

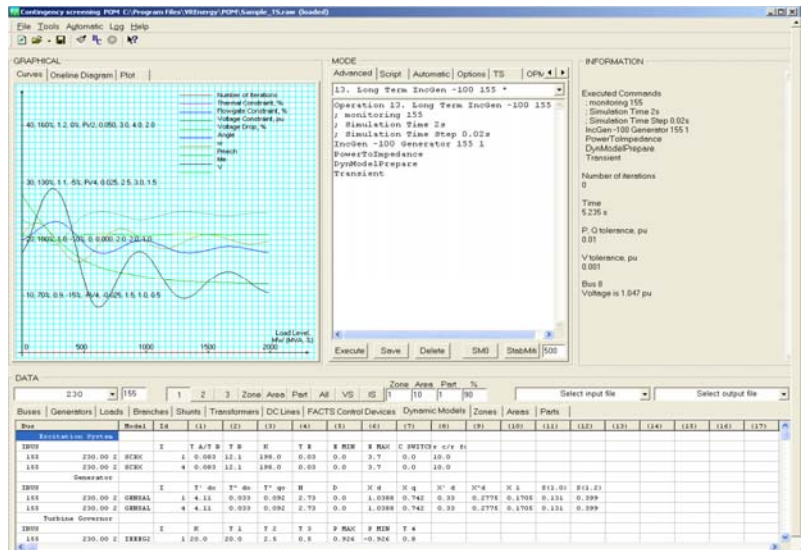
## PROJECT K014: PROBABILISTIC RISK ASSESSMENT (PRA) USER'S GROUP

### PROJECT RATIONALE:

Maintaining a high level of reliability on the power grid is one of the most pressing issues facing the electric power industry today. The Probabilistic Risk Assessment (PRA) program, developed by EPRI's Transmission Reliability Initiative, offers energy companies a more accurate tool for assessing grid reliability under restructured market conditions. The PRA program consists of two software programs; the *Physical Operational Margin (POM)* licensed by V&R to EPRI and qualified EPRI members, and the *Probabilistic Reliability Indices (PRI)* owned by EPRI.

The PRA program provides the means to identify the most critical potential grid failures, evaluate their adverse impacts, and recommend effective mitigation alternatives.

This project was approved in 2006. The agreement with EPRI was executed on 12/02/2005.



### 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

This project is specifically aimed at enhancing the reliability of the bulk power and distribution system by enhancing the planning for system stability and grid reliability.

EPRI was selected as the sole source vendor because of their expertise in the industry and their ability to leverage research funding with other utilities. Since this project was a specific supplemental project offering from EPRI, they were selected as the sole source provider.

**SCHEDULE:**

Project Duration: 51 Months  
 Start Date: 01/01/2006  
 Planned Completion Date: 12/31/2009

**SUMMARY OF COSTS:**

|                      | <b>Budget</b> | <b>Actual</b>    | <b>Variance</b> |
|----------------------|---------------|------------------|-----------------|
| <b>LIPA</b>          | \$47,500      | \$47,500         | \$0             |
| <b>Other Funding</b> |               |                  |                 |
| EPRI TC              |               | \$47,500         |                 |
| Other EPRI           |               | \$763,225        |                 |
| <b>Cumulative</b>    |               | <b>\$858,225</b> |                 |
| Leveraging           |               | <b>18 : 1</b>    |                 |

| <b>LIPA HISTORICAL EXPENDITURES</b> |                |
|-------------------------------------|----------------|
| <b>Year</b>                         | <b>Dollars</b> |
| 2006                                | \$11,875       |
| 2007                                | \$11,875       |
| 2008                                | \$11,875       |
| 2009                                | \$11,875       |

**PROJECT RESULTS:**

This project consists of two activities:

- *Support for Installation and Maintenance.* Providing assistance to the participant for PRA installation and maintenance. EPRI provided clearly written instructions on how to install PRA on a PC platform, with telephone support to update and execute the PRA program and suggestions for resolving problems and used Internet facilities to exchange information.
- *Educational Seminars, Training Workshops, and User Group Meetings.* Training the participant’s personnel on the subjects of Probabilistic Risk Assessment methodology, the use of POM, PRI, and the analysis of PRA results. EPRI organized and conducted educational seminars and user group meetings on PRA methodology for project participants.

**DELIVERABLES:**

|   | <b><u>Planned</u></b> | <b><u>Actual</u></b> |
|---|-----------------------|----------------------|
| • 2006 Support for POM (VRI) and PRI (EPRI) | 12/31/2006            | 06/21/2006           |
| • 2006 PRA User’s Group Meeting             | 12/31/2006            | 06/30/2006           |
| • 2007 Support for POM (VRI) and PRI (EPRI) | 12/31/2007            | 03/30/2007           |
| • 2007 PRA User’s Group Meeting             | 12/31/2007            | 03/30/2007           |
| • 2008 Support for POM (VRI) and PRI (EPRI) | 12/31/2008            | 03/30/2008           |
| • 2008 PRA User’s Group Meeting             | 12/31/2008            | 03/30/2008           |
| • 2009 Support for POM (VRI) and PRI (EPRI) | 12/31/2009            | 06/30/2009           |
| • 2009 PRA User’s Group Meeting             | 12/31/2009            | 06/30/2009           |

### **BENEFIT/COST ANALYSIS:**

- This project provided the planning group with an updated probability analysis tool that ranks planned capital projects for optimization of capital expenditures, thereby allocating resources in the most efficient manner.
- It provides the system operator with software that optimizes power dispatch, thereby preventing unnecessary load shedding during emergencies.
- It provides software that creates Transient Stability cases for the Electric System Operator which is used to maximize asset utilization and prevent equipment damage.

A series of reports, procedures and guidelines have resulted from this project. These new methods along with the use of the program itself has resulted in a savings of over \$1 million for LIPA in avoided costs and manpower expenditures.

### **TECHNOLOGY TRANSFER ACTIVITIES:**

The tool was used in 2009 to evaluate the transmission system to determine the probability of events and their impact. This allowed LIPA to determine if system reinforcements are necessary to eliminate the less likely events, which could have significant impacts to our customers. LIPA's Energy Planning activities is being supported by providing better information support and methodologies which are being used by LIPA to better coordinate the generating and transmission planning process.

### **POSSIBLE FOLLOW-ON WORK**

None at this time.

### **CONCLUSION:**

The project successfully issued all promised deliverables by 31 December, 2009. Electric Planning personnel have been provided with upgrades to the latest software and have been attending workshops on the use of the POM and PRI software held by VRI, Inc. and by EPRI.

This project is helping to provide planning tools which are used to identify potential points of grid failure so that they can be relieved prior to customer or system outages.

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## N049/O140: UV FOR INDOOR AIR QUALITY AND ENERGY SAVINGS

### PROJECT RATIONALE:

This project demonstrated the energy efficiency benefits and indoor air quality benefits associated with applying UV lighting systems to HVAC chiller coils.

Global Energy Partners (GEP) managed a project at North Shore Hospital that applied a UV lighting system to the chiller coils. The funding was shared among LIPA (Clean Energy and Electric Operations), GEP Healthcare and the hospital. The project measured air quality before and after and calculated/measured the energy savings and overall savings to the customer. Benefits of this unique application of the technology include better air flow, less cleaning of coils, and improved indoor air quality.



This project was approved by Retail Services March 2005. The contract with the hospital and GEP was executed on November 7, 2006.

### RELATIONSHIP TO LIPA'S MISSION:

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#### Strategic Objectives

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- √ 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 was specifically aimed at demonstrating and assessing a technology that both improves indoor air quality (health benefits) and saves energy by allowing greater motor efficiency for HVAC blowers. The project supports LIPA's commitment to a renewable energy program, and the need to meet the goals of the New York State Renewable Portfolio Standard (25% generation from renewable energy sources by the year 2013), as well as serving customer health needs. It promotes an electric energy use technology.

GEP was selected as the single source vendor. GEP (previously a subsidiary of EPRI) is a consultant specializing in programs for utilities and utility customers. GEP managed the project and send out an RFP to select the UV installer.

### **SCHEDULE:**

|                              |           |
|------------------------------|-----------|
| Project Duration:            | 34 Months |
| Start Date:                  | 06/2007   |
| Planned Completion Date:     | 06/2008   |
| Anticipated Completion Date: | 3/31/2010 |

The project was delayed because of slow response of Glen Clove hospital in sharing the information and data of the coil readings.

**SUMMARY OF COSTS:**

|                      | <b>Budget</b> | <b>Actual</b>   | <b>Variance</b> | <b>LIPA HISTORICAL EXPENDITURES</b> |                |
|----------------------|---------------|-----------------|-----------------|-------------------------------------|----------------|
|                      |               |                 |                 | <b>Year</b>                         | <b>Dollars</b> |
| <b>LIPA</b>          | \$16,000      | \$5,857         | (\$10,143)      | 2006                                | \$0            |
| <b>Other Funding</b> |               |                 |                 | 2007                                | \$5,857        |
| GEP                  |               | \$7,500         |                 | 2008                                | \$0            |
| <b>Cumulative</b>    |               | <b>\$13,357</b> |                 | 2009                                | \$0            |
| <b>Leveraging</b>    |               | <b>2.3 : 1</b>  |                 |                                     |                |

**Variance Explanation:**

LIPA was able to obtain \$7,500 in co-funding from GEP after the budget was established, lowering LIPA’s share of the costs. The balance of the under run is from lower than expected costs equipment and installation costs.

**PROJECT RESULTS:**

The UV system was installed at the hospital in early June 2007. The electricity was extended to the lamps in late July. Measurements of air quality and coil cleanliness were made initially and repeated at six months intervals.

**DELIVERABLES:**

|   | <b><u>Planned</u></b> | <b><u>Actual</u></b> |
|---|-----------------------|----------------------|
| ▪ Install UV arrays around an HVAC system chiller coils | 06/2007               | 06/2007              |
| ▪ Measure energy efficiency and air quality             | 07/2007               | 07/2007              |
| ▪ Final report  | 12/2009               | 03/2010              |

**BENEFIT/COST ANALYSIS:**

This project provided data on the ability of an ultraviolet germicidal irradiation (UVGI) system to inhibit the biofouling of air handler chiller coils in a hospital air handler and determine the resulting energy and pathogen reduction impacts. Chiller coils in commercial buildings in any climate are susceptible to biofouling problems, which impede heat transfer across the coils and exacerbate poor indoor air quality and energy efficiency. Irradiating air handler chiller coils with UV light has shown the potential to control microbial growth on coils, in drain pans, and in ductwork, resulting in improved indoor air quality and substantial energy savings. The results of this project will provide major accounts and customer service with another tool to provide better service to LIPA’s customers. The technology will help lower customer energy costs by increasing chiller efficiency. In addition to the lower energy costs, this technology also positively affects the air quality by reducing the amount of bacteria in the air flow.

### **TECHNOLOGY TRANSFER ACTIVITIES:**

- Glen Cove hospital personals were trained in the use and maintenance of the UVGI equipment.
- Global Energy Partners will develop two reports on the results of the demonstration:
  1. A summary technical report describing the demonstration, the equipment installed, equipment operation, and estimated energy savings and pathogen reduction impacts for the air handler based on the data collected. This report will be distributed only to the project participants.
  2. A condensed adaptation of the technical report to be distributed to electric utilities.
- UVGI system to remain in place and be a property of Glen Cove hospital.

### **POSSIBLE FOLLOW-ON WORK**

None.

### **CONCLUSION:**

The project is operational and measurements have been made. Remaining work includes a final report analyzing results, which has been delayed due to personnel changes.

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## O044: HOLBROOK 1 SUPERCONDUCTOR

### PROJECT SUMMARY AND RATIONALE:

Superconducting materials are perfect conductors of electricity when they are cooled below a critical temperature. They lose all resistance to the flow of electricity creating a significant increase in the power flow density of new high temperature superconductor (HTS) wires. HTS wires can conduct up to 140 times more power than conventional copper wires of the same dimension. A new family of ceramic-based HTS materials was discovered in the late 1980s. These discoveries changed the fundamental economics of superconductivity, and have opened up the range of applications for the electric power industry.



The worldwide demand for electricity continues to grow and more energy than ever is consumed in the form of electricity. Much of the growth in demand is fueled by rapid growth in the use of electronic devices incorporating semiconductors that are used today in large consumer markets such as automobiles, cell phones, computers of all types, telecommunications networks, and many manufacturing industries that incorporate sensitive equipment needed in the manufacturing process. In the United States and around the World, a "new economy" based on electronic commerce is being born. 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 overhead transmission lines and copper 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.

The scope of this project includes constructing, commissioning, testing and reporting data on a system in Holbrook using the next generation (1G) of superconducting cables. This information can then be used by LIPA to evaluate the advantages and cost effectiveness of using such materials in future construction.

The project was initiated April 1, 2003, with the sponsorship agreement being executed September 9, 2005. It was subsequently approved by the New York State Attorney General and Office of the State Comptroller on December 12, 2005.

**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

This project is specifically aimed at minimizing the cost of energy to the customer by increasing power flow capability without upgrading sections of the transmission system to 345 kV.

American Superconductor Corporation is a world leader in developing and manufacturing products using superconductor wires and power electronic converters for the electric power infrastructure. American Superconductor's products (and those sold by electrical equipment manufacturers that incorporate its products) can dramatically increase the bandwidth and reliability of power delivery grids, reduce manufacturing and operating costs, and conserve resources used to produce electric power.

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.

**SCHEDULE:**

|                              |            |
|------------------------------|------------|
| Project Duration:            | 69 Months  |
| Start Date:                  | 04/01/2003 |
| Planned Completion Date:     | 03/31/2008 |
| Anticipated Completion Date: | 12/31/2009 |

The project was delayed by several engineering challenges which took longer to resolve than anticipated.

**SUMMARY OF COSTS:**

|                      | <b>Budget</b> | <b>Actual</b>       | <b>Variance</b> |
|----------------------|---------------|---------------------|-----------------|
| <b>LIPA</b>          | \$6,611,842   | \$8,563,794         | \$165,568       |
| <b>Other Funding</b> |               |                     |                 |
| DOE / partners       |               | \$51,886,804        |                 |
| <b>Cumulative</b>    |               | <b>\$60,450,598</b> |                 |
| Leveraging           |               | <b>7 : 1</b>        |                 |

| <b>LIPA HISTORICAL EXPENDITURES</b> |                  |
|-------------------------------------|------------------|
| <b>Year</b>                         | <b>Dollars</b>   |
| 2005                                | \$1,592,711      |
| 2006                                | \$4,172,721      |
| 2007                                | \$2,534,588      |
| 2008                                | <b>\$263,774</b> |
| 2009                                | \$0              |

**PROJECT RESULTS:**

All construction was completed in early 2008. The system was activated and commissioned on April 22, 2008. After running for several months, the system was taken out of service to over-hall the refrigeration system and repair some critical components. The system remained offline for the balance of the year in order to correct a number of software alarm issues. It went back into service early in 2009.

This project demonstrated the a the current generation of superconducting cables; long length and very low impedance (VLI). 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.

The project was finished approximately 1 year behind schedule. The delay was due primarily to two conditions: (1) re-design of the terminations to accommodate the high voltage and low termination interfaces, and (2) a mechanical breakdown in the terminations experienced during the first cool down period in the fall of 2007.

**DELIVERABLES:**

Quarterly reports will be prepared by AMSC detailed progress on the project and future activities.

| <u>Deliverable</u> | <u>Planned</u> | <u>Actual</u>               |
|--------------------|----------------|-----------------------------|
| ➤ Cable System     | 12/31/2006     | Commissioned April 22, 2008 |

**BENEFIT/COST ANALYSIS:**

**Benefits:**

This project is designed to demonstrate a long length section of very low impedance (VLI) high temperature superconducting (HTS) cable that is 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.

The system was installed and remains part of LIPA’s electric system. Significant experience was gained by various planning, engineering and operating personnel which could not be gained elsewhere. In addition, LIPA has been recognized as a leading, innovative company in the field of transmission research and his highly respected in the industry as a result. All of these items add up to a benefit to LIPA of over \$50 million.

**TECHNOLOGY TRANSFER ACTIVITIES:**

The results of the project have been incorporated into daily operations and planning through the inclusion of design engineering, planning and operations on a day-by-day basis throughout the design, construction,

installation, commissioning and operation of the system. Results are disseminated to the industry through an annual Department of Energy seminar and numerous papers and presentations at various technical seminars and trade shows.

### **POSSIBLE FOLLOW-ON WORK**

A follow up project is planned which will replace one of the cable phases with a second generation (2G) cable, test an in-field splice and develop a new, highly reliable refrigeration system.

### **CONCLUSION:**

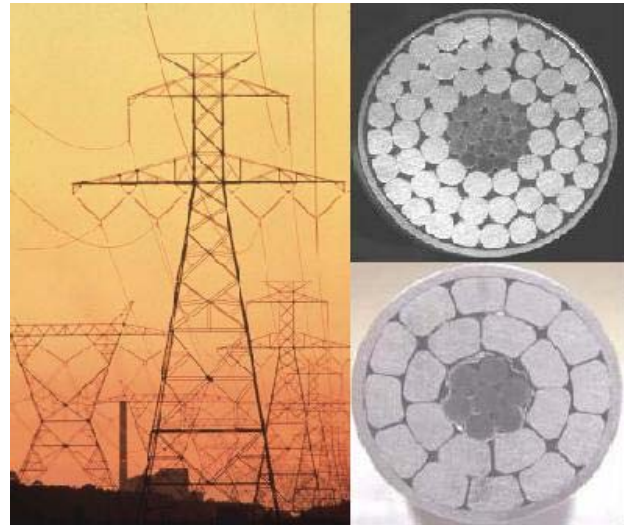
All equipment has been installed and operated. Data was collected and da final report is being prepared.

## O052: ADVANCED TECHNOLOGIES FOR OVERHEAD TRANSMISSION

### PROJECT SUMMARY AND RATIONALE:

Difficulties in acquiring rights-of-way for transmission lines have left electric power utilities with no other alternative than to squeeze more capacities out of their systems. One option is to operate the transmission lines at much higher temperatures than the original design. Some of the effects of high operating conductor temperatures are loss in conductor strength and reduction in conductor ground clearance (sag).

In response to this new operating condition, several manufacturers have developed new conductors in an attempt to overcome the conductor strength loss and to limit the conductor sag. An existing conductor can then be replaced with these high capacity conductors with little or no modification to the supporting structures.



The objective of the project is to evaluate the long-term performance and in-field aging of a five commercially or near-commercially available “High Temperature Low Sag” conductors that are capable of significantly increasing the current carrying capacity of thermally constrained transmission lines. These conductors (and their manufacturers) are:

- ACSS (Aluminum Conductor Steel Supported) – Southwire of Carrollton, GA
- GZTACSR (Gap Type Thermal Resistant Al-alloy) – J-Power Systems of Japan
- ACCR (Aluminum Conductor Composite Reinforced) – 3M of St. Paul, MN
- ACCC (Aluminum Conductor Composite Core) – CTC of Irvine, CA
- CRAC (Composite Reinforced Aluminum Conductor) – Goldsworthy of Torrance, CA

This project explores advanced overhead transmission technologies that could enable LIPA to meet load growth on Long Island. Managed by EPRI, this Tailored Collaboration (TC) project’s goal is to evaluate the performance of commercially or near-commercially available HTLS conductors that are capable of significantly increasing the current carrying capacity of thermally constrained transmission lines without the need for extensive tower modifications. With the support of 20 participating utilities, and a budget of \$3.25M, EPRI identified five HTLS conductors to be tested under this project. Project participants were able to benefit by obtaining vital information on selecting, designing, installing, operating, and maintaining the HTLS conductors. Additionally, host utilities benefit from the increased thermal rating capacity of the installed conductors during the field trials and after should they wish to own it.

This project was authorized by Electric operations December 2002. The agreement with EPRI was executed on December 3, 2002.

**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 was specifically aimed at minimizing the cost of energy to the customer by finding ways to use electricity more efficiently and providing greater customer satisfaction and control of energy costs.

The project generated substantial new learning on concepts and benefits of new energy delivery technologies at the transmission level to meet the increased power flow requirements within the existing Right-Of-Way and with limited modifications to existing structures.

EPRI was selected as the single source vendor. EPRI is the premier industry-wide research consortia in the United States. EPRI membership is open to all organizations involved in the energy industry. It was founded in 1973 as an independent, non-profit, public-interest, collaborative research and development (R&D) organization serving the electric utilities, their customers, and society. EPRI provides a wide range of innovative products and services to more than 1000 energy related organizations in 40 countries. It is recognized as a world leader in creating technological and environmental solutions for the energy industry and society.

**SCHEDULE:**

|                          |           |
|--------------------------|-----------|
| Project Duration:        | 65 Months |
| Start Date:              | 12/3/2002 |
| Planned Completion Date: | 1/31/2007 |
| Actual Completion Date:  | July/2009 |

**SUMMARY OF COSTS:**

|                      | <b>Budget</b> | <b>Actual</b>      | <b>Variance</b> | <b>LIPA HISTORICAL EXPENDITURES</b> |                |
|----------------------|---------------|--------------------|-----------------|-------------------------------------|----------------|
|                      |               |                    |                 | <b>Year</b>                         | <b>Dollars</b> |
| <b>LIPA</b>          | \$102,814     | \$102,814          | \$0             | 2002                                | \$100,000      |
| <b>Other Funding</b> |               |                    |                 | 2003                                | \$2,814        |
| EPRI TC              |               | \$100,000          |                 | 2004-2009                           | \$0            |
| Other Utilities      |               | \$3,000,000        |                 |                                     |                |
| <b>Cumulative</b>    |               | <b>\$3,202,814</b> |                 |                                     |                |
| Leveraging           |               | <b>31: 1</b>       |                 |                                     |                |

**PROJECT RESULTS:**

The final report was completed in July 2009 and distributed. A final review meeting was held in March 2009 to close out the project.

In previous years, all five conductors were installed and experienced at least three summers of operation. Along with periodic site inspections, performance monitoring equipment was installed at all sites to obtain data on performance parameters: conductor sag, conductor tension, weather condition (temperature, wind velocity, solar intensity, rain rate), conductor current, splice resistance, hardware temperature, corona effects, EMF, and visual appearance.

In addition, a conductor life prediction study was pursued at Oak Ridge National Laboratory.

**DELIVERABLES:**

|   | <b><u>Planned</u></b> | <b><u>Actual</u></b> |
|---|-----------------------|----------------------|
| • Project Review Meetings – Winter and Fall | Bi-yearly             | Complete             |
| • Technical Workshops                       | Periodic              | Complete             |
| • Final Workshop                            | 03/2009               | 05/2009              |
| • Final Report                              | 07/2009               | 07/2009              |

**BENEFIT/COST ANALYSIS:**

- Real-world performance information on commercially or near commercially available HTLS conductors from field trials is invaluable to transmission engineers and planning.
- Obtain recommendations from EPRI that can be included in any evaluation to re-conductor transmission circuits requiring increased thermal capacity. Recommendations will take into consideration parameters such as performance, costs, ease of installation, and availability of equipment.

Significant benefits area being realized by LIPA in transmission design and planning through thorough understanding of the applications and benefits of advanced transmission cables. The value of this project to LIPA is approximately \$3 million.

**TECHNOLOGY TRANSFER ACTIVITIES:**

Operations personnel were intimately involved with the day-to-day research of this program. In addition, results will be disseminated through reports and presentations developed during the research period.

**POSSIBLE FOLLOW-ON WORK**

None anticipated.

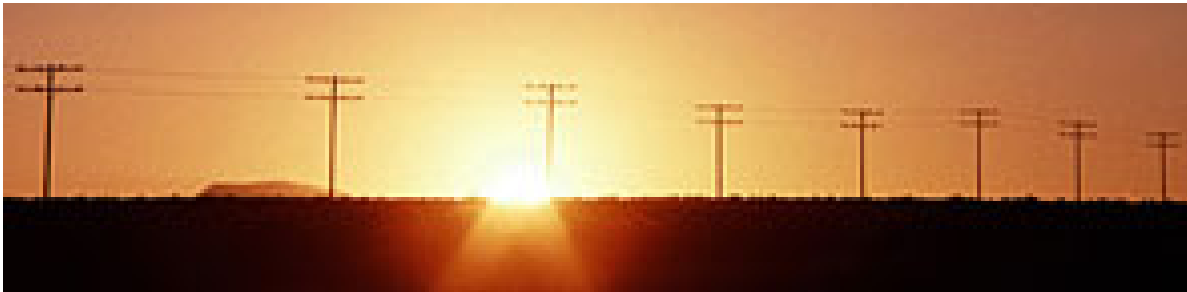
**CONCLUSION:**

The project installed four HTLS conductors (ACSS, GTZACSR, ACCC, CRAC) and one additional conductor (ACCR by 3M) for demonstration and performance evaluation. These installations were completed at various host utilities (CenterPoint Energy, Hydro One, Arizon Public Service, San Diego Gas & Electric).

## **PROJECT O119: UNDERGROUND DISTRIBUTION SYSTEMS, DISTRIBUTION SYSTEMS AND ADVANCED DISTRIBUTION SYSTEMS**

*(EPRI PROGRAMS 30, 124, 128)*

### **PROJECT RATIONALE:**



This distribution program is a conglomeration of three distinct but related EPRI Program areas:

- Underground Distribution Systems
- Distribution Systems
- Advanced Distribution Automation

Research in the Underground Distribution Systems Program provides unbiased scientific analysis, products, technology, design alternatives, and construction methods that enable the electric distribution industry to improve financial performance, reliability, safety and health, customer satisfaction, as well as advance societal priorities and strategically transform the industry with technical advancements. In parallel, work has also begun to address the aging workforce and retain the level of expertise through the use of innovative training and knowledge transfer guides and tools developed through EPRI.

The distribution systems infrastructure in the United States is three times that of transmission. While the networks are aging, demands for power are increasing; the drive for continuous improvements in reliability is relentless. This program focuses on improving reliability, reducing costs, and positioning distribution utilities as informed buyers and users of new technologies. As the industry debates the repair versus replacement decision for an aging infrastructure, the focus must shift to new technologies and the associated opportunities.

Participation in the Advanced Distribution Automation (ADA) Program provides each participating group with the technology and tools needed to upgrade their systems to keep pace with emerging trends and stakeholder demands relative to the Distribution System of the Future. Customers and regulators will demand more types of services, higher levels of service quality, higher system reliability, and increased system efficiency (lower electrical losses) as they become aware that the gains in technology make the higher levels achievable. This program assists members in addressing those anticipated demands by creating the technology basis for the Distribution System of the Future.

This project was authorized by Electric Operations and the participation was approved by the NYS OSC/AG on July 15, 2009.

**RELATIONSHIP TO LIPA’S MISSION:**

| <b>Applicability of LIPA’s Objectives</b> |   |
|---|---|
| ✓   | Enhance the Reliability of the Generation and Transmission System |
| ✓   | Enhance the Reliability of the Distribution System                |
| ✓   | Minimize Rates and Increase Customer Satisfaction                 |
| ✓   | Promote a Healthy Environment                                     |
|   | Position LIPA to Respond Rapidly to Change                        |

The range of projects in this program area is specifically aimed at enhancing the reliability of the distribution system. It plans for system stability and grid reliability.

**VENDOR SELECTION/JUSTIFICATION:**

EPRI was selected as the sole source vendor in order to take advantage of their on-going program in this area and gain the benefits of the collaborative research funding opportunity.

**SCHEDULE:**

|                          |            |
|--------------------------|------------|
| Project Duration:        | 15 Months  |
| Start Date:              | 01/01/2009 |
| Planned Completion Date: | 3/31/2010  |

**SUMMARY OF COSTS:**

|                      | <b>Budget</b> | <b>Actual</b>      | <b>Variance</b> | <b>LIPA HISTORICAL EXPENDITURES</b> |                |
|----------------------|---------------|--------------------|-----------------|-------------------------------------|----------------|
|                      |               |                    |                 | <b>Year</b>                         | <b>Dollars</b> |
| <b>LIPA</b>          | \$186,091     | \$186,091          | \$0             | 2009                                | \$186,091      |
| <b>Other Funding</b> |               |                    |                 |                                     |                |
| Other Utilities      |               | \$4,493,700        |                 |                                     |                |
| <b>Cumulative</b>    |               | <b>\$4,679,791</b> |                 |                                     |                |
| Leveraging           |               | <b>25 : 1</b>      |                 |                                     |                |

**PROJECT RESULTS:**

**Underground Distribution**

- Published the First Edition Underground Distribution Reference: the “Bronze Book.”
- Provided increased understanding of advanced diagnostics techniques, modeling, and methods.
- Applied sensor technologies and conduct laboratory testing and field demonstrations.
- Expanded manhole event research.
- Advanced nano-dielectric medium-voltage cables.
- Shared urban network best practices and conduct workshops.

## Advanced Distribution Automation

- Published initial version of the Distribution Automation Guidebook
- Held International Workshop on ADA and Distribution System of the Future
- Held PQA/ADA Conference and Exhibition
- Updated Smart Distribution System Roadmap
- Created Technology Watch for Distribution Smart Grid Technologies
- Created final plan and design for IUT field prototype
- Created field prototype of modular solid-state switchgear
- Advanced controls and simulation methods for implementing smart grid applications (e.g., loss reduction, equipment performance optimization, fault location)
- Recommended approaches and key applications for integrating advanced metering infrastructure with smart distribution systems
- Commercialization and integration of distribution fault anticipator technology

## Distribution Systems

- Performed component analysis and accelerated aging metrics
- Provided wood pole application alternatives
- Advanced fault location algorithms
- Provided neutral-to-earth voltage mitigation techniques
- Launched Knowledge-Based Services

### DELIVERABLES:

|   | <u>Report</u> | <u>Planned</u> | <u>Actual</u> |
|---|---------------|----------------|---------------|
| • Distribution Dispatch, Second Quarter, 2009   | 1019564       | 31-Dec-09      | 22-Oct-09     |
| • Distribution Dispatch, Third Quarter 2009   | 1019565       | 30-Sep-09      | 30-Sep-09     |
| • Distribution Dispatch, Fourth Quarter, 2009   | 1019566       | 31-Dec-09      | 14-Dec-09     |
| • Underground Distribution  | 1019596       | 31-Oct-09      | 18-Sep-09     |
| • Sensors for Underground Distribution Systems  | 1017686       | 31-Dec-09      | 31-Mar-10     |
| • Nanodielectrics for Underground Distribution Cables and Cable Systems                       | 1017688       | 31-Dec-09      | 18-Dec-09     |
| • Urban Underground Distribution Practices  | 1017689       | 31-Dec-09      | 23-Dec-09     |
| • Urban Networks Simulation Tools   | 1017690       | 31-Dec-09      | 31-Mar-10     |
| • First Edition Underground Distribution Reference Book                                       | 1017691       | 31-Dec-09      | 22-Dec-09     |
| • Subscription to EPRIs Distribution Knowledge-transfer electronic publications and resources | E232117       | 31-Dec-09      | 01-Apr-09     |
| • Solid-State Transfer Switch Development   | 1017830       | 31-Dec-09      | 10-Dec-09     |
| • 100kVA Intelligent Universal Transformer Development  | 1017831       | 31-Dec-09      | 21-Dec-09     |
| • Sensor Technologies for Real-Time Distribution System Monitoring                            | 1017832       | 31-Dec-09      | 02-Dec-09     |
| • Testing and Performance Assessment for Field Applications of Advanced Meters                | 1017833       | 31-Dec-09      | 04-Dec-09     |
| • Overhead Distribution System Component Reliability  | 1017836       | 31-Dec-09      | 23-Dec-09     |
| • Distribution Conductor Burndown Test Results  | 1017839       | 31-Dec-09      | 09-Dec-09     |
| • Distribution Circuit Inspection and Assessment Guidebook                                    | 1017840       | 31-Dec-09      | 03-Dec-09     |
| • Distribution Fault Location and Waveform Characterization                                   | 1017842       | 31-Dec-09      | 11-Dec-09     |
| • Elevated Neutral-to-Earth and Contact Voltages in Distribution                              | 1017843       | 31-Dec-09      | 30-Nov-09     |

## Systems

- Elevated NEV and Urban Stray Voltage Website Updates E230553 31-Dec-09 31-Jan-10

**BENEFIT/COST ANALYSIS:**

The wide range of projects pursued through this EPRI program area is geared towards improving distribution equipment and processes in order to reduce maintenance and capital costs and reduce customer outages.

A series of reports, procedures and guidelines has resulted from this project. The use of the information in these reports has been calculated to save over \$4.7 million in man-hours and avoided equipment costs.

**TECHNOLOGY TRANSFER ACTIVITIES:**

Planning personnel have been intimately involved with the day-to-day research in this program. In addition, results will be disseminated through reports and presentations developed during the research period.

**POSSIBLE FOLLOW-ON WORK**

It is anticipated that LIPA will participate in these same program areas in 2010.

**CONCLUSION:**

The project successfully issued all promised deliverables by 31 December, 2009. It is expected that further successes will be identified once the recommendations of the reports have been assessed and implemented during the normal course of business.

## O120: TRANSMISSION AND SUBSTATIONS (EPRI PROGRAMS 35, 36, 37, 38)

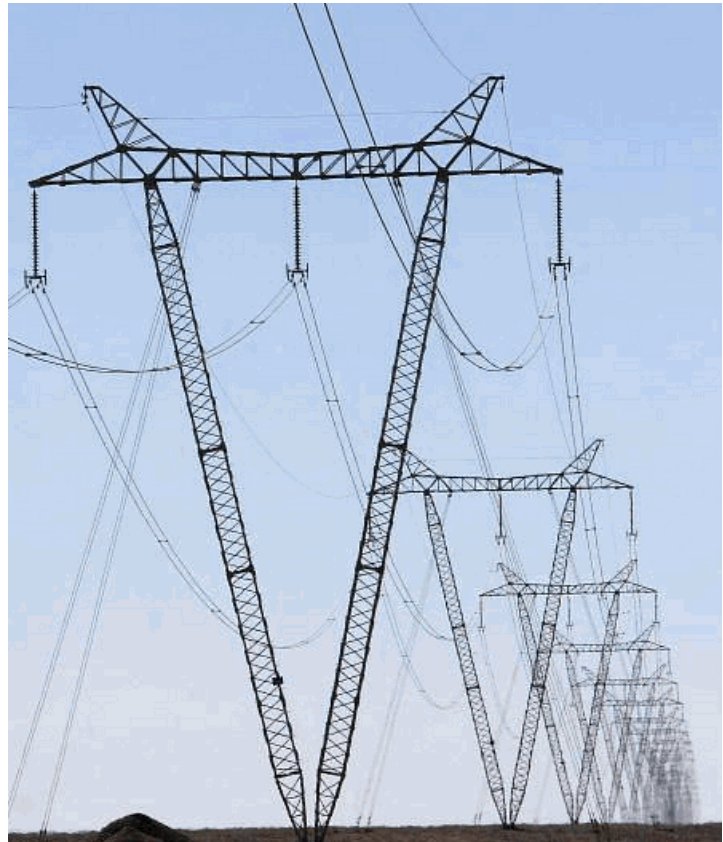
### PROJECT RATIONALE:

The overhead transmission line (OHTL) program area looks to reduce O&M costs and extend the life of equipment. The focal point of this particular effort is the *Inspection and Assessment Methods Guideline* (Yellow Book). Work on line components and inspection technologies were undertaken through separate projects, and results were condensed into a single inspection and assessment (IAM) repository: the Yellow Book. This project set helps clients stay abreast of the most current information and technology, enabling improved overhead transmission line design and component selection to optimize life cycle costs. Capital savings of 5–10% can be achieved through optimization of new designs. In addition, enhanced understanding gained through new technologies helps clients reduce risk and increase the life of new components.

The increased transmission capacity program is structured to develop methodologies for real-time rating calculations for transmission line equipment, focusing on integrating optimized software with hardware (i.e., instrumentation).

Some projects have developed minor upgrades on existing systems to provide owners results more quickly at a smaller return on investment. Other projects have been studying impacts on different transmission line components of increased power flow in transmission lines. This set also includes a systematic assessment of risks versus rewards when operating the system at increased power levels. The objective of this new project set is to enable utilities to increase the power capacity of existing transmission lines through major technological upgrades, such as conductor and voltage upgrades, as well as the integration of various advanced technologies (i.e., Flexible Alternating Current Transmission Systems (FACTS), Static VAR Compensators (SVCs), series capacitors, series reactors, and phase shifters) into transmission circuits. Such major technological upgrades can yield significant increases in power flow.

The underground transmission program recognizes investor, regulator, and customer pressure to reduce underground transmission installation and operating costs, improve transmission system reliability, increase transmission capacity, and ensure health and safety. It looks to do this through an investigation into extruded dielectric cable being installed at high voltage (HV) and extra high voltage (EHV) levels (e.g., selection of various cable sub-types, installation designs, operation and maintenance) and through the need to extend life of pipe-type and self-contained cable systems through selective upgrades, retrofits, and an increased operating and maintenance focus.



The substation program, in previous years, was limited and quite focused. However, second only to transformers, circuit breakers represent the most critical investment for utilities as well as significant maintenance and operation responsibilities. Research under this project set has expanded to provide utilities with better capabilities in managing these critical assets in the areas of investment decision-making, increased reliability, reduced failures, safer operating practices, reduced maintenance costs, and extended component life. This project set contains two projects: The first focuses on circuit breaker condition assessment and life extension; The second considers the opportunities presented by advances in metering and protection equipment to provide much needed circuit breaker monitoring and diagnostic functions.

This project was authorized by Electric Operations and the participation was approved by the NYS OSC/AG on July 15, 2009.

**RELATIONSHIP TO LIPA’S MISSION:**

| <b>Applicability of LIPA’s Objectives</b> |   |
|---|---|
| √   | 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 range of projects in this program area is specifically aimed at enhancing the reliability of the transmission and substation system by enhancing the planning for system stability and grid reliability.

EPRI was selected as the sole source vendor in order to take advantage of their on-going program in this area and gain the benefits of the collaborative research funding opportunity.

**SCHEDULE:**

|                          |           |
|--------------------------|-----------|
| Project Duration:        | 15 months |
| Start Date:              | 1/1/2009  |
| Planned Completion Date: | 3/31/2010 |

**SUMMARY OF COSTS:**

|                      | <b>Budget</b> | <b>Actual</b>      | <b>Variance</b> | <b>LIPA HISTORICAL EXPENDITURES</b> |                |
|----------------------|---------------|--------------------|-----------------|-------------------------------------|----------------|
|                      |               |                    |                 | <b>Year</b>                         | <b>Dollars</b> |
| <b>LIPA</b>          | \$229,829     | \$229,829          | \$0             | 2009                                | \$229,829      |
| <b>Other Funding</b> |               |                    |                 |                                     |                |
| Other Utilities      |               | \$5,471,075        |                 |                                     |                |
| <b>Cumulative</b>    |               | <b>\$5,700,904</b> |                 |                                     |                |
| Leveraging           |               | <b>25 : 1</b>      |                 |                                     |                |

**DELIVERABLES:**

|  | <b><u>Report</u></b> | <b><u>Planned</u></b> | <b><u>Actual</u></b> |
|--|----------------------|-----------------------|----------------------|
| • Zed-Meter Ver 1.0  | 1020242              | 31-Dec-09             | 15-Oct-09            |
| • Using the Zed-Meter (R)  | 1020243              | 31-Dec-09             | 23-Dec-09            |
| • Alternate Ground Electrode Materials   | 1017705              | 31-Dec-09             | 14-Dec-09            |
| • An Approach for Using TFlash to Improve the Lightning Performance of Transmission Lines  | 1017706              | 31-Dec-09             | 07-Dec-09            |
| • TFLASH 6.0 Transmission Line Lightning Protection  | 1017708              | 31-Dec-09             | 28-Oct-09            |
| • Guide for the Application of Transmission Line Surge Arrestors   | 1017709              | 31-Dec-09             | 21-Dec-09            |
| • EPRI Zed-Meter&reg; Construction Guide   | 1018972              | 31-Dec-09             | 23-Dec-09            |
| • Overhead Transmission Line Lightning and Grounding Reference Book 2009   | 1018973              | 31-Dec-09             | 23-Dec-09            |
| • Grounding Guide Workshop   | E230524              | 31-Dec-09             | 03-Nov-09            |
| • TLSA workshop  | E230525              | 31-Dec-09             | 11-Nov-09            |
| • EPRI Zed-Meter Training  | E230526              | 31-Dec-09             | 03-Dec-09            |
| • Optimization of Transmission Line Design Using Life Cycle Costing  | 1017712              | 31-Dec-09             | 22-Dec-09            |
| • Workshop for Life-Cycle Cost Analysis  | E230529              | 31-Dec-09             | 31-Dec-09            |
| • New York Power Authority Blenheim-Gilboa Unit 2 Cable Failure  | 1019450              | 31-Aug-09             | 08-Jul-09            |
| • On-Line Dissolved Gas Analysis in High-Pressure Fluid-Filled Cables  | 1019504              | 31-Dec-09             | 17-Nov-09            |
| • Underground Transmission Construction: Vault and Manhole Design and Current Practices  | 1019602              | 31-Dec-09             | 08-Dec-09            |
| • Future Inspection and Monitoring of Underground Transmission Lines   | 1020168              | 31-Dec-09             | 01-Dec-09            |
| • Future Inspection and Monitoring of Underground Transmission Lines   | 1020168              | 31-Dec-09             | 01-Dec-09            |
| • Pressurization Tests on High-Pressure Fluid-Filled Underground Transmission Cables of Public Service Electric & Gas Company  | 1020169              | 31-Dec-09             | 10-Dec-09            |
| • Thermo-Mechanical Bending Testing and Analysis for Public Service Electric and Gas Company Field-Aged Cables   | 1020316              | 31-Oct-09             | 28-Oct-09            |
| • Development of Nanocomposite Cables for Underground Transmission Systems   | 1020582              | 31-Dec-09             | 23-Dec-09            |
| • UT Workstation: v5.1 Functional and Technical Enhancement  | 1017727              | 31-Dec-09             | 02-Dec-09            |
| • Underground Transmission Cable System Installation and Construction Practices Manual   | 1017728              | 31-Dec-09             | 22-Dec-09            |
| • Simulation and Confirmation of Test Rig Dimensions   | 1017729              | 31-Dec-09             | 21-Dec-09            |
| • High Stress Cable Using Nano-Composites: Model Cable Tested  | E230532              | 31-Dec-09             | 16-Sep-09            |
| • Corrosion of Buried Steel Pipes Used With Transmission Pipe-Type Cable Systems   | 1017731              | 31-Dec-09             | 02-Nov-09            |
| • Development and Demonstration of New Condition Monitoring Sensors and Techniques   | 1017732              | 31-Dec-09             | 23-Dec-09            |
| • EPRI Transformer Guidebook Development   | 1017734              | 31-Dec-09             | 23-Dec-09            |
| • Program on Technology Innovation: Study on the Integration of High Temperature Superconducting DC Cables Within the Eastern and Western North American Power Grids | 1020330              | 30-Nov-09             | 25-Nov-09            |
| • Program on Technology Innovation: Transient Response of a Superconducting DC Long Length Cable System Using Voltage Source Converters                              | 1020339              | 31-Dec-09             | 21-Dec-09            |
| • EPRI Power Electronics-Based Transmission Controllers Reference Book ("The Gold Book")   | 1020401              | 31-Dec-09             | 23-Dec-09            |
| • Program on Technology Innovation: A Superconducting DC Cable   | 1020458              | 31-Dec-09             | 15-Dec-09            |
| • EPRI Increased Power Flow Guidebook, Third Edition   | 1017775              | 31-Dec-09             | 14-Dec-09            |
| • Tutorial on Increased Power Flow Guidebook, Third Edition  | 1017776              | 31-Dec-09             | 04-Dec-09            |
| • Dynamic Thermal Circuit Rating (DTCR ) v5.0  | 1017778              | 31-Dec-09             | 18-Nov-09            |

|  |         |           |           |
|--|---------|-----------|-----------|
| • DTCR Technology Workshop   | E230545 | 31-Dec-09 | 19-Oct-09 |
| • Thermal Models of Overhead Transmission Lines Operating at High Temperatures | 1017781 | 31-Dec-09 | 21-Dec-09 |
| • Effects of High-Temperature Cycling on Conductor Systems                     | 1017782 | 31-Dec-09 | 23-Dec-09 |
| • HTC (High-Temperature Conductor) Matrix: Version 3.0                         | 1017783 | 31-Dec-09 | 28-Oct-09 |

**BENEFIT/COST ANALYSIS:**

Aging transmission lines continue to be the workhorse of power delivery infrastructure, even as demand for new construction increases to meet load growth. EPRI's Transmission and Increased Power Flow programs develop tools for specifying, designing, maintaining, and inspecting existing structures; improving reliability and availability; ensuring worker and public safety; and reducing capital and O&M expenses. New developments and deployment in low-cost sensors for rapid and reliable inspection of transmission lines, insulators, and substructures as well as extensive documentation and demonstrations of live working procedures have resulted in robust guidance for the industry. Engineering and planning guides for increased power flow and the use of new conductor technologies are the focus of look-ahead transmission line technologies.

A series of reports, procedures and guidelines has resulted from this project. The use of the information in these reports has been calculated to save over \$7.5 million in man-hours and avoided equipment costs.

**TECHNOLOGY TRANSFER ACTIVITIES:**

Transmission and Substations personnel are intimately involved with the day-to-day research in this program. In addition, results have been disseminated through reports and presentations developed during the research period.

**POSSIBLE FOLLOW-ON WORK:**

It is expected that participation in this area will be on-going in 2010.

**CONCLUSION:**

The project successfully issued all promised deliverables by 31 December, 2009. It is expected that further successes will be identified once the recommendations of the reports have been assessed and implemented during the normal course of business.

## **O122: GRID OPERATIONS AND PLANNING** (EPRI PROGRAM 40)

### **PROJECT SUMMARY AND RATIONALE:**

By equipping grid operators with better tools and training them to be more effective, organizations responsible for reliability will keep the lights on, improve system reliability, maximize power transfer, and improve the efficiency of power markets. As a result, grid operators will be able to increase their operating and capital budgets, reduce operating costs, avoid costly blackouts and ensuing legal liabilities, and retain public trust.

Past research has developed a comprehensive set of direct methods to compute the boundaries of voltage and transient stability regions. Based on these direct methods, this project will generate a product-level software package to provide tools for operators. This project will



also develop an interface for CIM databases to allow their easy integration with any type of EMS system, as well as develop the interface with CAR. Combined with the thermal reliability region, this framework will enable the complete characterization of CAR, recognizing all types of constraints, and allow operators to visualize both thermal and stability boundaries within the same framework.

Real-time high-voltage transmission system measurements, power flow, voltage, current, power, and phasor, are performed today. Of these, only phasor measurements are made with devices, called phasor measurement units (PMUs), equipped with real-time clocks that time stamp the data to the millisecond accuracy needed for synchronized measurements.

This project was authorized by Electric Operations and the participation was approved by the NYS OSC/AG on July 15, 2009.

### **RELATIONSHIP TO LIPA'S MISSION:**

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#### **Applicability of LIPA's Objectives**

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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.

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This project is consistent with LIPA’s Energy Plan and is specifically aimed at enhancing the reliability of the bulk power and distribution system by enhancing the planning for system stability and grid reliability.

EPRI was selected as the sole source vendor in order to take advantage of their on-going program in this area and gain the benefits of the collaborative research funding opportunity.

**SCHEDULE:**

|                              |            |
|------------------------------|------------|
| Project Duration:            | 1 year     |
| Start Date:                  | 01/01/2009 |
| Planned Completion Date:     | 12/31/2010 |
| Anticipated Completion Date: | 03/31/2010 |

**SUMMARY OF COSTS:**

|                      | <b>Budget</b> | <b>Actual</b>      | <b>Variance</b> | <b>LIPA HISTORICAL EXPENDITURES</b> |                |
|----------------------|---------------|--------------------|-----------------|-------------------------------------|----------------|
| <b>LIPA</b>          | \$49,605      | \$49,605           | \$0             | <b>Year</b>                         | <b>Dollars</b> |
| <b>Other Funding</b> |               |                    |                 | 2009                                | \$49,605       |
| Other Utilities      |               | \$1,336,036        |                 |                                     |                |
| <b>Cumulative</b>    |               | <b>\$1,338,490</b> |                 |                                     |                |
| Leveraging           |               | <b>27 : 1</b>      |                 |                                     |                |

**DELIVERABLES:**

|   | <b>Report</b> | <b>Planned</b> | <b>Actual</b> |
|---|---------------|----------------|---------------|
| • Engineering Study Toolbox Version 1.0   | 1019373       | 30-Sep-09      | 15-Sep-09     |
| • Power Plant Model Validation Using On-Line Disturbance Monitoring                         | 1017801       | 31-Dec-09      | 07-Dec-09     |
| • Load Model Data Processing and Parameter Derivation (LMDPPD) Version 2.0                  | 1017802       | 31-Dec-09      | 26-Jun-09     |
| • Power Plant Parameter Derivation (PPPD) Software Version 2.0                              | 1017803       | 31-Dec-09      | 03-Jun-09     |
| • Load Model Data Processing and Parameter Derivation (LMDPPD) Version 2.1                  | 1020175       | 31-Dec-09      | 02-Sep-09     |
| • Conduct industry CIM/GID interoperability tests in conjunction with current IEC revisions | 1017804       | 31-Dec-09      | 30-Sep-10     |
| • Guidebook on Advanced Transmission Reliability Assessment and Planning                    | 1017805       | 31-Dec-09      | 07-Dec-09     |
| • Technical Conference on ERO Reliability Standards   | E230547       | 31-Dec-09      | 31-Dec-09     |
| • Assessment of Grid Reliability Benefits and Transfer Gains with Segmentation              | 1017806       | 31-Dec-09      | 20-Dec-09     |
| • Development of Next Generation Phasor Measurement Unit Features                           | 1017807       | 31-Dec-09      | 30-Oct-09     |

**BENEFIT/COST ANALYSIS:**

The research program for Grid Operations and Planning has made available to its members an integrated set of operating and planning tools, as well as a knowledge base, that together will provide three major benefits:

- Improve the Reliability of grid operation and increase grid operator effectiveness
- Enable a more Robust transmission grid through better coordination of transmission planning with resource planning, while enhancing the efficiency of power markets
- Enhance the Reflex mechanisms of a wide-area interconnected power system through advanced system approaches. (Reflex mechanisms is a metaphor for new automatic control systems that react intelligently using wide-area information.)

A series of reports, procedures and guidelines has resulted from this project. The use of the information in these reports has been calculated to save nearly \$500 thousand in man-hours and avoided equipment costs.

### **TECHNOLOGY TRANSFER ACTIVITIES:**

Planning personnel are intimately involved with the day-to-day research in this program. In addition, results will be disseminated through reports and presentations developed during the research period.

### **POSSIBLE FOLLOW-ON WORK**

It is expected that participation in this area will be on-going in 2010.

### **CONCLUSION:**

The project successfully issued all promised deliverables by 31 December, 2009. It is expected that further successes will be identified once the recommendations of the reports have been assessed and implemented during the normal course of business.

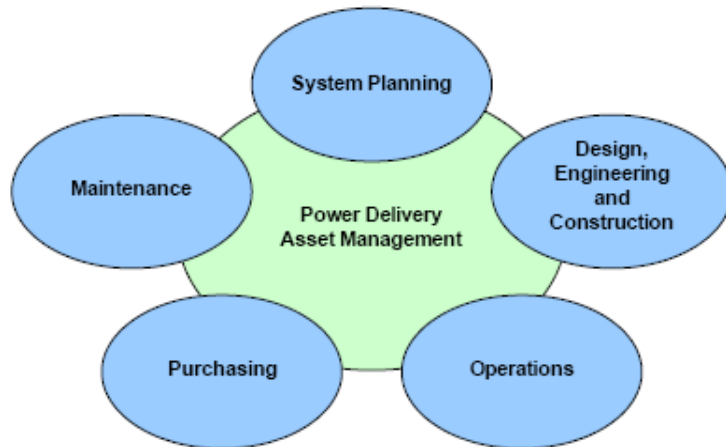
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**PROJECT O123: POWER DELIVERY ASSET MANAGEMENT**  
(EPRI PROGRAM 112)

**PROJECT RATIONALE:**

Today in the utility industry, there is a need for prudent management of company assets to maximize the benefit. Enhanced system reliability and performance is necessary to optimize maintenance expenditures.

This program provides numerous financial benefits: reducing the cost to implement and improving the performance of asset management functions; helping identify corporate goals and making them operational through explicit value models; and helping ensure that capital and O&M budgets are allocated to the highest value projects. Through its Aging Assets Analysis system, it enables members to reduce life-cycle costs by up to 35% through implementation of high-value repair/replace strategies. By focusing resources on high value projects, it enables up to 70% higher return on equity and 40% higher return of assets. It also helps to develop a consistent, systematic and repeatable framework for transmission, substation, and distribution asset risk and performance assessment.



This project was authorized by Electric Operations and the participation was approved by the NYS OSC/AG on July 15, 2009.

**RELATIONSHIP TO LIPA’S MISSION:**

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**Strategic Objectives**

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- √ 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 program area is specifically aimed at minimizing the cost of energy to the customer by finding ways to use electricity more efficiently and providing greater customer satisfaction and control of energy costs.

EPRI was selected as the sole source vendor in order to take advantage of their on-going program in this area and gain the benefits of the collaborative research funding opportunity.

**SCHEDULE:**

Project Duration: 15 Months  
 Start Date: 01/01/2009  
 Planned Completion Date: 3/31/2010

**SUMMARY OF COSTS:**

|                      | <b>Budget</b> | <b>Actual</b>    | <b>Variance</b> | <b>LIPA HISTORICAL EXPENDITURES</b> |                |
|----------------------|---------------|------------------|-----------------|-------------------------------------|----------------|
| <b>LIPA</b>          | \$34,362      | \$34,362         | \$0             | <b>Year</b>                         | <b>Dollars</b> |
| <b>Other Funding</b> |               |                  |                 | 2009                                | \$34,362       |
| Other Utilities      |               | \$685,548        |                 |                                     |                |
| <b>Cumulative</b>    |               | <b>\$687,337</b> |                 |                                     |                |
| Leveraging           |               | <b>20 : 1</b>    |                 |                                     |                |

**PROJECT RESULTS:**

- Further implementation of the power delivery asset management framework
- Enhanced decision making process models
- Continued development of the asset management effectiveness model
- Enhanced development of the asset health/system health method
- Asset management workshop
- Information integration for asset health assessment
- Technical requirements for system performance and risk assessment integrated framework development

**DELIVERABLES:**

|  | <b><u>Report</u></b> | <b><u>Planned</u></b> | <b><u>Actual</u></b> |
|--|----------------------|-----------------------|----------------------|
| • Asset Management Best Practices                        | 1017825              | 31-Dec-09             | 23-Dec-09            |
| • Asset Management Conference                            | E230548              | 31-Dec-09             | 06-Nov-09            |
| • Developing Value Models for Risk Mitigation Strategies | 1017827              | 31-Dec-09             | 23-Dec-09            |
| • Smart Grid Enabled Asset Management                    | 1017828              | 31-Dec-09             | 06-Nov-09            |

**BENEFIT/COST ANALYSIS:**

**Benefits:**

These projects provide numerous financial benefits, including reducing the cost to implement and improving the performance of asset management functions; helping identify corporate goals and making them operational through explicit value models; and helping ensure that capital and O&M budgets are allocated to the highest value projects. The more immediate effect to LIPA is useful technical reports that would have cost one man-year to produce.

- Improved asset management guidelines for wood poles and underground cables;
- Increased reliability of transmission and distribution systems;

- Improved asset management methods by comparing EPRI roadmap of how asset management can be implemented.

A series of reports, procedures and guidelines has resulted from this project. The use of the information in these reports has been calculated to save nearly \$200 thousand in man-hours and avoided equipment costs.

### **TECHNOLOGY TRANSFER ACTIVITIES:**

Planning personnel have been intimately involved with the day-to-day research in this program. In addition, results have been disseminated through reports and presentations developed during the research period.

### **POSSIBLE FOLLOW-ON WORK**

None.

### **CONCLUSION:**

The project successfully issued all promised deliverables by 31 December, 2009. It is expected that further successes will be identified once the recommendations of the reports have been assessed and implemented during the normal course of business.

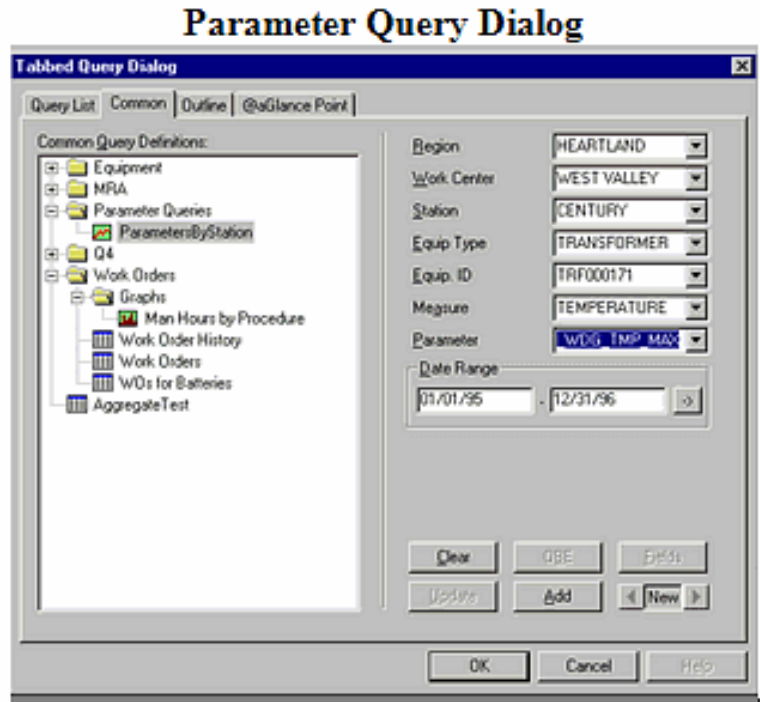
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## O144: MAINTENANCE MANAGEMENT WORKSTATION (MMW) USERS GROUP

### PROJECT SUMMARY AND RATIONALE:

The Maintenance Management Workstation (MMW) provides electric power utilities with a centralized means to access and utilize the information required to initiate, schedule, track, record, and analyze equipment maintenance tasks. This application allows utilities' equipments maintenance and management program to be customized to their specific needs. By implementing MMW's fully integrated core modules, engineers can assess the condition of equipment across various transmission, substations, and distribution networks, and recommend maintenance priorities to management.

As part of its ongoing commitment to improving MMW to meet the demands of the utility industry and provide ongoing support to MMW users, the Electric Power Research Institute (EPRI) proposed forming a Users Group to gather centralize all users through this project.



The objective of this project was to perform the following services as a collaborative effort that will allow for efficiencies of scale in the three parts:

1. Common Product Support to help utility administrators and end users effectively resolve critical product design issues; This to allows a more smooth and effective use of MMW capabilities;
2. Customer Specific Issues to help resolve specific operational issues that end users face when using MMW in business applications;
3. Annual user group meetings where members would have an opportunity to eliminate redundancy, discuss product enhancements, and encourage innovation.

This project was authorized by Electric Operations and the agreement was executed on September 16, 2005.

### RELATIONSHIP TO LIPA'S MISSION:

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#### 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 enhancing the reliability of the bulk power and distribution systems by providing continued support and collaboration on MMW, a tool that enables LIPA to maintain their equipment, manage its assets, and ultimately reduce or prevent outages.

As this project was a specific supplemental offering from EPRI, they were selected as the sole source provider. The NYS OSC has approved the sole source justification through a multi-year EPRI contract 2006-2008.

EPRI was selected as the sole source vendor in order to take advantage of their on-going program in this area and gain the benefits of the collaborative research funding opportunity.

**SCHEDULE:**

Project Duration: 51 Months  
 Start Date: 9/26/2005  
 Planned Completion Date: 12/31/2009

**SUMMARY OF COSTS:**

|                      | Budget   | Actual           | Variance | LIPA HISTORICAL EXPENDITURES |         |
|----------------------|----------|------------------|----------|------------------------------|---------|
|                      |          |                  |          | Year                         | Dollars |
| LIPA                 | \$47,000 | \$47,000         | \$0      | 2005                         | \$9,400 |
| <b>Other Funding</b> |          |                  |          | 2006                         | \$9,400 |
| EPRI TC              |          | \$47,000         |          | 2007                         | \$9,400 |
| Other Utilities      |          | \$188,000        |          | 2008                         | \$9,400 |
| <b>Cumulative</b>    |          | <b>\$235,000</b> |          | 2009                         | \$9,400 |
| Leveraging           |          |                  | 4 : 1    |                              |         |

**PROJECT RESULTS:**

In this project, EPRI brought together MMW users and provided support on design issues related to software source code, and specific support to address the individual concerns of participants. In addition, participants also obtain new releases of MMW through this Users Group.

The Users Group meets via web-meetings/conference calls and face-to-face in collocation with Project Set 37B (Improve Overall Substations Maintenance) Task Force meetings – primarily due to a request from the User Group in order to minimize travel time and costs.

EPRI Principal Investigators have been assisting LIPA with MMW issues on an ongoing project which involves application of Standards (CIM) for integrating Substation Data. After the first training session and a week long user group meeting at LIPA in December 2005, the user group decided to wait until the next release before meeting again for a similar training exercise. The next subsequent improved version of MMW is being readied for Beta Testing by utilities. The programmers will reach out to participating utilities and provide them participating utilities with the beta version for testing. Utilities in the User Group can reach out to EPRI is available to the utilities at any time for assistance; other utilities in the user group are also an available information resource pool for and are also welcome to reach out to other member utilities to learn about new projects involving MMW.

**DELIVERABLES:**

|  | <b><u>Planned</u></b> | <b><u>Actual</u></b> |
|--|-----------------------|----------------------|
| • Common Product Support                     | On-going              | Complete             |
| • On-Site Utility Specific Report to install | 12/31/2005            | 12/31/2005           |
| • Annual User Group Meeting – 2005           | 12/31/2005            | 12/31/2005           |
| • Annual User Group Meeting – 2006           | 12/31/2006            | 12/31/2006           |
| • Annual User Group Meeting – 2007           | 12/31/2007            | 12/31/2007           |
| • Annual User Group Meeting – 2008           | 12/31/2008            | 12/31/2008           |
| • Annual User Group Meeting – 2009           | 12/31/2009            | 12/31/2009           |

**BENEFIT/COST ANALYSIS:**

**Benefits:**

- Ability to request customized training and support on MMW projects specific to the utility.
- Have a say in Input into ongoing enhancements and product changes.

A series of reports, procedures, guidelines and training has resulted from this project. The use of the information in these reports has been calculated to save over \$500 thousand in man-hours and avoided software costs.

**TECHNOLOGY TRANSFER ACTIVITIES:**

Maintenance personnel have been intimately involved with the day-to-day research in this program. In addition, results have been disseminated through reports and presentations developed during the research period.

**POSSIBLE FOLLOW-ON WORK**

None anticipated.

**CONCLUSION:**

To date, the project has installed and tested all proposed cables, connectors, and crimping techniques and provided great insight on their performance. Although the testing of the LIPA/Exelon proposed experiment was not successful, EPRI and CTL are still determined to complete the test upon funding commitment from the two sponsoring utilities.