased from 9,500 units in 2000 to 313,783 units in 2008, relatively few hybrid medium and heavy duty truck vehicles exist. Truck Original Equipment Manufacturers (OEMs) are just beginning to offer hybrid versions of light duty trucks that offer benefits to utilities.



In this project, two hybrid bucket trucks will be procured and deployed in LIPA's service territory. The benefits associated with a hybrid bucket truck include: improved performance; increased fuel economy; and quieter operation while at the job site. Comparisons to conventional trucks will be made including fuel economy, driving performance, driver satisfaction, and noise benefits.

The rationale for this project is to assess hybrid technology relative to conventional technology, lower fuel costs of LIPA trucks, promote a healthy environment by reducing fuel emissions, and reduce workplace noise at the job site.

The project was approved by the NYS OSC/AG on July 15, 2008.

RELATIONSHIP TO LIPA'S MISSION:

Applicability of LIPA's Objectives

- √ Promote a healthy environment through leadership in efficiency and renewables
 - √ Balance the objectives of the electric resource plan with the impact on customer bills
 - Maintain high reliability of the bulk electric system
 - Maintain high reliability of the distribution system
 - √ Position LIPA to respond rapidly to change in order to manage risk
-

This project is specifically aimed at assessing medium duty hybrid vehicle technology that both improves fuel economy and provides air quality benefits while performing work on the distribution system.

International / Altec was selected as the vendor through a competitive bid process.

SCHEDULE:

Project Duration: 30 months
 Start Date: 07/01/2006
 Planned Completion Date: 12/31/2009
 Anticipated Completion Date: 06/30/2010

Longer production times than anticipated caused a delay in the delivery of the vehicles.

SUMMARY OF COSTS:

	Budget	Planned	Variance	LIPA HISTORICAL & PLANNED EXPENDITURES	
				Year	Dollars
LIPA	\$415,414	\$415,414	\$0	2009	\$415,414
Other Funding				2010	\$0
None					
Cumulative		\$415,414			
Leveraging		1:1			

*Funding from capital not RD&D.

PROJECT RESULTS (to date):

With the advent of hybrid passenger vehicles beginning to capture market share for new vehicles, light duty truck manufacturers have been making inroads as well. In September 2006, LIPA issued an RFP for a Hybrid Truck. In response to the RFP, bids were evaluated and International Truck & Engine / Altec was awarded the contract.

The truck was manufactured by International Truck & Engine in early 2008 and then sent to Altec Industries, Inc. for the body upfit. The parallel hybrid drive train was manufactured by Eaton Corporation. The trucks are production run vehicles. Parallel operation means that, if the hybrid system goes off-line for any reason, the truck will still continue to work conventionally. Inspection of the vehicles was made by Operations and Fleet personnel in September 2009. The trucks were delivered to the Hicksville facility in October 2009. Dielectric and stability testing has been completed and skin designs for the truck were completed. The trucks were outfitted with MDSI equipment after the vehicles arrived on the property. Training was conducted by Altec on November 12, 2009 for fleet and operations personnel. The two trucks were placed in service on December 18, 2009 operating out of the Greenlawn and Patchogue yards respectively.

Overview of vehicle operations:

- At low speeds and without a demand for heavy acceleration, the electric motor supplies driving power to reduce diesel engine rpm and increase fuel economy reducing emissions.
- The truck has the same size engine as a conventional truck but with the addition of a 60 hp electric motor, it has faster acceleration (9 second faster acceleration from 0-60).
- The truck uses regenerative braking. When the brakes are applied, the energy is captured and used to charge the lithium-ion battery system.
- The boom operates from the lithium-ion battery for 1½ - 2 hrs with the engine off. After this time, engine will start and charge the battery in about 6 minutes. Once the batteries are recharged, the engine will automatically turn off. Operation with the engine off saves fuel, reduces emissions, and reduces noise levels, a concern especially during off-hours.

REMAINING ACTIVITIES:

The vehicles will be tested for fuel economy and jobs per day and will be compared against non-hybrid trucks. In addition, driver feedback on vehicle operations will be performed through a vehicle survey.

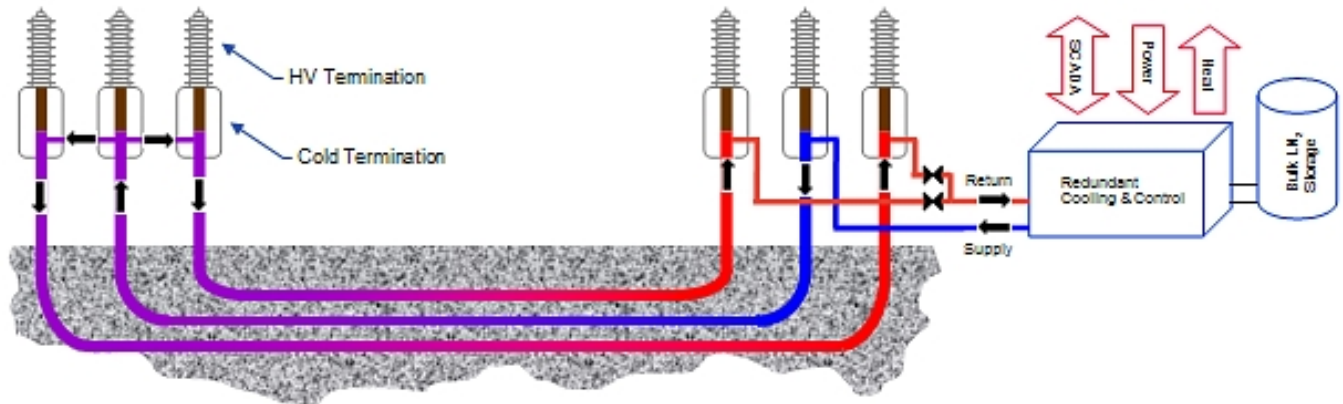
DELIVERABLES:

	<u>Planned</u>	<u>Actual</u>
• Two hybrid service trucks	12/2009	10/2009
• Final Report	06/30/2010	--

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O155: HOLBROOK SUPERCONDUCTOR PHASE 2

PROJECT RATIONALE:



The worldwide demand for electricity continues to grow and more energy than ever is consumed in the form of electricity. As blackouts and power price spikes become more common, it is becoming clear that the power transmission and distribution networks that provide the lifeblood of this economy have not been maintained, expanded or improved to keep pace with rising power demands.

The congested power grid and environmental pressures are requiring utilities look for new solutions to solving power flow problems that address the growing concern over locating facilities and quality of life issues in urban and suburban communities. High-capacity, low-impedance HTS cables offer significant benefits over conventional transmission lines and cables. The use of HTS wire in an HTS cable enables three to five times more power than copper-wire cables of the same dimension making them an ideal solution for network upgrades and urban retrofit projects.

This project is designed to demonstrate the next generation (2G) of superconducting cables: long length, very low impedance (VLI) high with fault current limiting characteristics. These cables are capable of increasing power grid transmission capacity without increasing system voltage levels, while at the same time eliminating the need for dielectric oils; and enabling controllable power flow in an AC power network. Steady growth in power consumption and the growing opposition to new high voltage projects demands new, technological solutions to meet consumer power demands. High temperature superconductor (HTS) cables offer the opportunity to transmit more electrical power at the same or a reduced voltage in a compact cable construction.

This is a milestone driven project divided into two principal phases. The first phase will focus on the development and testing of required technologies and subsystems. These include the cryostat, refrigeration system, cable joint, manufacturing and demonstration of 2G-wire in a cable, and transferring thermal contraction compensation techniques to long lengths of 2G cable. During the second phase, three single-phase, 2G HTS fault current limiting cables will be substituted for the existing 1G cables in LIPA 1 and a splice of the cable will be tested in the field. Additionally, refrigeration work will continue until a standardized, low cost, high performance refrigerator design is established. Key components will be fabricated to prove the design.

LIPA signed an MOU which was included as part of the proposal to the DOE. The project was subsequently awarded to AMSC. The sub-contract with AMSC is still being negotiated for this project.

RELATIONSHIP TO LIPA’S MISSION:

Strategic Objectives

- √ Promote a healthy environment through leadership in efficiency and renewables.
Balance the objectives of the electric resource plan with the impact on customer bills
- √ Maintain high reliability of the bulk electric system
Maintain high reliability of the distribution system
Position LIPA to respond rapidly to change in order to manage risk

American Superconductor (AMSC), Nexans Cable and Air Liquide were selected for the project team. Although superconducting cables are available from several other vendors, this project is sponsored and supported by the United States Department of Energy (DOE) as one of its premier research projects in the Transmission and Distribution area. AMSC is acting as the prime contractor with LIPA, Nexans Cable and Air Liquide as sub-contractors to AMSC. (All four companies together are referred to as the “partners.”) This project builds upon earlier work done by the team and will be tested on LIPA’s system at the location of the first superconductor project.

SCHEDULE:

Project Duration: 48 Months
 Start Date: 10/01/2007
 Planned Completion Date: 09/30/2011

The project is currently on schedule.

SUMMARY OF COSTS:

	Budget	Planned	Variance	LIPA HISTORICAL & PLANNED EXPENDITURES	
LIPA	\$0	\$0	\$0	Year	Dollars
Other Funding				2007	\$0
Project Partners		\$12,730,229		2008	\$0
DOE		\$9,000,000		2009	\$0
				2010	\$0
Cumulative		\$21,730,229		2011	\$0
Leveraging		--			

LIPA has no cost component in this project, therefore, there can not be any leveraging calculation. However, significant information and experience on this technology is being gained by LIPA operations and engineering.

PROJECT RESULTS (to date):

During the past year, work has been performed by the partners in developing cable and refrigerator designs. The basic cable design has been completed. Refrigeration optimization and sub-component design has been completed. Fluid pump windage testing was conducted and completed and magnetic bearings identified.

REMAINING ACTIVITIES:

- A second generation cable will be constructed and installed in one of the conduits on-site, replacing the current cable. In addition, a field splice will be demonstrated using the existing center box. The system will then be operated and evaluated for 12 months.

DELIVERABLES:

Quarterly reports to the DOP have been prepared and submitted on time since project inception.

	<u>Planned</u>	<u>Actual</u>
• Gen 2 Cable System	06/30/2010	--
• Cable Splice	06/30/2010	--
• Final report	09/30/2011	

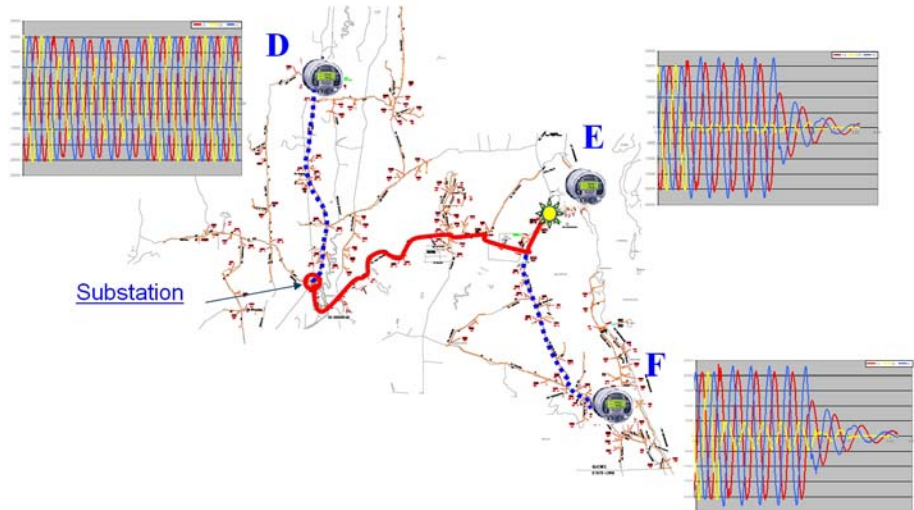
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O188: FAULT LOCATOR WITH HYDRO QUEBEC

PROJECT SUMMARY AND RATIONALE:

Hydro Quebec's distribution fault locator (DFL) technology enhances reliability by detecting faults as they occur and identifying their location, thereby enabling utility companies to quickly correct problems and reduce their affects upon customers.

Minimal equipment is needed using this method. A power quality meter is placed in the. Knowing the impedance of the circuit, the location of the fault can be calculated from the substation. By placing several meters in critical locations on the circuit system, the branch that the location is located on can be identified and the location of the fault more accurately determined.



The project was authorized by electric operations in August 2008.

RELATIONSHIP TO LIPA'S MISSION:

Applicability of LIPA's Objectives

- Promote a Healthy Environment through leadership in efficiency and renewables.
- √ Balance the objectives of the electric resource plan with the impact on customer bills.
- Maintain high reliability of the bulk electric system.
- √ Maintain high reliability of the distribution system.
- √ Position LIPA to respond rapidly to change in order to manage risk.

This project is specifically aimed at minimizing the loss of electricity to the customer by reducing response and repair times.

EPRI/Hydro Quebec was selected as the sole source vendor because they had the technology and funding for the project.

SCHEDULE:

Project Duration:	15 Months
Start Date:	09/01/2008
Planned Completion Date:	12/31/2009
Anticipated Completion Date:	06/30/2010

The project has been delayed because of a difficulty in getting the monitoring devices and data formats in a compatible format.

SUMMARY OF COSTS:

	Budget	Planned	Variance	LIPA HISTORICAL & PLANNED EXPENDITURES	
				Year	Dollars
LIPA	\$0	\$0	\$0	2008	\$0
Other Funding				2009	\$0
EPRI Base Program		--		2010	\$0
Cumulative		--			
Leveraging		--			

Note: LIPA was asked to participate in this project by EPRI as an additional test site. No costs other than labor to install the devices was incurred. All other project costs were absorbed by the individual participants and are not available.

PROJECT RESULTS (to date):

Two circuits originating in the Commack substation have been identified for the demonstration and testing. Locations for the secondary meeting on the circuits have also been identified.

Meters were installed at all locations and data is being collected. Data transmission rates have precluded the use of automated and remote downloads, therefore, for the purposes of the demonstration, the data was collected periodically (manually) and sent to HydroQuebec for analysis. A future “full blown” system will require more robust communications.

Data was collected through the end of June 2009.

REMAINING ACTIVITIES:

Preparation of a final report incorporating LIPA data, as well as data from other locations, is under preparation.

DELIVERABLES:

- Final Report

Planned
06/30/2010

O199: COOPER FAULTED CURRENT INDICATOR

PROJECT SUMMARY AND RATIONALE:

Through LIPA's participation in DV2010, the Company has been able to become a host utility to test and evaluate Cooper's newest generation of Faulted Current Indicators (FCI's). The Cooper Power Systems S.T.A.R.™ faulted circuit indicator product line offers five basic types of FCIs and each unit is tailored for the intended application. Each type varies by reset method and the type of system it connects to.

All Cooper Power Systems S.T.A.R. faulted circuit indicators reset automatically upon restoration of system power or after a predetermined time period. Automatic resetting fault indicators sense either voltage or current to determine that power has been restored to the system. The units then reset to the normal position to eliminate the need for line personnel to manually reset the units. This saves time, money and makes the fault indication more reliable.

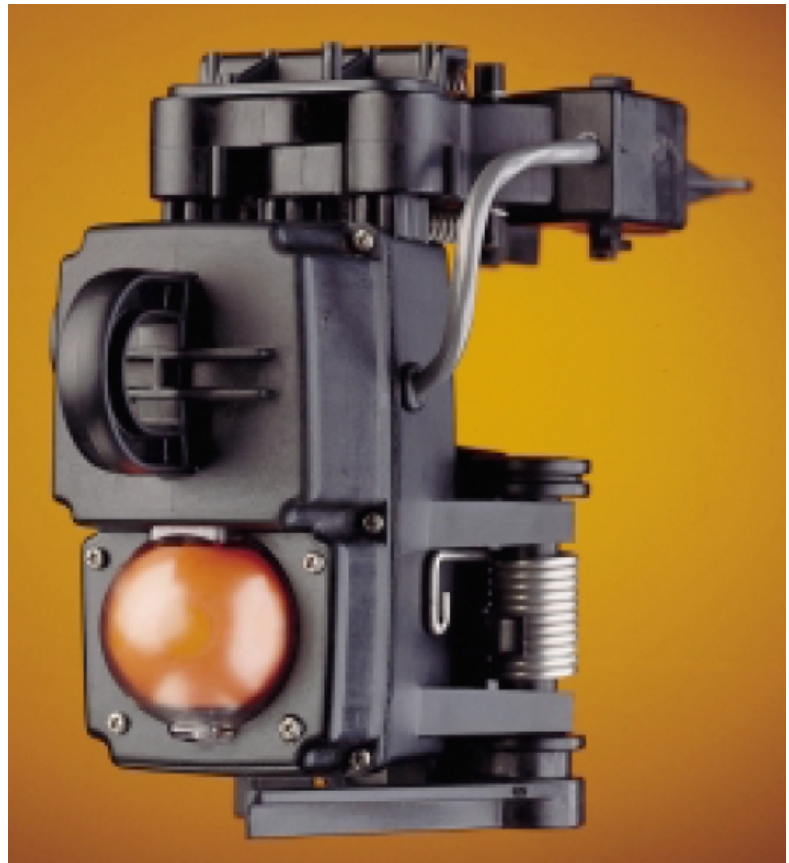
Fault indicators are devices which indicate the passage of fault current. When properly applied, they can reduce operating costs and reduce service interruptions by identifying the section of cable that has failed. At the same time, fault indicators can increase safety and reduce equipment damage by reducing the need for hazardous fault chasing procedures.

This project was authorized by Electric Operations in December 2007.

RELATIONSHIP TO LIPA'S MISSION:

Applicability of LIPA's Objectives

- Promote a Healthy Environment through leadership in efficiency and renewables.
 - √ Balance the objectives of the electric resource plan with the impact on customer bills.
 - Maintain high reliability of the bulk electric system.
 - √ Maintain high reliability of the distribution system.
 - √ Position LIPA to respond rapidly to change in order to manage risk.
-



This project is specifically aimed at minimizing the cost of delivering energy to the customer by maximizing existing or new AMI systems to collect data and control system components.

Cooper / DV2010 was selected as the sole source vendor as a result of their involvement with LIPA in DV2010. They asked for test sites for their equipment which the Company received at no cost.

SCHEDULE:

Project Duration:	24 Months
Start Date:	01/01/2008
Planned Completion Date:	12/31/2009
Anticipated Completion Date:	12/31/2010

The monitoring period of the project has been extended as a result in delays getting the equipment and difficulties with power requirements.

SUMMARY OF COSTS:

	Budget	Planned	Variance	LIPA HISTORICAL & PLANNED EXPENDITURES	
LIPA	\$0	\$0	\$0	Year	Dollars
Other Funding				2008	\$0
DV2010		--		2009	\$0
Cumulative		--		2010	\$0
Leveraging		--			

Note: LIPA was asked to participate in this project by DV2010 as an additional test site. No costs other than labor to install the devices was incurred. The cost of the device is not available.

PROJECT RESULTS (to date):

Four locations were selected in the East Hills area and an FCI was placed at each location; one per phase. These locations were selected for reliability reasons (by the Distribution Reliability Group). Original data indicated that it would require 2 Amps on each phase to provide power to the unit. It was later determined that a much higher load would be needed on each phase (>10 amps). As a result, only one of the locations was sufficient. New locations for the remaining FCI's were assigned. Some other challenges necessitated design changes. Cooper has since made the appropriate changes to the units.

In June 2009, 12 newly designed FCIs were received, located and installed. A Cooper Power Systems online website allows access to each of the 13 units current conditions.

REMAINING ACTIVITIES:

The devices, which are already installed, will continue to monitor system conditions for the remainder of the test period at which time their performance will be evaluated in a final report.

DELIVERABLES:

- Final Report **Planned**
12/31/2010