EPRI

TECHNOLOGY TRANSFER AWARDS | 2023

ENERGY DELIVERY & CUSTOMER SOLUTIONS SECTOR

The EPRI Technology Transfer Awards recognize the leaders and innovators who have applied EPRI research to help shape the future of energy.

The award winners have shown exceptional application of EPRI research and technology in solving a problem of size and significance, championing a technology both within their companies and across the industry, driving progress in the electricity sector, and providing meaningful benefits for their companies' stakeholders and society.

The awards spotlight the value of collaborative research to the electricity sector and its customers. EPRI recognizes and applauds the hard work, commitment, and leadership demonstrated by these award winners to help make electricity more reliable, efficient, affordable, safe, and environmentally responsible.

Again, this year the Energy Delivery & Customer Solutions Sector received more than 100 nominations. All submissions included impressive combinations of engineering, research, and novel application, with the following 21 projects selected to represent the best of the best in 2023.

Energy Delivery & Customer Solutions (ED&CS) is the Sector formerly or previously known as Power Delivery & Utilization (PDU).

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DISTRIBUTION

TECHNOLOGY APPLIED

Distribution Asset Condition Monitoring Technologies

PROGRAM

Distribution Systems – Transmission and Distribution Infrastructure

AWARD SUMMARY

With significant advances in asset monitoring in recent years, EPRI continues to investigate these technologies through lab testing, information sharing, and demonstration studies. From these results, National Grid identified and deployed new technologies that are providing enhanced situational awareness of distribution assets and improving system reliability, resilience, and safety.

National Grid selected two technologies to pilot: an early fault detection system and an underground monitoring system to detect anomalies such as gas buildup, heating, and arcing.

National Grid deployed the early fault detection system on a 30-mile poor-performing circuit to help identify issues that could evolve into outages, improving reliability for customers.

Assessment of the underground monitoring system's ability to detect anomalies indicated the units were registering false positives. Test results helped identify product improvements, including the need for an external antenna. The enhanced technology led to a second pilot demonstration, further improving underground structure safety and reliability.

COMPANY	WINNERS
National Grid USA	James George Jonathan Gonynor

DISTRIBUTION

TECHNOLOGY APPLIED

Long Duration Energy Storage Technology Evaluation and Procurement

PROGRAM

Energy Storage & Distributed Generation and Bulk Energy Storage - Integrated Grid and Energy Systems

AWARD SUMMARY

Salt River Project (SRP), collaborating with EPRI, sought to refine criteria for issuing a proposal for long-duration energy storage (LDES) technologies. Without real proposals and performance estimates to meet contractual performance guarantees, it was difficult for SRP to start including new technologies in their long-term resource planning models.

The team started with EPRI's Energy Storage Technology Database (ESTD), which contains summaries of nearly 100 energy storage technologies and provides perspective on technology maturity, benefits, challenges, safety considerations, and cost. From the information in the database, the team developed a "must have" set of criteria to identify candidate technologies that were suitable for the desired use case, project timeline, project site, and aligned with SRP's long-term energy storage strategic objectives. This yielded a short list of technology developers that were invited to participate in the solicitation.

In parallel with the technology screening, EPRI worked with SRP to develop a Bid Evaluation Scoring Matrix to provide objective criteria for evaluating the proposals, which yielded high-quality bids well suited for the needs of SRP's portfolio. Ultimately, SRP decided to move forward with two energy storage pilot projects on two 5-megawatt solar sites, due to be operational in 2026. SRP sought to demonstrate technologies that had not previously been deployed at this scale to help identify system integration issues that may not be apparent with a smaller demonstration. The methodology developed by SRP for vetting the proposals greatly reduced risk and ensured a better success rate for the demonstration projects.

COMPANY	WINNERS
Salt River Project	Richard Anderson Collin Friedrich Chico Hunter Tessa Murdock Eric Robinson

DISTRIBUTION

TECHNOLOGY APPLIED

Mitigating Distribution Impacts of High Photovoltaic Penetration

PROGRAM

DER Integration – Integrated Grid and Energy Systems

AWARD SUMMARY

Duke Energy, Taiwan Power Company (TPC), and Xcel Energy, in collaboration with EPRI, advanced methods to enhance hosting capacity on distribution systems with high solar penetration.

Duke Energy worked with EPRI to study the performance of reactive power control through smart inverter functions at a 5-megawatt solar site on a feeder with high photovoltaic (PV) penetration. This work led to the development of an improved feeder model that captured true system operations, which will help guide interconnection requirements, system planning, and operation practices.

TPC evaluated voltage regulation technologies on distribution systems with high PV penetration, concluding that distribution connected STATCOM and grid energy router technologies can be used to improve the PV hosting capacity, leading to improved power quality and power system reliability. The outcome of the study resulted in a planned deployment, which is currently underway.

Xcel Energy evaluated flexible interconnection capacity solutions (FICS) to allow deployment of a proposed group of distributed energy resources (DER) that had failed the screening study under standard interconnection guidelines. By modeling the distribution feeder set to predict levels of energy curtailment from the proposed DER under a variety of scenarios and operating conditions, the project demonstrated how a FICS approach can be used to allow more DER interconnection than would be permitted under normal circumstances.

The research helped utilities understand the strengths and limitations of advanced approaches to manage distribution operations on feeders with high penetration of PVs.

COMPANIES	WINNERS
Duke Energy	Kevin Chen Staci Haggis Trent Miller
Taiwan Power Company	Chang Wen Chi Kuan Hua Su
Xcel Energy Services, Inc.	Beth Chacon Matthew Hagen Yashar Kenarangui Jessica Lau

DISTRIBUTION

TECHNOLOGY APPLIED

RF Monitoring and Wind Mitigation in Fiber Optic Supply Cables

PROGRAM

Distribution Systems–Transmission and Distribution Infrastructure

AWARD SUMMARY

Exelon (ComEd) sought to understand and quantify the effects of sustained and gusting wind on their overhead fiber system, as well as the effectiveness of different wind mitigation methods.

Following several downed fiber events, including spans utilizing wind mitigation technology, ComEd needed to quantitively measure the effectiveness of different types of wind diverters and their impact on fiber galloping. In a joint effort with EPRI, ComEd measured fiber displacement in relation to frequency and weather conditions using RF motion sensing technology.

Three sites were chosen in Mendota, IL, to collect weather and fiber motion data. Each site was equipped with one base station to collect all the data, one weather station, and six RF sensors that were deployed on the overhead fiber cable and on spans that had two different wind mitigation methods, an air flow spoiler (AFS) and a V-Style wind dampener (VSD), to compare the effectiveness of each.

RF sensors measured displacement and frequency of the movement on the fiber spans, and the weather stations collected data such as temperature, wind speed and direction, humidity, and precipitation.

The study provided conclusive data of the effectiveness of each wind mitigation method. Over months of monitoring, the study found that air flow spoilers were effective at limiting maximum conductor displacement. Going forward, ComEd will standardize these wind diverters knowing they provide a measurable benefit preventing severe conductor galloping.

COMPANY	WINNERS
Exelon (ComEd)	Jessie Bauer Ryan Kelly

DISTRIBUTION

TECHNOLOGY APPLIED

Voltage Conversion Assessment for Supporting Future Load

PROGRAM

Distribution Operations and Planning–Integrated Grid and Energy Systems

AWARD SUMMARY

Los Angeles Department of Water and Power (LADWP), in collaboration with EPRI, sought to determine the costs, benefits, challenges, risks, and paths forward for a wide-area conversion to a higher distribution voltage class.

The team utilized distribution system analysis and economic modeling to estimate the system-wide costs and operational impacts of accommodating future loads at the existing voltage level and at multiple proposed new voltage levels. Data and feedback from the LADWP team enabled EPRI to develop efficient and scalable analysis methods to identify and prioritize high-level needs and challenges across LADWP's service territory without the need for detailed power-flow models, which were not available.

Broad and in-depth stakeholder engagement across the company revealed real-world physical and geographical limitations and opportunities known by those outside of the distribution development department, which ensured long-term strategic decisions would reflect feedback from every area of the company. Broad participation from these internal stakeholders was crucial to ensuring the analysis was realistic.

Development of new tools and guidance for strategic planning and voltage conversion are expected to become critical for utilities expanding and modernizing their systems to support decarbonization. The project also serves as the foundation for continued research at EPRI on voltage conversion and long-term strategic distribution planning.

COMPANY	WINNERS
Los Angeles Department of Water and Power	Kent Chan Tomy Giang Steven Lam Peter Liang Yamen Nanne Vincent Zabukovec

ELECTRIFICATION AND SUSTAINABLE ENERGY STRATEGY

TECHNOLOGY APPLIED

Building Electrification Technologies for New York State

PROGRAM

Electrification – Electrification & Sustainable Energy Strategy

AWARD SUMMARY

Central Hudson Gas & Electric, Consolidated Edison, New York ISO, and New York Power Authority collaborated with EPRI to develop detailed electrification implementation strategies and outreach recommendations for the State of New York. State goals seek to address climate change by reducing economy-wide greenhouse gas emissions, encouraging consumers to adopt energy efficient and low-carbon emitting technologies.

This research comprehensively examined both current and emerging building electrification technologies in space heating, water heating, and cooking, evaluating impacts from the perspective of the utility grid, customer investments, and energy burden.

Participants performed a review of actual field-observed heat pump data to better understand heat pumps' real-world performance. Results helped utilities better understand the feasibility of implementing a wide range of advanced heating technologies, such as next-generation heat pumps, geothermal heat pumps, and dual-fuel heat pumps. It also examined the market adoption potential of heat pumps, along with their environmental, customer, and grid impacts.

Results offered clarity between building envelope energy efficiency measures and heating options to help make program decisions based on the benefits and costs for retrofit applications. The team also explored the role and value of energy storage, demand response, and other grid flexibility options to manage future peaks.

Finally, the team evaluated the changes in climate conditions impacting peak demand under different energy use patterns to help the energy companies plan infrastructure upgrades to better withstand extreme weather events.

COMPANIES	WINNERS
Central Hudson Gas & Electric Corporation	John Borchert
Consolidated Edison Company of New York	Sarah Murphy Shuchita Prakash Terrell Skipper
New York Independent System Operator, Inc.	Arthur Maniaci Michael Swider
New York Power Authority	Alan Ettlinger Guy Sliker

ELECTRIFICATION AND SUSTAINABLE ENERGY STRATEGY

TECHNOLOGY APPLIED

Ergonomic Tool for Moving Electric Utility Manhole Covers

PROGRAM

Enterprise-Wide Occupational Health and Safety – Electrification & Sustainable Energy Strategy

AWARD SUMMARY

Manholes and vaults are important access points to an electric company's underground network and require frequent inspection and maintenance, including the replacement of cable conductors. These are accessed most often by utility workers using manual tools to remove and replace manhole covers, typically made of heavy iron weighing up to 227 kg. Severe injuries to workers, resulting in musculoskeletal disorders (MSDs) that are either acute or cumulative, have been reported.

The team addressing this issue, Consolidated Edison, Portland General Electric, Alabama Power Company, and EPRI, sought to design a new tool to reduce the risk of MSDs injuring utility workers. Defining risk, identifying manhole removal processes, and reviewing employee procedures guided the development of an electric assist manhole cover removal tool.

Participating companies critically evaluated the device and employed field testing to identify weaknesses and opportunities for improvement. The research project produced an effective solution to reduce ergonomics risk associated with manhole cover removal operations.

COMPANIES	WINNERS
Alabama Power Company	Benjamin Cross Chris Fitzgerald
Consolidated Edison Company of New York	Brenda Hill Prakash Kothari Steve Labudzinski
Portland General Electric	Ben Lumsden

ELECTRIFICATION AND SUSTAINABLE ENERGY STRATEGY

TECHNOLOGY APPLIED

Monarch Butterfly Habitat Model and Landholding Assessment

PROGRAM

Endangered and Protected Species – Electrification & Sustainable Energy Strategy

AWARD SUMMARY

The U.S. Fish and Wildlife Service communicated in 2023 that the monarch butterfly (Danaus plexippus) is being considered for listing under the U.S Endangered Species Act. Regardless of the outcome, it is prudent to consider land management and conservation plans and how to communicate those plans in terms of reputation management, regulatory risk, financial costs, and industry leadership.

A group of diverse energy companies, in collaboration with EPRI, sought to develop habitat management plans and communicate those to stakeholders. Barriers included the scale and distribution of land assets of individual power companies, the lack of a definition of monarch habitat, the complexity of monarch science, and the lack of a science-based approach for evaluating large land assets for monarch habitat. Participating members collectively oversaw the development of modeling methods to overcome these seemingly intractable barriers. Collaboration yielded the EPRI Monarch Habitat Model, currently the best-known model for landscape-scale analysis.

The project provided valuable information about habitat modeling and analysis and the importance of foundational data to geospatial modeling. Results highlighted opportunities for companies to partner with conservation groups and federal and state agencies to collectively manage monarch resources.

The project also helped energy companies quantify the vegetative makeup of their energy systems, conduct habitat assessments, identify conservation opportunities, assess regulatory risk, and educate the public about monarch butterflies and other pollinators.

COMPANIES	WINNERS	
Alliant Energy	Deborah Frosch	Wendy Greene
Ameren	Kevin Atkins	Jennifer Queen
New York Power Authority	Cari D. Ficken Lewis Payne	John Nolan
PNM Resources	Mikaela Busher	Alaina Pershall
Sacramento Municipal Utility District	Kathleen Ave	
Salt River Project	Chuck Paradzick	
Tennessee Valley Authority	Suzanne Fisher Holly Grace Hoyle	Hill Henry Justin Hunteman

ELECTRIFICATION AND SUSTAINABLE ENERGY STRATEGY

TECHNOLOGY APPLIED

Object Based Image Analysis Wetlands Identification Tool

PROGRAM

Ecosystem Risk and Resilience – Electrification & Sustainable Energy Strategy

AWARD SUMMARY

Lincoln Electric System (LES), in collaboration with EPRI, initiated a project to improve desktop wetland identification systems utilizing satellite imagery to target fieldwork. LES advised in the model development and applied it to its service territory.

The team published a brief outlining standard operating procedures for desktop wetland identification and performed a literature review, which identified the use of artificial intelligence (AI) for object-based image analysis. Researchers also interviewed EPRI members, capturing desired functionalities of an online wetland identification tool. EPRI and its research collaborator Chesapeake Conservancy developed an AI architecture that uses a deep learning model, allowing for scalability in wetland identification.

LES applied the Wetland Identification Tool to a new geography, the LES service territory, leveraging local wetland training data along with satellite imagery data inputs. The exercise involved sampling 1,515 locations along wetland edge, 1,061 locations outside wetlands, and 46 locations inside wetlands. The tool allowed LES to use AI techniques to screen out areas that could be wetlands, a measure that provided cost savings, reduced time in the field, and improved staff safety. The method eliminates the need for expensive or heavily engineered data inputs, providing a scalable approach to wetland identification.

The project demonstrated the use of new methods to mitigate antiquated data that utilities rely on to minimize impacts to wetlands. Innovative AI techniques, LES's participation in model development, and the commitment of the LES team to pursue tech transfer has multiple benefits for the industry, including savings in cost and labor and increased safety for field personnel.

COMPANY	WINNER
Lincoln Electric System	Melissa Landis

ELECTRIFICATION AND SUSTAINABLE ENERGY STRATEGY

TECHNOLOGY APPLIED

Potential System Impacts of Electric Vehicle Charging and Driving Behaviors

PROGRAM

Electric Transportation – Electrification & Sustainable Energy Strategy

AWARD SUMMARY

Understanding electric vehicle (EV) drivers, charging behavior, and EV load shapes ensure electric companies can invest appropriately to upgrade the grid for the increased load from EVs. However, there is not yet extensive data to quantify EV charging behaviors.

Southern Company, in collaboration with EPRI, performed a tracking study in their service territory to better understand EV behavior and inform their planning practices. The study collected data from more than 300 EVs over a year-long period in Alabama, Georgia, and Mississippi. The resulting work provides insight into how the real-world usage of EVs and charging behavior may impact utilities.

Analysis of the data resulted in the creation of average 24-hour load shapes by vehicle type and by location type (home, work, and public charging). Vehicle characteristics were paired with information from advanced metering infrastructure at participant's homes, including whether they were on a time-of-use (TOU) rate.

Through this work, Southern Company was able to weigh the benefits of deferred infrastructure investment against program implementation. Also, of those enrolled in a TOU program, the study indicated how much energy is charged during off-peak times to be able to predict how effective these programs may be for shifting load in the future.

The results have also been integrated into various EPRI tools on load shapes and impact of EVs on transformers, allowing for additional knowledge transfer.

COMPANY	WINNERS
Southern Company	Shardul Modi Brooke Williams

ELECTRIFICATION AND SUSTAINABLE ENERGY STRATEGY

TECHNOLOGY APPLIED

Value Framework for Building and Transportation Electrification for the City of Seattle

PROGRAM

Electric Transportation, Electrification, Advanced Buildings and Communities – Electrification & Sustainable Energy Strategy

AWARD SUMMARY

Seattle City Light (SCL) sought to develop a comprehensive Electrification Strategic Roadmap, to include differentiation for various customer segments and building typologies; considerations of equity, social, and racial justice; and actions such as rate design and program development. This work advanced prior research with EPRI and addressed optimal strategies for electrifying buildings and transportation. It also focused on value for the customer, the electric company, and society at large.

The project team modeled buildings and transportation in Seattle from different perspectives to understand the effectiveness of electrified end-uses and transportation to reduce carbon emissions. In addition to understanding the economic and non-economic benefits of electrifying buildings and transportation, the team modeled future growth scenarios for electrification, incorporating existing city planning, strategies, and policies that guide SCL's load forecasting and IRP processes.

Results showed fossil fuel consumption in buildings could be decreased by 14.7 to 18.2 trillion Btu, offsetting approximately 0.8 to 1.0 million metric tons of carbon. Due to efficiency advantages, final energy consumption is expected to decline across all tested scenarios, helping to achieve the City of Seattle Climate Action Plan's emissions targets.

COMPANY	WINNERS
Seattle City Light	Mike Hamilton Stefanie Johnson Madeline Kostic Irina Rasputnis

INFORMATION, COMMUNICATION AND CYBER SECURITY

TECHNOLOGY APPLIED

Industrial Control Systems Automated Digital Forensics Harvester

PROGRAM

Cyber Security for Energy Delivery and Customer Solutions – Transmission and Distribution Infrastructure

AWARD SUMMARY

Consolidated Edison collaborated with EPRI to develop an automated forensics collection tool to potentially identify issues earlier in the incident response process and enable routine and automated collection of critical artifacts.

Most often, a forensics analysis of a device occurs during the postmortem analysis of an incident. In this project, the team developed an automated forensic harvesting tool designed to run on intelligent electronic devices in Con Edison's operational technology environment, such as in substations. The tool extends the use of existing communication protocols and can be used in the acquisition of forensics artifacts.

The ability to collect critical forensics artifacts quickly and accurately is a crucial component in an organization's incident response process. The openness and flexibility of this harvester tool and protocol would facilitate the forensics acquisition processes and analysis across a wide variety of supported devices, and help investigators identify the mechanisms by which one or more devices became compromised. This research effort developed a unique forensics harvester tool that allows employees to extract important forensics information from a device in real time, supporting forensics automation.

COMPANY	WINNERS
Consolidated Edison Company of New York	Richard Alcalde Serena Lee Piotr Lisowski

TRANSMISSION

TECHNOLOGY APPLIED

AC/DC Hybrid Line Ion Emissions and EMF Evaluation

PROGRAM

Electric and Magnetic Fields and Radio-Frequency Health Assessment and Safety, Overhead Transmission – Transmission and Distribution Infrastructure

AWARD SUMMARY

Amprion, a leading transmission system operator in Europe and one of four transmission system operators in Germany, is planning and permitting a hybrid AC/DC overhead power line. The retrofit will be the first long-distance overhead AC/DC hybrid line in the world and a vital project to support Germany's 2035 renewable energy goals.

An existing AC overhead power line will be refitted, on the same pylon, to be an AC/DC multi- circuit power line spanning 340 km in a densely populated area. Proactively addressing public health concerns helps Amprion obtain the needed permits in a timely manner and supports one of Germany's most ambitious grid projects.

EPRI collaborated with Amprion in the evaluation and characterization of ion currents, resulting in a more thorough understanding of how environmental factors such as air pressure, wind, altitude, and humidity could affect the electric field and ion density for different line configurations. The EPRI team applied its TLW-Gen2 software application, which incorporated algorithms learned over decades of trials and full-scale lab testing of numerous line configurations. The results helped Amprion evaluate the configurations and understand the magnitude of the expected ion currents and weather dependencies.

The research provides critical information Amprion needs during the plan approval processes, in the design processes of possible future projects, and in addressing public concerns. In addition to the benefits to Amprion, the study results enhance industry knowledge of how different AC/DC hybrid line design configurations and varying environmental factors can impact ion-current density and EMF levels and inform future engineering design guidelines.

COMPANY	WINNERS
Amprion	Dr. Markus Franke Alex Wollny

TRANSMISSION

TECHNOLOGY APPLIED

Application of Transmission Asset Management Analytics Tools and Techniques

PROGRAM

Transmission Asset Management Analytics – Transmission and Distribution Infrastructure

AWARD SUMMARY

Aging equipment fleets, more stringent operating requirements, financial constraints, and lost expertise through retirements make managing substation assets challenging. International members ICE, ISA, and Transener collaborated with EPRI to explore asset management concepts and decision-making procedures to minimize equipment life-cycle costs and risks.

The data, analytical tools, and models required for power delivery equipment risk assessment and management require additional development to maximize their value. For the first time in South America, three of EPRI's analytical tools were applied: the Power Transformer Expert System Software to help identify at risk transformers and recommend actions; the Circuit Breaker Replacement Ranking Method Software to identify replacement candidates and help improve maintenance; and the Natural Language Processing Algorithms to categorize Spanish maintenance records in specific categories to identify replacement candidates.

The results provided a technical basis for replacement, helping the electric companies develop maintenance programs, improve reliability, and make more effective use of their limited operations and maintenance resources.

COMPANIES	WINNERS
ICE	Christiam Valerio Mena Freddy Vargas R. Josué Daniel Hidalgo Quesada
ISA	Iván Lozada Ayala Victor Diez Leon Martinez Nelson Mesa Juan Quintero Cristian Urrea
Transener	Martin Acosta Robert Schurman Arreaza Hugo E. Contreras Ezequiel González Mariano Ignacio Gonzalez Sergio Martínez Ezequiel Gonzalo Niselewicz Hernán D. Vanni

TRANSMISSION

TECHNOLOGY APPLIED

IEC 61850 Digital Substation Technologies Implementation and Development

PROGRAM

Substations – Transmission and Distribution Infrastructure

AWARD SUMMARY

Southern Company, New York Power Authority, and FirstEnergy collaborated with EPRI on a task force to advance new digital substation designs and deploy the designs from a lab setting to field implementations.

The project included developing and implementing digital substation strategies and roadmaps; advancing new digital substation designs; and engaging stakeholders in trainings, knowledge preparation, technology assessment, lab testing, and field implementation. The work also reduced vulnerability to Electromagnetic Pulse (EMP) or Electromagnetic Interference (EMI) by replacing traditional copper-cable-based designs with new fiber-optics-based designs.

The EPRI research provided the electric companies with the skills and tools needed for modernizing substations, implementing cutting-edge digital technologies for enhancing reliability, improving worker safety, simplifying asset management and maintenance, and reducing costs.

COMPANIES	WINNERS
FirstEnergy	Eric Schock Julie Sofaly
New York Power Authority	Frank Ronci, PE
Southern Company	Jonathan Doroh Glenn Wilson

TRANSMISSION

TECHNOLOGY APPLIED

Maintaining Grid Stability with Inverter Based Resources

PROGRAM

Bulk System Integration of Renewables and Distributed Energy Resources - Integrated Grid and Energy Systems

AWARD SUMMARY

American Electric Power, Florida Power & Light, ISO New England, and New York Power Authority collaborated with EPRI to explore screening metrics and system strengthening devices to evaluate grid stability under increasing amounts of inverter-based resources. As decarbonization efforts continue, the industry seeks to evaluate metrics and methods to help determine where and when detailed simulations are required, along with assessment of whether a future power system will be stable.

The team employed EPRI's Grid Strength Assessment Tool (GSAT), Transmission Hosting Capacity Tool (THCT), and Generic Grid Forming (GFM) Technology to determine where system strengthening and upgrades may be required and their impact on the performance of the network.

With grid forming technology still under development, the use of the generic models helps identify whether new technology may improve reliability of the network. In pushing the barriers of the application of new metrics, tools, and models to help evaluate future power networks, the work can also help inform and improve interconnection procedures and practices. Finally, results of this research illustrate how different screening metrics can help identify regions where detailed studies are required, and just as importantly, where detailed studies may not be required.

COMPANIES	WINNERS
American Electric Power	Dr. Nishantha Ekneligoda Robert J. O'Keefe
Florida Power & Light	Huzaifa Karimjee Joe Ribeiro
ISO New England	Xinghao Fang Faheem Ibrahim Xiaochuan Luo Jason Ploof Qiang "Frankie" Zhang
New York Power Authority	Xia Jiang

TRANSMISSION

TECHNOLOGY APPLIED

Risk Framework to Develop New Transmission Ratings

PROGRAM

Overhead Transmission – Transmission and Distribution Infrastructure

AWARD SUMMARY

In response to FERC-ordered changes for transmission ratings, electric companies identified potential knowledge gaps about the new requirements and wanted to ensure the ratings aligned with their goals for public safety and system reliability.

Working with EPRI, Consolidated Edison, Cooperative Energy, Duke Energy, Pacific Gas and Electric, and Salt River Project first identified which lines are most at risk. This varies with design practices, asset types in use, local climate conditions, and other factors. The allowable level of risk is translated into a metric of rating accuracy.

This work helps companies optimize power flow based on their unique system requirements. The maximum amount of power is transmitted up to the point at which a utility would see reduced asset life, decreased system reliability, or encroachments on public safety (exceeding line clearances for example).

Electric companies will have a technical basis for their ratings which can be readily updated over time using the framework and analytics, allowing them to implement new ratings on time to comply with FERC 881. These projects leverage significantly more data than a traditional rating project, with more than a billion rating calculations performed with each utility, including a large set of weather data for multiple conductor types and different rating methods.

COMPANIES	WINNERS
Consolidated Edison Company of New York	Jade Wong
Cooperative Energy	Jason Goar
Duke Energy	Prasad Yenumula
Pacific Gas and Electric Company	Will Dong
Salt River Project	Bryce L. Priest

TECHNOLOGY APPLIED

Systematic Approach to Determine Risk of Extreme Weather Conditions on Energy Adequacy

PROGRAM

Bulk System Integration of Renewables and Distributed Energy Resources – Integrated Grid and Energy Systems

AWARD SUMMARY

ISO New England (ISO NE), together with EPRI, developed a methodology to identify the risk posed by future weather conditions to the supply of energy in a bulk power system. The study encompassed the New England power system for the years 2027 and 2032, allowing for changing demand, generation mix, and climate trends.

In the three-phase project, the team studied the structural changes in climate that are likely over the assessment periods; developed a methodology and a tool to screen multiple years to identify the most impactful conditions for demand and the anticipated generation fleet; and conducted detailed studies of the operation of the system during the conditions that posed the most risk.

The work laid the foundation for ISO NE and others to build a forward-looking risk assessment process that can systematically identify risks and study their impact to the future power system. These studies can inform where specific intervention may be needed to develop or retain critical assets for power system reliability and resilience.

The outcomes from the project have provided an innovative, systematic, and repeatable approach that reliability coordinators can use to identify the most challenging future operating conditions. The outcome of this research has been used to quantify and qualify the types of risk that the region will face, allowing for focused decision-making about the resilience and reliability of the bulk power system.

COMPANY	WINNERS
ISO New England	Stephen George Ke Ma Jinye Zhao

TRANSMISSION

TECHNOLOGY APPLIED

Underground Transmission High Pressure Fluid-filled Cable Systems Assessment

PROGRAM

Underground Transmission – Transmission and Distribution Infrastructure

AWARD SUMMARY

Reliable underground transmission lines are essential for power delivery. New York Power Authority, Southern Company, and Georgia Power applied EPRI's condition assessment approach to assess conditions of four aging underground transmission high pressure fluid-filled cable systems.

As underground cable circuit conditions degenerate, reliability may be impacted. Using EPRI-developed procedures for condition assessment, the project team conducted a complete evaluation of cathodic protection sufficiency, buried steel pipe coating conditions, and AC/DC stray current interference on four underground transmission high-pressure, fluid-filled, pipe-type cable systems. The team also conducted a root cause analysis of a recent fluid leak and investigated a discontinuation of cathodic protection.

The project led to a better understanding of pipe-type cable system aging mechanisms and end-of-life criteria. In addition to recommendations for developing a more effective maintenance and replacement strategy, results will help minimize system outages, increase system reliability, improve public safety, and reduce system operating costs.

COMPANIES	WINNERS
New York Power Authority	Sean Eagleton Alan Ettlinger Zhong "Kyle" Zheng
Southern Company	Frank Li Mark Smith
Southern Company (Georgia Power Co.)	Katherine Giometti Andrew Wright

CROSS-CUTTING APPLICATIONS: DISTRIBUTION AND ICCS

TECHNOLOGY APPLIED

DER Network Gateways for Control Integration of Smart Inverters

PROGRAM

DER Integration - Integrated Grid and Energy Systems
DER Integration - Cyber Security for Energy Delivery and Customer Solutions; Information, Communication and Cyber Security

AWARD SUMMARY

Electric companies are deploying DER management systems (DERMS) intended to connect with distributed energy resources (DER), making them an integral part of system operations. EPRI and a group of 10 companies worked together to identify the functions of DER gateways.

The revolving mix of DER types and capabilities that will be continuously interconnected and retired over time presents a challenge. Standardization efforts make integration possible by specifying simple functions to the DER and leaving many utility-specific functions to the integration system. The DER Gateway is designed to address these management-specific functions. Serving as a local platform housing features and logics important to the utility, it also performs several other important functions, including translation of the DER's communication protocol to the protocol used in the communication network and enabling secure integration with utility operations.

The team developed a DER Gateway Requirements Document, which lists specifications and applications for a DER gateway, including hardware platform, operating system, firmware, hardware security, environmental, communication interfaces, and functional and cyber security.

COMPANIES	WINNERS	
Consumers Energy	Rosanna Kallio	
Électricité de France	Quentin Morel	
Evergy	Julie Way	
Exelon	Jeffrey W. Tisa	
Exelon (BGE)	Damel Goddard	
Exelon (ComEd)	Sean W. Carr	
Korea Electric Power Corporation	Seongsoo Cho Jongmin Jo Nogil Myoung	Inji Choi Yoojin Kwon
New York Power Authority	James Weaver	
North Carolina Electric Membership Corporation	North Carolina's electric cooperatives	
Salt River Project	Juan Cardona	
Southern Company	Andrew Ingram	
Tennessee Valley Authority	Sam Delay	

TECHNOLOGY APPLIED

Fleet Electrification Planning and Assessment for New Load

PROGRAM

Distribution Operations and Planning; Integrated Grid and Energy Systems
Electric Transportation; Electrification & Sustainable Energy Strategy

AWARD SUMMARY

To anticipate an increase in electric vehicles (EVs), a broad group of companies, together with EPRI, collaborated on a project to better understand the future needs of medium-duty and heavy-duty (MDHD) EVs and the electrification opportunity of distribution feeders. The challenge electric companies face in planning for this new load is not region- or state-specific, especially when considering national fleet operators. The study focused on how to characterize MDHD EV demand and whether the grid is ready for this load.

The first efforts of the project focused on advancing industry technical capabilities and information related to locating commercial vehicles through fleet activity maps; estimating electrical demand through fleet EV loadshapes; assessing electrification timelines; developing a novel methodology to evaluate load flexibility opportunity; optimizing new analytics to assess electrification opportunity on distribution feeders; and developing innovative analytics to assess grid readiness and integration.

Next was the application of these new capabilities to specific jurisdictions for each project participant, allowing them to validate or improve their own internal processes. Each company's service area has different structures and fleet types, which made this project more comprehensive. Results helped identify areas where under-utilized assets could be leveraged to incentivize early electrification adopters and to prioritize infrastructure investments in areas with limited capacity.

These methods filled an industry gap in planning capabilities and fleet characterization, putting tools and knowledge in the hands of companies to enable proactive planning decisions.

COMPANIES	WINNERS
Alabama Power Company	John W. Bowen
Consumers Energy	Matt Henry Ian Meredith
Dominion Energy, Inc.	Zohreh Hosseini
Exelon	Christopher J. Budzynski
Exelon (ACL)	Saul Morales
Exelon (BGE)	Oyekunle Oyedeji
Exelon (ComEd)	Vincent Westfallen
Exelon (PECO)	Joe Long
Exelon (Pepco Holdings)	Qin Zhang

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CROSS-CUTTING APPLICATIONS: DISTRIBUTION AND E&SES

COMPANIES, *continued*	WINNERS, *continued*
Fayetteville Public Utilities	Nathan Taylor
Los Angeles Department of Water and Power	Karl Agbayani Vida Daneshmand Peter Liang Yamen Nanne
Portland General Electric	Aaron Banks Andy Eiden Jennifer Galaway
Seattle City Light	Stefanie Johnson Uzma Siddiqi Angela Song
Southern California Edison	Ilia Gueorguiev Matthew Tonyan Jun Wen Le Xu
Southern Company	Thomas Canada
Tennessee Valley Authority	Steven Coley Drew Frye Ryan Stanton
Tennessee Valley Authority (KUB)	Apsana Bhandari Zack Cole
Tennessee Valley Authority (MTE)	Deryl Long Larry D. Taylor, PE
Xcel Energy Services, Inc.	Francisco Munoz Martin David Mino Paul Vaynshenk

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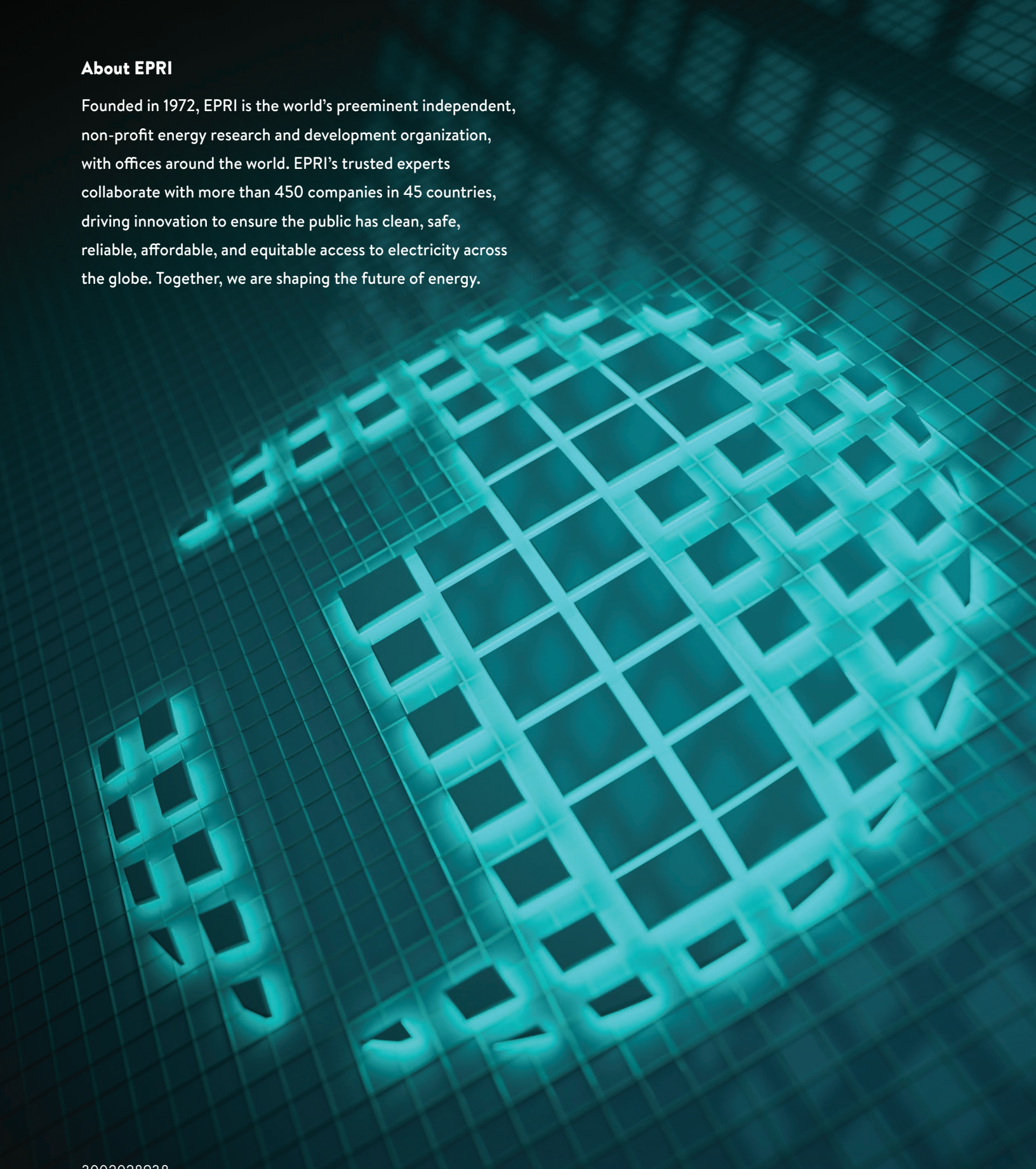

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