TITLE OF WORK TO BE PERFORMED

KCP&L GREEN IMPACT ZONE SMARTGRID DEMONSTRATION

PROGRAM AREA OF INTEREST

AREA OF INTEREST 1: SMARTGRID REGIONAL DEMONSTRATIONS
TRANSMISSION AND DISTRIBUTION (T&D) INFRASTRUCTURE

SUBMITTED TO:
U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

SUBMITTED BY:

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IN RESPONSE TO:
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PROJECT NARRATIVE

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PROJECT NARRATIVE

1. INTRODUCTION

Kansas City Power & Light (KCP&L or the Company) is a firm believer in the need to advance our energy infrastructure and the critical role that SmartGrid technologies and solutions will play in industry progression. Throughout its history, KCP&L has been at the forefront of designing, testing, implementing, and operating new technologies, business models, systems and protocols to improve the delivery of energy to customers. The Company also has a strong record and history of community and customer involvement and views its infrastructure investments as a means to provide benefits to its service territory by:

- Deferring the need for more costly generation;
- Positively impacting our environment and reducing emissions;
- Helping our customers reduce their energy costs;
- Enabling economic investment and job creation in both the local and national economy through job training and workforce development; and
- Reducing our reliance on fossil fuels, which leads to increased energy independence.

This approach is nothing new to KCP&L as the Company has a strong track record of community and customer service involvement. Since 2005, the Company has advanced a number of energy efficiency programs that have helped us to realize significant value for our customers and community. As a result of these efforts, we believe that our modest $25 million of program-to-date investments have created 115 MWs of resource capacity, generated $80 million of local and national economic activity, created over 70 new jobs (60 within the Kansas City metropolitan area) and reduced CO_2 emissions equivalent to the removal of nearly 7,000 cars from the road. KCP&L believes that developing an integrated approach to SmartGrid will provide a valuable foundation upon which to realize these benefits.

KCP&L's new approach is being driven by rising environmental awareness and increasingly price sensitive consumers that will require the energy industry to become more responsive to the need for timely energy usage and pricing information, more tailored energy options and greater individual customer control. The utility of the future involves a shift from a model in which electricity is generated and controlled centrally to one in which energy is generated at a local level and integrated into the grid to improve energy efficiency and reduce transmission losses while taking advantage of renewable energy sources. Recognizing this paradigm shift, KCP&L is planning to design and deploy a demonstration program to develop, operate, test and report on a complete, end-to-end regional SmartGrid demonstration (the SmartGrid Demonstration) in a socially and economically diverse area of Kansas City, Missouri (the Demonstration Area). The SmartGrid Demonstration will be critical not only for developing and proving concepts, technologies, and protocols, but also for serving as a blueprint for capturing, understanding and demonstrating economic costs and benefits.

KCP&L's project complies with the DOE's funding guidelines and introduces commercial innovation with a unique approach to SmartGrid development and demonstration:

- First, it truly creates a complete, end-to-end SmartGrid – from SmartGeneration to SmartEnd-Use – built around a major SmartSubstation. This approach will enable detailed analysis and testing to demonstrate the benefits of optimizing energy and information flows and utility operations across supply and demand resources, T&D operations, and customer end-use programs. Done successfully, this demonstration will serve as the prototype for SmartGrid implementations across the country.
- Second, it introduces new technologies, business models, applications, and protocols that can be tested and refined in this "laboratory" to demonstrate the optimal approach to achieving the project goals of increased efficiency with reduced cost and environmental impact.
- Third, it involves a best-of-breed approach to the SmartGrid. Rather than focusing on a packaged

approach, KCP&L will leverage the best solutions from leading players to maximize the benefits captured. KCP&L will work with these technology and solution providers to select the best technologies for a given application and then integrate these applications into a holistic, end-to-end optimal SmartGrid solution.

- Finally, KCP&L's demonstration project will integrate with a wider urban revitalization effort--the Green Impact Zone. The Green Impact Zone is designed as a means to use Federal funds to redevelop an urban core. Key to this redevelopment is the provision of a modern energy infrastructure. The Green Impact Zone has significant political and community support, which will provide the catalyst for high customer engagement to better demonstrate our integrated view of the SmartGrid.

Working with the City of Kansas City, Green Impact Zone participants and its solution partners, KCP&L will invest in and deploy an end-to-end SmartGrid that will include advanced generation, distribution and customer technologies and solutions to the Demonstration Area's electrical infrastructure. This "SmartGrid" program will provide area businesses and residents with enhanced reliability and efficiency through real-time information about electricity supply and demand. It will also enable customers to manage their electricity use, and save money, by providing useful information about electricity prices. Co-located renewable energy sources, such as solar and other parallel generation, will be placed in the Demonstration Area and seamlessly feed into the energy grid. By demonstrating this end-to-end solution rather than specific components such as Distributed Management System (DMS) or Automated Metering Infrastructure (AMI) technologies alone, KCP&L will be able to test and evaluate the solution's ability to achieve a complete suite of prospective SmartGrid benefits - greater energy efficiency, reduced cost, improved reliability, more transparent information and an improved environmental footprint.

KCP&L believes that the SmartGrid Demonstration qualifies as a demonstration for the purposes of this funding opportunity as it involves the combination, integration and testing of best-of-breed emerging technologies across the entire electricity supply chain. This development and testing of a holistic end-to-end solution that integrates multiple technologies and programs can serve as a blueprint for future integrated SmartGrid demonstrations and implementations throughout the country.

The promise of the SmartGrid Demonstration project has attracted the interest of companies around the globe. We have conducted a structured evaluation and are very pleased to have the strong team of partners shown below:

Project Component	Partner(s)
SmartSubstation	Siemens Energy, Inc.
DMS	Siemens Energy, Inc.
Advanced Distributed Automation	Siemens Energy, Inc.
Utility-Based Distributed Resource Management	Open Access Technology, Inc. (OATI)
AMI	Landis+Gyr AG
Customer-Based Resource Management	GridPoint, Inc.
Grid Connected Battery Storage IED	Kokam America, Inc.
Technical Project Assistance	Electric Power Research Institute (EPRI)
DR Thermostats and Local Customer Service	Howeywell International, Inc.

The proposed SmartGrid Demonstration would require $48.1 million in funding requirements, of which $13.8 million (29%) are KCP&L contributions, $10.2 million (21%) are partner contributions and $24.1 million (50%) are federal funds. The SmartGrid Demonstration and its Green Impact Zone applications will provide an opportune model for the DOE to understand the potential for targeted urban SmartGrid applications in the future.

2. PROJECT OBJECTIVES

The primary objective of the SmartGrid Demonstration project is twofold: (1) to demonstrate, test and report on the feasibility of combining, integrating and applying existing and emerging SmartGrid technologies and solutions to build innovative SmartGrid solutions and (2) to demonstrate, measure, and report on the costs, benefits, and business model viability of the demonstrated solution. The proposed technologies and solutions will be evaluated both individually, and as part of a complete end-to-end integrated SmartGrid system in a defined geographical area. The project will demonstrate certain operational, economic, consumer, and environmental benefits that can be enabled by single SmartGrid technologies and further enhanced by integrated solutions as proposed for this demonstration. For specific parts of the solution, KCP&L intends to demonstrate the potential for innovative and flexible business models that can be employed in the integration of its solutions.

The objectives of individual initiatives are focused on implementing a next-generation, end-to-end SmartGrid that will include Distributed Energy Resources (DER), enhanced customer facing technologies, and a distributed-hierarchical grid control system.

2.A. TRANSMISSION & DISTRIBUTION (T&D) INFRASTRUCTURE

2.A.1) SmartSubstation

The primary objective of the SmartSubstation program is to develop and demonstrate a fully automated, next-generation distribution SmartSubstation with a local distributed control system based on IEC 61850 protocols. The new SmartSubstation will enable the following benefits that will be quantified throughout the demonstration period:

- Improved real-time operating data on critical substation equipment
- Reduced O&M costs of relay maintenance, and
- Improved reliability by enabling distribution automation

By achieving these objectives, we expect to demonstrate Advanced Distribution Automation (ADA) capabilities such as the ability to monitor and capture real-time transformer temperature and gas data; the enablement of real-time equipment ratings; full substation automation with intelligent bus throw-over; and all the benefits of intelligent electronic relays such as peer-to-peer communication, fault recording, fault location, circuit breaker monitoring and increased ease of maintenance.

2.A.2) SmartDistribution

The primary objective of the SmartDistribution program is to develop and demonstrate a fully automated, next generation Distributed Control and Data Acquisition (DCADA) controller that incorporates a Customer Information Management (CIM) based model of the local distribution network and performs local grid assessment and control of individual intelligent electronic device (IED) field controls. The DMS and Smart-Substation™ Controllers will provide the operational backbone of the system supporting significant levels of automation on the feeders, complex and automated feeder reconfiguration decisions, and tightly integrated supervision with the Control Centers. The DMS serves as the primary point of integration for the grid facilities and network management functionality including Distributed System Control and Data Acquisition (D-SCADA) systems, Distributed Network Architecture (DNA) systems, Outage Management Systems (OMS), Distributed Energy Resource Management (DERM) systems, Geographical Information Systems (GIS) and other supporting systems.

The new SmartDistribution implementation will enable the following benefits that will be quantified throughout the demonstration period:

- Improved service reliability by reducing the frequency and duration of sustained outages.
- Reduced frequency of momentary outages.
- Reduced operational expenses as many functions will occur automatically without human intervention or be performed remotely without a field crew.

- Reduced maintenance expenses by providing rich data to enable predictive and proactive maintenance strategies

In achieving the above objectives, we expect to demonstrate a family of automatic, distributed "first responder" distribution grid monitoring and control functions:

- Sub and Feeder Load Profile Metering at 15-minute intervals
- Circuit outage and faulted section identification and isolation switching
- Sub and Feeder VAR Management
- Sub and Feeder Voltage Management
- Sub and Feeder Integrated Volt/VAR Management
- Sub and Feeder Overload Management w/ Dynamic Voltage Control (DVC & CVR)
- Distributed DER monitoring & management
- Sub and Feeder Overload Management w/ DER
- Feeder Overload Management with Ambient & Duct Temperature
- Digital Fault Recording on Breaker Relays
- Incipient Fault Detection and Reporting

We also expect to demonstrate time-synchronized voltage and current from strategic points on the circuits, which will improve the accuracy of capacity planning models and will enable better load balancing and improved decision-making for capacity additions.

2.A.3) SmartMetering

The primary objective of the SmartMetering program is to develop and demonstrate state-of-the-art integrated AMI & meter data management (MDM) capabilities that support two-way communication with 14,000 SmartMeters in the Demonstration Area and provide the integration with CIS, DMS, OMS, and DERM. The SmartMetering infrastructure will provide the technology basis for recording customer and grid data that will be used to measure many SmartGrid benefits. The new AMI/MDM implementation will enable the following operational benefits that will be quantified throughout the demonstration period:

- Improved accuracy of meter reads, frequency of reads and flexibility of read scheduling by enabling customers to select dates for turn on/turn off requests without associated field visits.
- Improved accuracy of meter inventory and reduction in untracked meters.
- Increased percentage of automated reads and reduced amount of stale reading within the existing automated one-way meter reading system.
- Increased percentage of near real-time outage notifications and power restoration that would be supplied by a two-way metering system, and:
- Provided real-time, two-way communication for Demand Response (DR) program control initiation and verification of program participation

The SmartMetering technology will also provide advanced meter-to-HAN communications to facilitate in-home display, home energy management systems, and other consumer-facing programs.

2.B. SMARTGENERATION (DISTRIBUTED ENERGY RESOURCE TECHNOLOGY)

2.B.1) Smart DR/DER Management

The primary objective of the Smart DR/DERM program is to develop and demonstrate a next-generation, end-to-end DERM system that provides balancing of renewable and variable energy sources with controllable demand as it becomes integrated in the utility grid, coordination with market systems, and provision of pricing signals. We expect to demonstrate a number of capabilities including:

- The ability to manage and control diverse types of Distributed Energy Resources (e.g. DVC, DG, bulk and mobile storage)
- The ability to manage and control various DR programs including dispatchable/direct load control programs.
- The ability to manage price-based and voluntary programs with market-based and dynamic tariffs

similar to those described under SmartEnd-Use
- The ability to manage various market and transmission operation support products such as mapping DR/DER capabilities to wholesale energy products and managing energy and ancillary services capacity
- The interoperability with the DMS to monitor distribution grid conditions and manage distribution grid congestion, and
- The ability to track and manage renewable portfolio standards (RPS) and greenhouse gas (GHG) reduction capabilities of distributed and demand side resources

By achieving these objectives, KCP&L expects to demonstrate advanced capabilities in demand side resource management, including the ability to leverage those capabilities for operational and environmental efficiencies as well as the ability to aggregate and use such capabilities in support of wholesale market operations.

2.B.2) SmartGeneration

KCP&L's primary objective in its SmartGeneration program is the implementation of DER technologies and DR programs sufficient in quantity and diversity to support the DERM development and demonstration. To achieve this objective, the demonstration program will include:
- Installation of a variety of roof-top solar systems on a mix of residential and commercial buildings (a larger scale, 100kw, installation is planned for a school or public building)
- Installation of a 1MWh grid-connected battery to provide grid support.
- Integration of the existing EnergyOptimizer DR thermostat program in the demonstration area
- Integration of the existing MPower load curtailment program customers in the demonstration area
- Implementation of public accessible plug-in hybrid electric vehicle (PHEV) charging stations to demonstrate smart-charging strategies.

In addition to the primary objective, KCP&L expects to demonstrate the ability to offset fossil-based generation with renewable sources as well as the potential for flexible, alternative business ownership models. With respect to PHEVs and charging stations, KCP&L expects to demonstrate an intelligent, two-way communication between plug-in vehicles, charging stations and the utility grid while controlling the flow of electricity to plug-in vehicles, balancing real-time grid conditions with the needs of individual drivers.

2.B.3) SmartEnd-Use

The primary objective of the SmartEnd-Use program is two-fold. The program will achieve a sufficient number of consumers enrolled in a variety of consumer-facing programs to 1) support the DERM development and demonstration; and 2) measure, analyze, and evaluate the impact that consumer education, enhanced energy consumption information, energy cost and pricing programs and other consumer-based programs have on end-use consumption. We have identified several secondary objectives for the suite of SmartEnd-Use programs expected to be deployed in the Demonstration Area:
- First, we intend to improve customer satisfaction by increasing awareness and reducing costs through energy efficiency and demand response program execution.
- Second, we expect to improve KCP&L productivity through increased knowledge of customer behavior and usage patterns.
- Third, we expect to improve peak load profiles, reducing the need for capacity expansion, as customers are incented to utilize energy in off peak periods.
- Fourth, we expect to pilot alternative time-of-use (TOU) rate programs designed to provide the incentives to reduce energy usage during peak periods.

By achieving these objectives, we expect to demonstrate how the integration of a broad suite of efficiency and innovative rate programs into a complete SmartGrid solution can enhance the overall

benefits of the solution and optimally leverage the additional technical and operational capabilities that the investment will enable.

3. PROJECT DESCRIPTION

KCP&L is proposing a SmartGrid Demonstration that truly creates an end-to-end SmartGrid – from SmartGeneration to SmartEnd-Use – built around a major SmartSubstation. It introduces new technologies, business models, applications, and protocols that will be tested and refined in this "laboratory". The project will include detailed analysis and testing to demonstrate the benefits of optimizing energy and information flows and utility operations across supply and demand resources, T&D operations, and customer end-use programs. Done successfully, this demonstration will serve as the prototype for SmartGrid implementations across the country.

3.A. PROJECT SCALE & IMPACT

Our Team seeks to demonstrate the value of using SmartGrid technology and communications to manage distributed energy resources within a utility's service territory. In particular, we are targeting edge-of-grid resources using a comprehensive SmartGrid platform in order to integrate and manage distributed grid assets, according to the project scale defined below:

- The Team will design, develop, and deploy a next generation end-to-end (or top-to-bottom) distribution grid management infrastructure. The grid management systems proposed will be based on distributed-hierarchical control concepts, an emerging technology, and will include:
  - DR/DER Management Systems (centralized, back office)
  - DMS - Distribution Management System (centralized, back office)
  - AMI Command Center (centralized, back office)
  - MDM-Meter Data Management System (centralized, back office)
  - DCADA-Distributed Control and Data Acquisition (distributed substation controller)
- We will upgrade Midtown Substation, an existing urban substation, to create a next-generation SmartSubstation with IEC-61850 communication protocols and control processors to implement distributed, unattended control with automated "first responder" monitoring and control functions. The existing Midtown Substation consists of:
  - 4 Distribution Power Transformers - 191.7 MVA total
  - 8 Distribution Busses
  - 32 Distribution Circuit Breakers
  - 16 Distribution Tie Breakers
- Multiple distribution circuits will be upgraded with a variety of feeder based monitoring and control IED to evaluate the impact of a variety of Advanced Distribution Automation (ADA) functions (described further in the project objectives section). Current plans for circuit automation and demonstration are:
  - 1 Green Impact Zone control circuit with concentrated EE programs
  - 2 Green Impact Zone circuits with advanced automation, circuit ties & EE programs
  - 1 Green Impact Zone circuit with advanced automation and 1MW battery
  - 1 control circuit
  - 2 circuits with advanced automation, circuit ties & EE programs
  - 1 circuit with advanced automation with converted stand-by to parallel generation
  - 2 UMKC circuits (potential for future micro-grid implementation)
- The demonstration will include the following SmartEnd-Use initiatives to provide consumers with enhanced information on energy use and cost and to measure the impact on SmartGrid automation on end-use consumption:
  - 14,000 accounts outfitted with two-way AMI communications and SmartMeters

- 14,000 accounts with access to AccountLink, KCP&L's Web-based customer portal, with access to historical interval usage data aimed at educating customers on their usage patterns.
- Up to 1,600 households outfitted with in-home displays aimed at educating homeowners in real-time about their energy consumption and costs.
- 400 households with a web-based customer Energy Management System (EMS) portal, Home Area Network (HAN), and basic home automation components, including displays for energy consumption, educational tools, and dynamic pricing signals for indirect load control
- Three (3) commercial buildings/schools with new EMS SmartGrid enabled systems.
- Ten (10) public PHEV/PEV charging stations

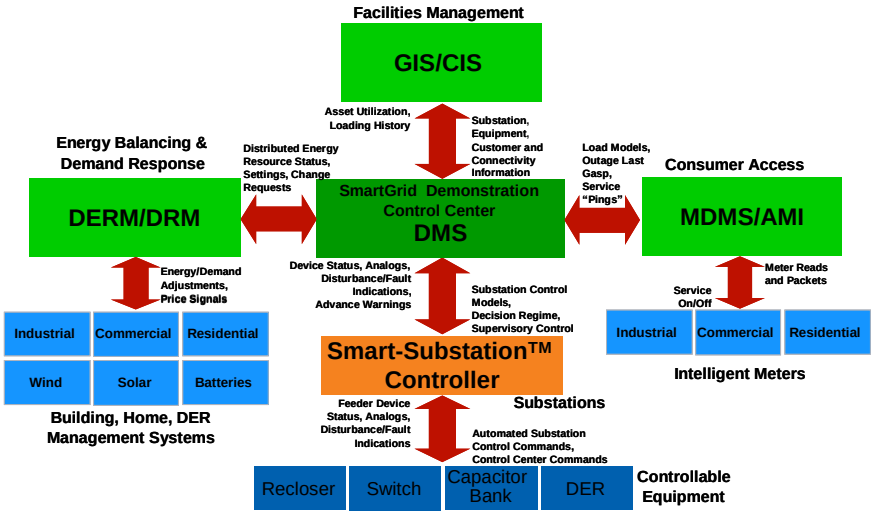
- SmartGeneration initiatives will be deployed to provide the field devices required to test the SmartGrid management components and measure the grid impacts of the technologies.
  - Up to 1,600 households outfitted with SmartGrid enabled DR thermostats
  - Four (4) substation transformers with dynamic voltage control (DVC) controlled by the SmartSubstation
  - 15 distributed photovoltaic (PV) roof-top generation assets (180kW)
  - One (1) stand-by generator converted to parallel generation and SmartGrid enabled.

3.B. TRANSMISSION & DISTRIBUTION (T&D) INFRASTRUCTURE

The proposed T&D SmartGrid Infrastructure demonstration will implement a regional grid control system that will consist of four major components as shown in Figure 1 below. The components include:

- Distribution Network Management. This provides all the necessary systems and applications for the KCP&L Control Center Operators to manage the distribution network reliability; quality of supply; coordinate with substation controllers and field automation; and enhance efficiency of the operations, crew and maintenance staff.
- Distribution Network Automation. This supports the arming of the feeder network with telemetry units and controllers for reclosers, switches, and capacitor banks to support communication with Smart-Substation™ Controllers for automated feeder reconfiguration.
- Advanced Metering Infrastructure and Meter Data Management. This supports two-way communication with electronic meters for consumer billing information, verification of electrical service status, and remote service on-off capabilities.
- Distributed Energy Resource Management. This provides balancing of renewable and variable energy sources with controllable demand as it becomes integrated in the utility grid, coordination with market systems, and provision of pricing signals to consumers.

Figure 1: SmartGrid T&D Grid Control Infrastructure



This combination of functions will create the next-generation grid monitoring and control platform that will be used to manage the KCP&L Green Impact Zone Demonstration grid for project duration.

The DMS and Smart-Substation™ Controllers provide the operational backbone of the system supporting significant

levels of automation on the feeders, complex and automated feeder reconfiguration decisions, and tightly integrated supervision with the Control Centers. The DMS serves as the primary point of integration for the grid facilities, electrical system load, and real-time substation and feeder information. It includes Distribution Supervisory Control and Data Acquisition (D-SCADA), Distribution Network Analysis (DNA), Outage Management (OMS) and integration with KCP&L's existing Mobile Work Force Management system, Geographic Information System (GIS), and other supporting systems.

The Smart-Substation™ controller establishes an intelligent substation IT infrastructure with the ability to make feeder and substation reconfiguration decisions, control field equipment, verify operations, track local grid capacity, and coordinate with the DMS. This "proactive" management of the distribution grid is a necessary step in preparing for the integration of significant levels of renewable and variable energy resources, controllable demand, and demand response. With the addition of distributed energy resources the DMS and Smart-Substation™ become essential to, managing Volt/VAr conditions, adaptively modifying protection equipment settings, and managing crew safety.

The AMI/MDMS provides access, collection, and management of meter asset information and the consumer metering information for billing, consumer awareness and consumer participation in demand management/response programs or the market. It will be deployed to all customers in the KCP&L Green Impact Zone SmartGrid Demonstration area, including residential, commercial and industrial consumers. It will collect the customer's 15-minute interval consumption data required to support many of the SmartGrid analysis to be performed and for the experimental TOU rates and other EE/DR incentives to be evaluated. Additionally, the MDMS will manage the flow events and other data flows between the legacy CIS and OMS and the demonstration DMS/OMS, DERM system and provides an avenue for integration with selected Home Area Network (HAN) management systems.

The DERM system provides all the necessary functions to balance distributed energy resources with available dispatchable ("controllable") demand to make the most efficient use of existing energy options while optimizing economic value for consumers in the market. It aggregates distributed energy resources and controllable load groups for dispatch and market participation with group and, potentially, demographic leverage. It assesses balancing within a defined future time period (i.e. five minutes) and issues commands to participating resources to adjust their output and/or demand where appropriate. Excess resource can be bid into the market. The system tracks aggregate and individual resource commitments and settles accounts. It uses available load models and network conditions from the DMS as constraints to ensure reliable network operation, request network control changes and verify resource participation. It accepts requests from the DMS to suspend dispatch of energy resources in areas where operational safety conditions are at risk. It will use consumption information from the AMI/MDMS system to verify demand management/response participation. It will track, retain, and report all information necessary to quantify resource and related economic participation.

All these systems assume an underlying standards-based infrastructure of communications, field automation, and end-to-end cyber-security. The demonstration systems will be fully integrated using the standards defined by the NIST SmartGrid Interoperability Framework, where applicable, and will interface with existing production systems at KCP&L at clearly defined and controlled integration points to maintain the security and integrity of KCP&L enterprise systems. As a whole, the program will verify a full range of NIST and other standard modeling and information exchange protocols necessary to implement a functional, cost-effective, secure intelligent grid. The project will define, validate, and verify the necessary parameters and potential solution adjustments for KCP&L, and the industry, to plan and implement a system-wide roll-out of the successful SmartGrid technologies and processes.

In parallel, KCP&L will develop a significant "change management" program to guide and manage its transition to a SmartGrid business paradigm. This will begin with the assignment of a select team to implement this project and identify the business, market, and customer service process changes necessary for a complete implementation. The result will be a comprehensive staged plan to modify the necessary

business processes; retrain its business, operations, engineering and planning, market, and maintenance staff; and educate its customer base.

Several fundamental aspects of next generation SmartGrid T&D Infrastructure will be demonstrated and verified in this project, including:

- Upgrading a multi-transformer, multi-bus distribution substation to a state-of-the-art SmartSubstation deploying the IEC61850 communication protocols over a secure IP Ethernet substation LAN.
- Implementing a highly-integrated, distributed hierarchal control solution between a centralized DERM system, DMS/SCADA system, a distributed DCADA controller within the SmartSubstation, and individual IED field controls.
- Implementing numerous "first responder" distributed automated decision making through intelligent substation controllers and enabled feeder devices
- Implementing dynamic equipment ratings based on field conditions
- Integrating supervision of automation and filtering of field information to improve distribution operations situational awareness
- Integration of significant distributed and renewable energy resources and controllable demand
- Enabling demand response, price signals, and market participation
- Enabling two-way accessibility of the customer meter, availability of current energy usage information, and customer participation in energy programs
- Creating a pervasive SmartGrid communications infrastructure
- Implementing end-to-end cyber security

3.B.1) SmartSubstation

The Midtown SmartSubstation will consist of new numerical protective relays, substation controllers, communication system, local DCADA and applications, which will operate KCP&L's substation with advanced functionality to provide more reliability, efficiency and security.

The existing electromechanical relays will be replaced with new microprocessor relays (IEDs). These IEDs will have communication capabilities utilizing IEC61850 in the protection and automation system. The IEC61850 will allow KCP&L to minimize wiring in the substation and provide automation such as interlocks through this digital system.

Siemens will provide protective relays on the distribution level. This includes the feeders, the tie connections, bursars and transformer protection. Protective relays will provide protection and circuit breaker monitoring. Transformer relays will measure temperatures, in order to detect incipient faults in the substation. The system will proactively send warnings and alarms to a central site to inform about these circumstances.

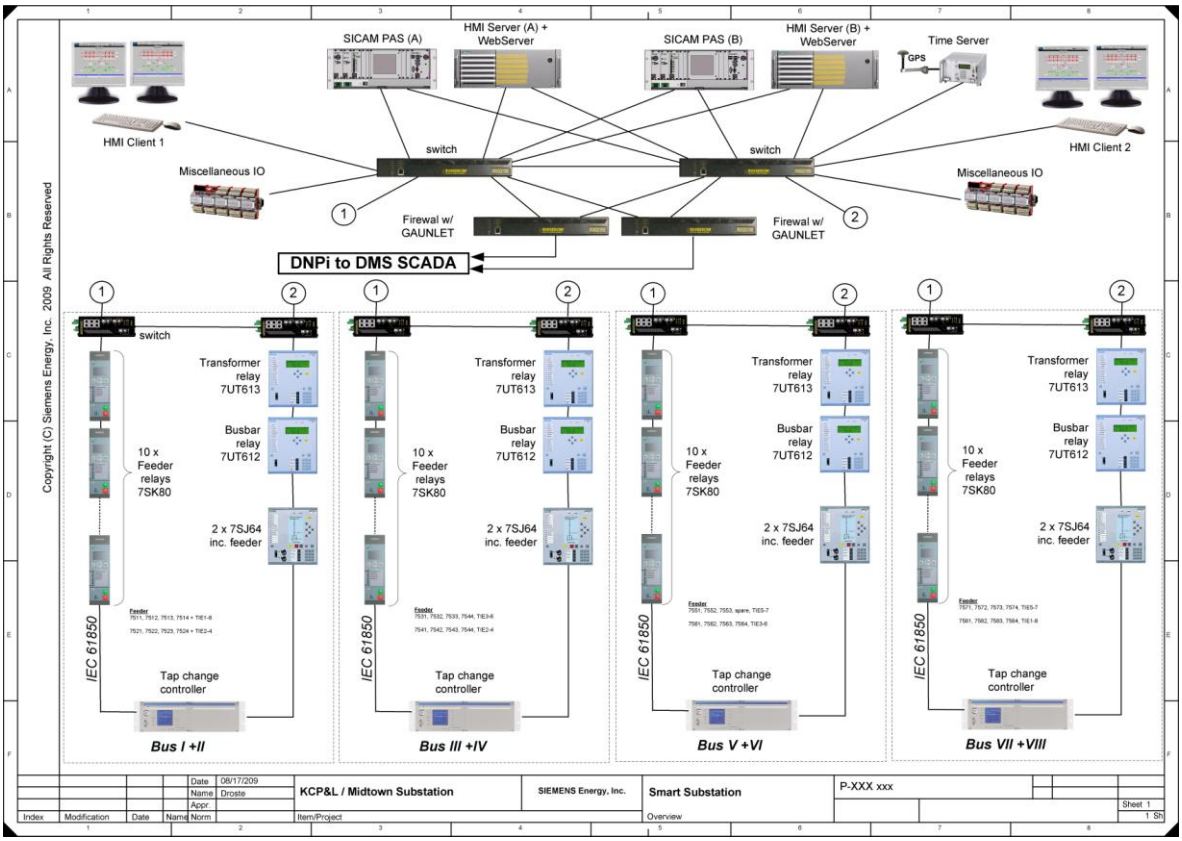
Each power transformer feeds two busbars, with one IEC61850 communication loop for each transformer and its associated busbars and feeders. All four of these IEC61850 loops are interconnected through a substation LAN, which combines the communication loops. The substation controller and a local HMI (Human Machine Interface) system are connected to this substation LAN to interface to the relays in the substation and provide protocol conversion from the substation to the DMS SCADA system.

Figure 2 provides an overview of the substation automation and protection system that will be implemented.

Through the protective relay system, tap changes and some miscellaneous I/O, KCP&L is able to deploy the function of a SmartSubstation. This will include:

- Peer-to-peer communication between IEDs over IEC61850
- Controlling the tap changer of the transformers over IEC61850
- Protection of substation devices, assets and feeders
- Redundant data collection concentration in the substation

Figure 2: SmartSubstation Control Infrastructure



- Redundant local HMI
- Cyber Security with firewall and access control and NERC-compliant logging tools
- Redundant Connection over DNP3i (TCP/IP) to the DMS SCADA system
- Other legacy protocols are available in the substation
- Retrieval of fault records automatically over IEC61850 communication and storage on a local computer
- Access for remote diagnoses, maintenance and programming
- Smart applications in the substation that use the mode Automatic, Verify or Monitor to make sure it fits into the KCP&L operations strategy
- Real-time transformer rating with oil temperature by using the transformer relay for the measurements, or an additional small I/O device built into the control cabinet of the transformer. Logic in the I/O device or the relay (PLC) will provide for the fan controls
- Metering through the relay includes the calculations of P,Q, S, etc.
- The substation controller is also connected over DNP3i to devices on the feeder (DA controls). The application FISR (Fault Indication and Server Restoration) will automatically calculate the switching procedures to isolate faults on the feeders and provide service restoration.
- Volt/Var Management using the tap changers and the capacitor controls
- Feeder Overload Management with Dynamic Voltage Control will be done locally in the substation to respond to those states quickly. This also can be a combination of an application that runs on the enterprise bus with the local substation control.
- DER monitoring and management
- Fully CIM- and IEC61850-compliant
- Arc Flash Mitigation through local redundant HMI system

3.B.2) SmartDistribution

The following paragraphs give a brief description of the SmartDistribution functionality, which will be performed by the DCADA system in the Midtown SmartSubstation. These applications, running on a redundant system, are enhancements to the basic substation automation system. As part of the project, KCP&L will implement local "first responder" applications that greatly improve the control of the distribution network, increase supply quality and reliability, ensure optimal use of network equipment, and minimize losses and detection and elimination of overloads at particular points in time.

Distribution Network Analyses (DNA) provide tools to simplify and improve the analysis of situations, providing more reliable network status information and supporting the network operation for both unplanned situations and planned activities. DNA uses the CIM-based logical and topological data model of the distribution network of the real-time database. This data model will be downloaded from the central DMS SCADA system into the substation DCADA system.

Distribution Network Analyses comprise several components, mostly independent of each other:

- Topology functions
- Fault location (FLOC)
- Distribution System Power Flow (DSPF)
- Fault Isolation And Service Restoration (FISR), including DSPF

3.B.3) Distribution Management System (DMS)

Siemens Distribution Management Systems (DMS) enable the user to evaluate the state of the electrical distribution system, efficiently manage day-to-day construction and maintenance efforts, and proactively guide operators when the system is needed most; during storms and related restoration activities. As utilities come under greater pressure to more fully utilize existing equipment, a DMS is an essential element in maintaining and improving delivery reliability while reducing complexity and automating related work processes. The recent acceleration in Distribution Automation, Substation Automation and AMI in the industry has created additional impetus to establish DMS as a solid foundation to leverage these aspects of the emerging "SmartGrid".

For KCP&L, the demonstration DMS will be composed of a number of tightly integrated tools and systems addressing different aspects of the Distribution Operator's work tasks, including:

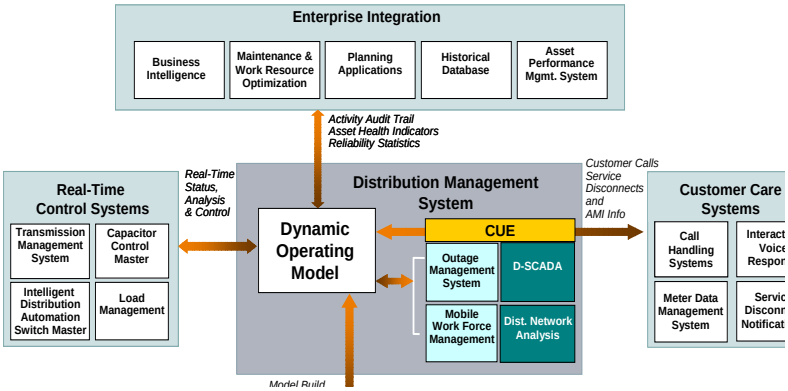
- Distribution SCADA (D-SCADA): Provides real-time device and automation information to keep the operating model as close as possible to the real conditions in the field. D-SCADA provides all real-time data services and control agent capabilities for the combined solution.
- Distribution Network Analysis (DNA): Provides equipment loading and complex voltage calculations to help the operators understand the voltage and loading of the distribution feeders and individual equipment at any point in time. It also provides a variety of Fault Management and Operations Optimization tools to offload the operations staff and improve efficiency.
- Outage Management (OMS): Provides the ability to view the current connectivity of the distribution feeders and safely manage day-to-day and emergency restoration work. The Siemens offering includes the Intergraph InService product as an integral component in the total DMS solution. The OMS provides the basis for all outage information and is uniquely suited for KCP&L's needs, minimizing the integration costs with the existing GIS and Mobile Work Force Management systems. The OMS is integrated at a product level with the Siemens DNA and D-SCADA products to provide a complete solution with "best of breed" product functionality.

These systems are tightly integrated to automate the user's workflow as much as possible and enable efficient transition between major functions. Siemens DNA and D-SCADA components of a DMS System are integrated with Outage Management and Mobile Work Force Management systems. The interfaces enable lower implementation and maintenance costs for its customers and directly support cost-effective rollout of the demonstration project. Figure 3 outlines a general DMS solution.

Figure 3: Full Generalized DMS Solution

Key Features:

- Provides a single highly efficient user interface for all DMS functions
- Visually correlates and integrates large amounts of field information
- Supports management of outage restoration and mobile work crews
- Utilizes all available information from Distribution Automation (DA) and Automated Metering Infrastructure (AMI) sources



- Provides modeling and simulation of Distributed Energy Resources
- Provides modeling and simulation of intelligent field devices and the supporting protection and control schemes
- Incorporates all available feeder and substation measurements and fault indicators
- Establishes a time-smoothed granular feeder load model for more accurate solutions
- Rapidly and accurately determines fault locations and automatically provides isolation and restoration plan options
- Tracks system/feeder load reduction capacity on an on-going basis
- Supports various optimization objectives, including Voltage, VAr, Loss, and Load Capacity management
- Establishes a generalized model-based integration platform for simplified integration with other enterprise systems

Siemens will provide all associated integration efforts related to the DMS and the associated systems pertinent to operations. Siemens is proficient in real-time and extended business integration efforts leveraging operations systems, models, and information, as well as maintenance, customer, meter management systems, and operations asset management solutions.

3.B.4) Smart Metering

The Landis+Gyr Gridstream SmartGrid communication system and SmartMeters provides the capability for AMI, Advanced Distribution Automation (ADA) and a meter to Home Area Networking (HAN) gateway over a common two-way communication infrastructure. The system supports the acquisition of load profile, time-of-use and demand meter data, and meter and site diagnostic information from electric meters that perform these measurements. The system also supports "under-glass" remote physical disconnect and Home Area Network communication via the ZigBee Smart Energy Profile standard with meters equipped with these capabilities. Electric meters also support outage and restoration reporting and real-time on-request reads.

3.B.4.a) Command Center – The AMI Head-End System

Command Center is the leading advanced metering software platform that brings everything together – from data reporting to system control – in a single application. The system is highly scalable and feature rich. It enables users to remotely program meters; schedule time-of-use periods and rates; handle remote disconnects; analyze critical peak usage; view load control indices; and perform other critical, day-to-day

functional operations. Command Center simultaneously manages the meter data collected from millions of endpoints, validating each data element, and integrating it throughout the system. Built to interoperate with meter data management (MDM) systems, as well as key billing, customer service, engineering, accounting and field service software programs, Command Center delivers unmatched energy resource management, collaboration and productivity.

Command Center ensures immediate productivity with an intuitive interface and easy integration. Command Center is MultiSpeak® compliant and follows IEC CIM 61968 standards. An extensive Web Service library offers 100 pre-built techniques ready to use. In addition to Web Service APIs for common interface points, Command Center delivers pre-built data extracts, flexible data extracts and formats, CSV file imports, and support for XML templates. Web Services are based on Service Orientated Architecture (SOA), and Command Center simultaneously processes and validates meter readings, and also inserts database records for millions of devices quickly and efficiently. Comprehensive integration with billing, CIS and engineering software enables Command Center to provide a seamless link between metering data and the applications that use it.

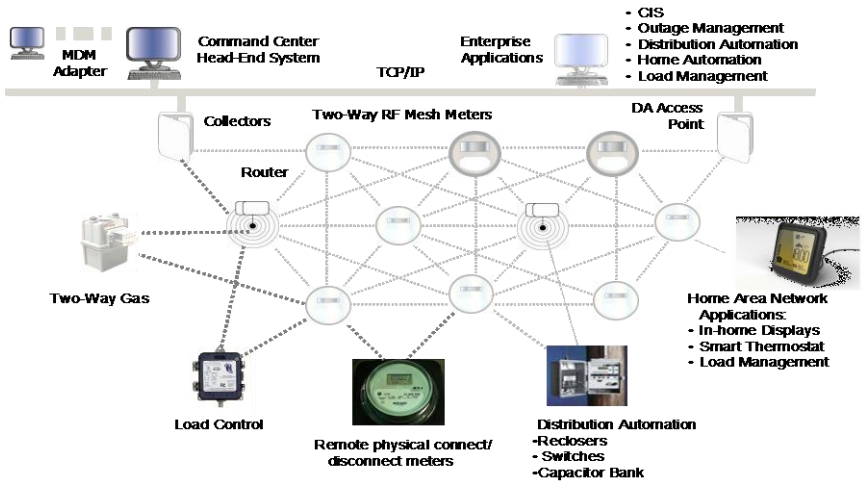
3.B.4.b) Gridstream Wireless Field Area Network (FAN)

The Landis+Gyr Gridstream SmartGrid communication system provides full two-way wireless mesh communication and functionality to electric meters, direct load control devices, advanced distribution automation (ADA) devices and Home Area Network devices enabled with a ZigBee communication module.

Advanced metering and diagnostic information that electric meter provides can be communicated over the network to the Command Center head-end operating system and displayed, reported and interfaced to a utility's Meter Data Management (MDM) system, Customer Information System (CIS), Outage Management System (OMS) and other enterprise applications.

Below is a schematic of the Gridstream System for AMI, ADA and Meter to HAN Gateway.

Figure 4: The Landis+Gyr Gridstream SmartGrid two-way Communication System



3.B.4.c) Smart Meters

Some of the features of the L+G SmartMeters with the Gridstream AMI System include:

- Full two-way Mesh Radio AMI Communications
- Variable Output Power 100 to 425 milliwatts
- Auto-registration
- ANSI C12.19 Tables support
- Forward, Reverse, Net, Total Energy

- Voltage/Power Quality Information
- Downloadable Firmware
- Advanced Metering: Demand/TOU/Load Profile
- 5/15/30/60-minute Interval Data Recording
- Data Storage
- Outage and Restoration Notification
- Integrated Service Disconnect
- Load limiting
- ZigBee Smart Energy Profile HAN Interface
- Reactive Energy & Power Factor (commercial meter only)

FOCUS AX-SD Meter
With Remote Connect
and ZigBee HAN

3.B.5) Advanced Distribution Automation (ADA) via the Gridstream FAN

The Landis+Gyr Gridstream network can support both AMI and ADA communications over the same network. The Gridstream network has been integrated to a number of ADA device control suppliers via both serial and IP interface connections using standard protocols such as DNP3.

Typical Advanced Distribution Automation (ADA) applications include:

- Automatic feeder sectionalizing and restoration with intelligent switches
- Automatic circuit recloser monitoring and control
- Voltage regulator monitoring and control
- Distribution feeder capacitor bank monitoring and control
- Network protector relay monitoring and control
- Faulted circuit indicator monitoring
- Monitoring of Smart Transformers

3.B.6) Meter to HAN Gateway via Gridstream Communication System

The Landis+Gyr Gridstream system supports meter to HAN gateway applications via the ZigBee Smart Energy Profile standard using the meter as the HAN gateway. This allows the AMI network to communicate with any ZigBee compliant in-home device: applications include in-home displays (usage information, price, text messages), Smart thermostats and potential other future devices. A diagram displaying the main components of the Landis + Gyr Gridstream solution is shown below.

Figure 5: Communication Flow from Utility, through Gridstream, to the HAN via the Meter Gateway

3.C. SmartGeneration

KCP&L is proposing to work with its partners, in a fully integrated team approach, to implement and demonstrate key SmartGrid technologies in the areas of demand response, distributed and renewable resource management, integration and management of demand side resources for improved grid economics, reliability and environmental compliance, including full coordination with distribution

automation capabilities for voltage, VAR, PQ management and three-phase balancing requirements, as well as system operations for improved system scheduling and market operations, and balancing variable generation. The proposed solution and capabilities are presented in the following subsections:

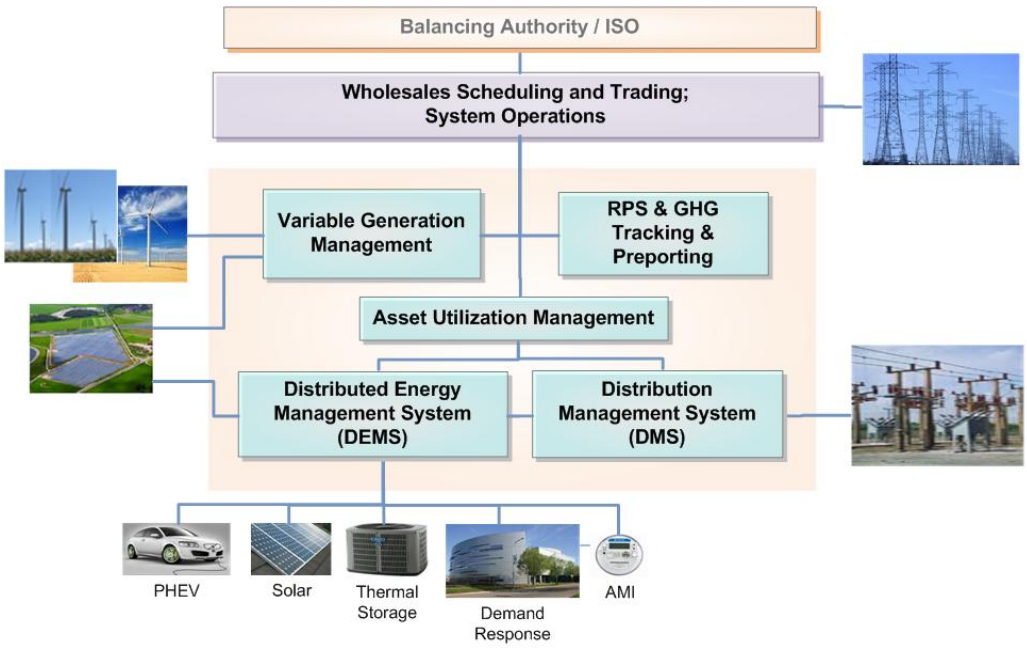
3.C.1) Smart DR/DER Management

OATI webSmartEnergy is a comprehensive suite of software products for end-to-end integration of demand-side, distributed and renewable resources with transmission, distribution and energy market operations for both reliability and economic considerations. These products are specifically designed to enable utilities to best realize the new Smart Grid benefits while considering existing business practices, regulatory and operational constraints, and technical requirements. They provide the capabilities needed to support high penetrations of renewable and variable generation resources, and provide for integration of demand response and demand-side resources with system operations to address, and to improve, system reliability, supply economics and operational efficiency.

The key components of the webSmartEnergy suite are shown in Figure 6 and include:

- Distributed Energy Management System (DEMS) – The industry's most comprehensive product for management of demand-side and distributed resources.
- Asset Utilization Management – For management of distributed and renewable assets' capabilities and operating information
- Renewable Portfolio Standards (RPS) and Greenhouse Gas (GHG) emissions tracking and reporting Modules
- Variable Generation Management Tools – For management, optimization and automation of wind generation scheduling, trading and operations

Figure 6: Distribution Energy Management System



The webSmartEnergy products are built on a proven platform that is designed for large scale deployments. The scalability considerations are applied to the database design to manage a large number of customers and resources; to the user interface for a large number of users; and to external interfaces to handle large volumes of data transactions. webSmartEnergy is built on standard interfaces and external legacy and third party systems. webSmartEnergy provides a high-performance workflow manager to handle large volumes of concurrent data collection.

OATI applications adhere to stringent cyber security measures including full compliance to NERC CIP requirements. OATI's proven cyber security techniques for application level, system level, database level, user access, and physical security have been successfully deployed and practiced over the years for many utility mission critical applications. All access to webSmartEnergy is secured and encrypted.

The webSmartEnergy is typically provided in a Software-as-a-Service (SaaS) delivery model. As such, the additional costs to the project for implementing computer hardware and the peripheral software, as well as the costs associated with providing the required support infrastructures are reduced. In addition, the SaaS implementation model provides an additional layer of security, or the "Air Gap", needed to shield utility's internal systems.

The following are more detailed descriptions of components of webSmartEnergy.

3.C.1.a) Energy Distributed Management System (EDMS)

The OATI Energy EDMS is the industry's most comprehensive software solution for demand-side resource management and control. webSmartEnergy EDMS provides the bridge between advanced metering, DR/DER, variable generation, distribution grid, transmission grid, and wholesale markets. In addition to a full complement of conventional Demand Response capability, webSmartEnergy EDMS provides the capabilities needed to optimally manage distributed energy resources for the support of distribution system load relief, and for the transmission and market operations, (e.g., providing ancillary services and balancing energy to support variable generation). By mapping DR/DER to distribution grid locations, and tracking circuit, feeder, and equipment conditions, webSmartEnergy EDMS provides a unique combination of capabilities for integrated Smart Grid operation while considering limitations imposed by transmission and distribution grids.

The webSmartEnergy EDMS solution provides the following advantages:

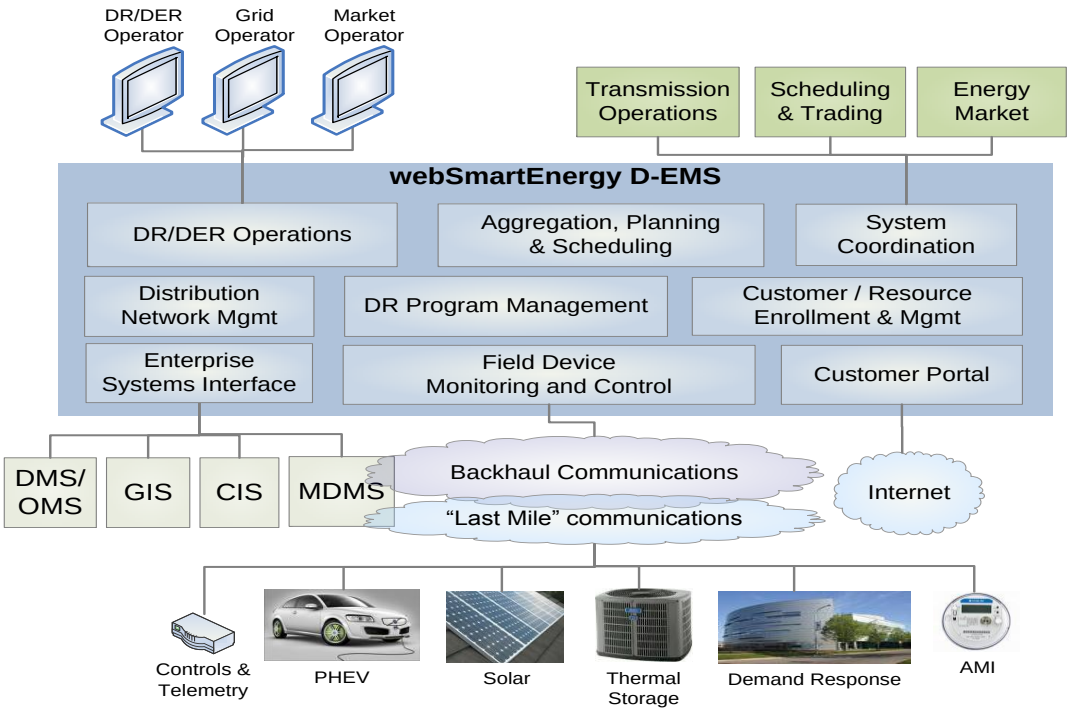
- Managing and controlling diverse types of demand-side resources:
  - Demand Response resources including C&I EMS, HAN devices, home automation equipment, concentrated EE programs
  - Feeder and Substation-level generation and storage resources including, PV roof-top assets, the Green Impact Zone1MW Feeder Battery
  - Customer Stand-by/Parallel on-site displaceable and none-dispatchable generation
  - PEV vehicles and PHEV charging stations
- Creating and Managing various DR programs:
  - Dispatchable/Direct Load Control programs as well as price-based and voluntary programs, including market-based and dynamic tariffs
  - A variety of traditional utility DR programs including TOU, Critical Peak Pricing, AC Cycling and emergency curtailment
- Managing various market and transmission operation support products:
  - Mapping DR/DER capabilities to wholesale energy products
  - Energy, Ancillary Services (Non-spinning Reserve, Spinning Reserve, and Regulation from eligible resources), Capacity (for Resource Adequacy, and where allowed by market)
  - Aggregation at feeder and substation levels, as well as by device type, DR programs, market product, zone, pricing nodes, etc.
- Tracking and managing RPS and GHG contributions of distributed and demand-side resources
- Interfaces and secure integration with AMI/MDMS, field devices, customers, system operations, enterprise, and other external system interfaces:
  - Interfaces with wholesale scheduling and trading functions - ISO operations,
  - Integration with Systems, Operations, and Customer Service systems including MDMS, CIS, SCADA/EMS/DMS,
  - Interfaces with field equipment including Home-Area-Network (HAN) based devices

- User interface and operational support for different user classes/roles including:
  - Demand Response Manager/Curtailment Service Provider/Aggregator
  - Customer services for customer enrollment and customer interactions
  - Merchant Operator– wholesale aggregation and scheduling
  - Customer Portal
- Scalable design with high-performance work flow for DR program execution management. It is designed to support a large number of customers, a large volume of transactions (DR functions), and a large number of simultaneous users (customer portal access)
- Stringent cyber security measures and adherence to NERC CIP and other cyber security standards (levering OATI's experience and capabilities)
- Data privacy and data stringent cyber security measures and access authorization/control by user classes and functional roles
- Web service interfaces for integration and interoperability with utility's system operations and wholesale scheduling systems

3.C.1.b) webSmartEnergy EDMS Functional Overview

webSmartEnergy EDMS provides full visibility into demand-side capabilities, the ability to leverage those capabilities for operational and economic efficiencies, and the ability to aggregate and use those capabilities in support of wholesale market operations. A diagram of the webSmartEnergy EDMS solution appears below:

Figure 7: Energy Distributed Management System Functional Overview



Some of the webSmartEnergy EDMS functional capabilities include:

- Residential, Commercial and Industrial Customer enrollment including business/facility hierarchy and service point connections. EDMS handles the processes required for customer and customer resource enrollment, and association of customers to DR programs
- All access, for both utility personnel and other authorized users, is through standard Web browsers over a secure link that provides customer privacy and information security

- Enrollment and management of demand-side and distributed resource assets. DEMS provides a comprehensive data repository for demand-side asset including geo-spatial mapping
- Creation, administration, and execution of Demand Response programs including voluntary (dynamic price and incentive based) as well as dispatchable (direct load control) programs. EDMS provides a flexible rule-based capability for defining DR programs based on time (e.g., TOU), price (e.g., dynamic tariff), and event parameters, including the KCP&L EnergyOptimizer, DR Thermostat, and KCP&L MPower programs. Demand Response (DR) programs may be designed based on the customer load patterns, available resources and ability to react to DR requests on a day-ahead or same-day basis
- Baseline load calculations based on the NAESB standards. The interval meter data (15 minutes) from AMI/MDM will be used to generate the customers' baseline load.
- Aggregation and mapping of DR capabilities into wholesale products that can support system operations including energy, ancillary services and capacity
- Aggregation, and dispatch of DR/DER based on electrical location (substation, feeder, etc.), DR program participation, and wholesale product eligibilities
- Monitoring and control of distributed generation including wind, solar PV, and other on-site generation resources
- Monitoring and dispatch of storage devices, including battery, thermal, and other grid storage.
- Monitoring and management of plug-in electric vehicles (PEV/PHEV) charging and discharging
- The Demand Bidding Strategy & Market Interface function provides the capability to aggregate the controllable load as market products that can be bid directly into the ISO/RTO, including bidding/scheduling strategies for Energy and Ancillary Services
- Displays are provided to support wholesale DR scheduling and associated ISO/RTO interface functions. OATI provides a full set of automation capabilities for interfaces with the ISO/RTO
- Interfaces and integration with system operations and enterprise systems including MDMS, CIS, GIS, EMS/DMS, scheduling and trading
- Interface capabilities with Field communications head-end systems, as well as near real-time communications with IP-enabled devices at customer site for DR management
- User Interfaces displays designed to support different user classes including Customer Service representatives, DR operators, distribution grid operator, and wholesale merchant power trader
- Customer portal to support individual C&I and residential customers
- Support for and interfaces with 3rd party Curtailment and Energy Service Providers

3.C.1.c) Asset Utilization Management

OATI webSmartEnergy Asset Utilization Management module is a tool for managing information associated with distributed, demand-side and renewable assets, and their operating characteristics and conditions. With the increased numbers and diversity of distributed and renewable generation and storage assets, demand response and demand-side resources, and their interconnection topology with the distribution and transmission grid, it is important to maintain a well structured database to provide a consistent, accurate and timely view of the assets capabilities.

OATI webSmartEnergy Asset Utilization Management module is designed to meet the utility operational requirements, including planning and forecasting, scheduling and dispatch, balancing and real-time operations, as well as settlements and billing. It maintains individual asset information for different classes of resources, including wind, solar, and other renewable generators, energy and thermal storage, distributed generation, demand-response equipment and PEV/PHEV resources. Also, it maintains the asset's grid connection information, operating constraints, operating condition, and availability information. It also provides for maintaining the asset condition monitoring sensors as-operated (metering) information associated with the asset operations. In addition to maintaining device characteristics, the webSmartEnergy Asset Utilization Management module also maintains the geo-spatial

coordinates of individual assets, to provide for an easy and flexible presentation of system information on geographic maps and displays.

3.C.1.d) Distributed Resource Schedule Optimization

This advanced application provides for economic dispatch of resource portfolios dominated by distributed and intermittent generation resources. The resource portfolio may include wind and solar generation, storage resources, dispatchable demand-side and demand response resources and dispatchable on-site and other thermal generation.

- Integration with OATI's energy trading, tagging, and the dispatch application is designed with the following characteristics:
- Execute automatically every few minutes to produce an optimal portfolio generation/demand-response schedule with five minute resolution over a dispatch time horizon up to 90 minutes, while utilizing a rolling wind generation forecast over the scheduling time horizon
- Capability to also execute on-demand
- Capability to execute in what/if study mode
- Callable contracts are modeled as dispatchable resources
- The five minute dispatch set-points will be provided to webSmartEnergy EDMS, utility SCADA and other unit control systems for implementation
- Handling of various constraints for thermal and other dispatchable resources including high and low capability limits, up and down ramp rates, maximum startup times, minimum up and down times, transmission and area constraints, etc.
- Handling of Ancillary Services and Reserve self provision or priced offer, including Non-spinning (Supplemental), Spinning, and Regulating reserves as allowed in the specific market or reliability jurisdiction for DR/DER.
- Handling of various unit statuses such as: Available, Must Run, Economic, Fixed, and Outaged
- OASIS Transmission reservation tools

3.C.1.e) Distributed Resource Integration with Wholesale Market Operations

OATI's webSmartEnergy operates in conjunction with KCP&L's scheduling/trading system (including OATI's web Trader) to provide for integration of DR/DER into wholesale market products commensurate with prevailing market rules and provisions. Currently, some ISO/RTO markets allow Demand Response to offer a subset of market products. Moreover, rules and limitations apply to aggregation of otherwise dispersed DR/DER resources as market commodities. Under FERC Order 719 issued October 17, 2008, all ISO/RTOs must treat Demand Response and Generation resources on a comparable basis; specifically ISO/RTOs must accept bids/offers from DR resources for Ancillary Services (A/S) comparable to any other A/S capable resources. There may be specific metering or telemetry requirements on DR/DER to allow these resources to participate in Ancillary Service markets. Of particular relevance to this project is treatment of DR/DER in the Southwest Power Pool (SPP) market. SPP is incorporating two flavors of Demand Response in SPP's current (EIS) market, namely, Block Dispatch Demand Response (BDDR) and Variable Dispatch Demand Response (VDDR), and is expanding the role of DR/DER in the new SPP markets currently under design and targeted to commence operation in 2012.

OATI's offering has provisions to accommodate different flavors of DR/DER integration into wholesale Energy, Ancillary Services, and Capacity markets. An important issue related to participation of DR/DER in wholesale markets is the extent to which the ISO/RTO market operator (or system operator) has visibility into these resources. This is important for the resource operations planning, scheduling, dispatching, performance monitoring and settlement processes of ISO/RTO. OATI will work with KCP&L to integrate OATI's webSmartEnergy platform with KCP&L's scheduling/trading and dispatch/control systems to provide for a hierarchical information and control mechanism whereby information from distributed resources is aggregated and presented to SPP, and dispatch instructions from

SPP are disseminated either directly (e.g., to Customer Driven MicroGrid) or indirectly through the KCP&L distribution dispatch/control service.

Generally for the dispatch of aggregated DR/DER resources, what the ISO/RTO (in this case SPP) is interested in is to make sure the requested MW (or MW change) is realized within pre-defined boundaries (DR/DER zone) that are usually agreed upon between the ISO/RTO and the DR/DER provider in the aggregate DR/DER resource registration process. These may be resources physically connected to distribution feeders and laterals emanating from a transmission or sub-transmission substation, or a wider geographical area (a collection of pricing nodes recognized by the ISO/RTO).

The manner in which dispatch signals from SPP are distributed to individual constituents of DR/DER aggregated resource can be determined by the webSmartEnergy optimal resource dispatch algorithm. This algorithm recognizes distribution congestion and can allocate the required MW (or MW change) so as to avoid or relieve distribution congestion.

In the context of the current project, these functionalities will enable KCP&L to bundle and offer DR/DER as energy resources into the SPP's EIS market, and receive and implement real-time DR/DER dispatch instructions from SPP optimally with a view to distribution circuit limitations. KCP&L can also include DR/DER as Ancillary Services in its Resource Plan to SPP, and use them towards meeting Resource Adequacy obligations.

The new SPP market will go into operation towards the tail end of this demonstration project. However, webSmartEnergy will enable KCP&L to participate effectively during the new SPP market trial period that is expected to start towards the middle of the timeline for this project. This will enable KCP&L to test participation of its DR/DER resources in new SPP markets (Day-ahead Energy, RUC, Contingency Reserve, and Regulation) markets far in advance of the start of the new markets.

3.C.2) Utility Controlled DER/DR Demonstrations

KCP&L will make use of a variety of distributed energy resources in the project area, including demand response programs and dynamic voltage control. Working in concert with other SmartGrid technologies, these programs will serve to create a "virtual power plant" that can dynamically respond to changing system conditions. The net effect of this virtual power plant is to defer the need to build additional fossil-fuel-fired generating resources as well as helping to defer distribution system upgrades. Benefits of such deferrals flow through directly to customers in the form of lower costs, increased reliability and lower environmental impact.

3.C.2.a) DR Thermostats

As part of the proposed project, KCP&L will leverage the EnergyOptimizer DR thermostat program to demonstrate enhanced grid operational benefits. The AMI FAN will provide the two-way communication between the customer premise and the back office DERM webSmartEnergy application, DEMS and DMS, and other grid management systems. By using circuit, substation, and system level indicators the DR thermostats can be aggregated and operated based on grid connectivity (small or wide scale) as needed to provide the desired locational load relief.

The project will assess the DR Thermostats capabilities for providing "fast DR" emergency and ancillary service products, e.g., non-spin and balancing energy. The demonstration will include design and execution of specific evaluation test to assess the capabilities of the remote Thermostats control for providing short-term ancillary services in support of system operations and variable generation management.

3.C.2.b) DR Customer Load Curtailment

KCP&L will extend its existing commercial curtailment program, MPower to the project area. MPower is a load curtailment program designed to help manage system, or circuit-level peak demands. Program participants are paid up to $45 per kW of curtailable load just for agreeing to be "on call" to reduce load to a predetermined level at KCP&L's request. They are paid an additional payment of $.35

per kW when they are called upon to reduce load and successfully do so. This program serves to defer the need to build additional fossil-fuel-fired generating resources while contributing to grid stability and reliability.

Also, capabilities for supply of "fast DR", i.e., ancillary services, from demand-side resources will be provided. DR load curtailment programs will be evaluated to specifically demonstrate the aggregated ability of demand-side resources to supply ancillary services such as spin and non-spin energy in support of grid operations, e.g., balancing variable generation from solar and wind resources. Similar to the DR Thermostats programs, by mapping and tracking the DR load curtailment capabilities against circuit, feeder and substation connectivity, locational energy products can be made to support grid operation and variable generation balancing.

3.C.2.c) Distribution Voltage Control (DVC)

The capabilities of the Green Impact Zone DR/DER will be integrated with the existing KCP&L DVC program. This will include:

- Voltage regulation at substation and feeder level using tap-changing transformers and voltage regulators;
- Demand-side load adjustments using DR and DER management capability;
- Changes in load and distributed generation levels, and possible Power Factor regulation at solar panel inverter / on-site generation interconnection point.

The proposed Smart Grid infrastructure will provide the capabilities needed to monitor voltage levels at the end of distribution lines and customer service points. This will provide the capability for regulating the voltage levels at substation and feeder levels while maintaining the end-of-the-line voltage within the target operating limits. Also, the capability for managing feeder/substation load based on voltage regulation will be demonstrated.

3.C.2.d) Roof-top Solar Photovoltaic Generation

KCP&L will install roof-top solar photovoltaic systems on both residential and commercial properties, including a 100kW installation on Kansas City Missouri School District's Paseo High school. The project will demonstrate the opportunity of distributed generation utilizing current PV technologies. KCP&L will examine the options of either leasing customer roof-tops for a monthly fee or the opportunity to net-meter the installation at the customer's premise. In either case, KCP&L intends to own and manage the equipment for the duration of the demonstration. The location of individual generating units will be mapped based on feeder and substation connectivity to support feeder load forecast, and forecast updates based on weather conditions. The PV generation capabilities will be used to assess the following:

- Impact of solar generation/inverter operation on the distribution circuit voltage and power quality
- Metering of renewable generation and tracking that against Renewable Portfolio Standards (RPS) targets for the Green Impact Zone.
- Building a historical database of PV panel performance in the Green Impact Zone for support of distribution planning, system and merchant operations
- Assess issues associated with two-way power flows. Special evaluation program and metering will be designed and deployed for this purpose. The existing interconnection rules in Kansas support net-metering of on-site renewable generation at 25kW for residential customers and 200kW for non-residential customers.
- The capability of aggregating, managing and potentially dispatching (controlling) a high penetration of PV solar panels with Net Metering capability will be implemented and demonstrated. The proposed webSmartEnergy will serve as the platform for this evaluation.

- Display of PV locations, generation levels, circuit loading and operating conditions on a web-based geospatial map accessible by PV owners and other authorized users.

3.C.2.e) Grid-Connected Battery Storage

Kokam, KCP&L's partner to develop an advanced and economically viable grid storage solution uses Superior Lithium Polymer Battery (SLPB) technology. The patented SLPB technology is proven, is already in production in the U.S., and is being used in numerous applications around the world. Many U.S. companies and agencies have adopted SLPBs as the primary power and energy source for equipment in industries ranging from medical, aerospace and defense to high-end industrial tooling.

The proven SLPB cell design increases energy density to as high as 200 Wh/Kg in high energy cell configurations and power densities as high as 2400 W/Kg can be achieved with minimum optimization on a high power cell design. The Kokam SLPB meets all performance standards of the U.S. Advanced Battery Consortium (USABC) and has been commercially sold into multiple applications for over eight years.

Kokam has offered and delivered fully integrated multi-cell modules of robust energy storage units that provide safe, maintenance-free performance for the life of the application. The high level of repeat business with customers is a strong indication that Kokam batteries meet or exceed industry standards for cost, energy capacity, pulse power, abuse tolerance, and calendar and operational life.

The Grid-Scale Energy Storage Demonstration Project will implement a 1MWh, 1MW-capable Superior Lithium Polymer Battery Storage (SLPB) system connected into a single 13.2kV distribution feeder circuit on the KCP&L system.

Lithium polymer batteries are significantly more powerful for their size and weight than other types of batteries such as Lead Acid and NiCd. SLPB can store up to three times more energy and generate twice the power as the nickel-metal hydride batteries. Prismatic lithium polymer batteries provide greater volumetric and gravimetric energy density than other battery technologies such as cylindrical lithium ion, lithium phosphate, nickel metal hydride, nickel cadmium, or lead acid.

Based on an advanced battery design, it has been proven that the Kokam SLPB technology can improve power density, energy density, cold temperature performance and safety over commercially available rechargeable Li-ion batteries available today. Over the past 18 months Kokam has built the only U.S. highly automated lithium polymer battery manufacturing facility. The Kokam SLPB has numerous technical advantages over a typical lithium cell:

- Higher Power Density – can reach higher W/Kg
- High Energy Density – lighter weight
- High Rate Charge Capability – up to 3C (up to 6C continuous with nanotechnology)
- High Discharge Rates – can be designed up to 30C continuous
- Long Cycle Life – able to get greater than 2500 cycles at 80% depth-of-discharge (up to 6000 cycles at 100% depth-of-discharge with nano technology)
- Wider Operating Temperature – can operate between -30ºC to +60ºC
- Improved safety over conventional Li-ion due to lower impedance cell design that reduces heat generation in operation
- Highly automated process developed by Kokam over 10 years yields lower cost of production

Additionally, SLPB technology provides benefits that are considered to be among the best in class for a Smart Grid battery solution including the following:

- Extended run time
- 10+ years operational life
- Safe low-impedance prismatic design
- Full-scale production within 18 months in the United States with supply from offshore today
- Reduced need for complex cooling systems
- Operation over a wide range of temperatures
- Highly automated manufacturing, contributing to affordable production of battery cells

The SLPB technology also involves patented folder-to-folder (Z-fold like) cell assembly processes. Kokam has developed in-house equipment engineering that supports economical manufacturing of lithium polymer batteries and has focused on the need to produce powerful batteries at the lowest commercial price. The electrochemistry behind the cell is similar to that of a lithium cell, but provides improvements in safety and performance by using the SLPB cell manufacturing process. The highly automated, unique manufacturing processes coupled with the advantages of polymer cell configurations keep cell impedance lower and maintain consistency in performance. Lower internal impedance results in lower heat generation which means improved safety, cycle life, and charge/discharge performance.

Kokam has the ability to offer its customers a nano-structured cathode and anode that provide additional benefits of longer cycle life, improved safety, fast charge capability, and the ability to charge at cold temperatures (-30°C). A nano technology cell has the ability to maintain over 90% end-of-life (EOL) capacity after more than 2000 cycles to 100% depth-of-discharge. This data was obtained by testing actual 40Ah cells with a nano structure cathode only. It is Kokam's expectation to reach 6000 cycles at 100% depth-of-discharge at EOL with nano structure anode and cathode electrodes. The typical Li-ion battery drops to 80% of rated capacity after approximately 500 cycles. The Kokam standard SLPB Nickel Manganese Cobalt (NMC) cells can currently deliver 1400 cycles at 100% depth-of-discharge to 80% EOL. This new technology will provide a practical 10-year solution for the EV/HEV market.

In developing the nano technology, Kokam took a phased approach where the first phase only coated the anode electrode with nano material. The resulting product was called "Nano 0.5" and was able to achieve as high as 3000 cycles. On the second phase of the development, Kokam introduced nano material into the cathode electrode also. This process is expected to yield over 6000 cycles and was called "Nano 1.0".

The superior performance difference between the nano SLPB and a battery manufactured by any other supplier can be attributed to the manufacturing process; the heart of the facility. A DC/DC converter technology coupled with AC/DC inverter technology, allows Kokam to manage the power demands more effectively.

3.C.3) SmartEnd-Use

While energy efficiency is not a directly controllable distributed resource, the proposed project will implement and evaluate several technologies that facilitates indirect load control by providing customers with energy education tools and in-home displays empowering customers to reduce energy consumption and costs. Energy education and in-home displays also serve the added benefit of preparing customers for dynamic pricing as well as a means for utilities to communicate pricing signals.

A customer Web portal will provide customers with all the necessary system information, customer's load history, pricing data, and other supporting information. Customer-specific log-in capability provides customizable displays, and targeted information while providing for customer-specific information privacy. This will be supported with the capability for sending notifications, e-mail messages and other information to individual customers based on their specified requirements and preferences.

3.C.3.a) Historical Time-of-Use (TOU) Usage Date via AccountLink

KCP&L currently provides historical daily usage to consumers via our AccountLink Web-based customer service portal. This initiative will augment this current capability and provide all customers served by an AMI with historical 15-minute interval usage data. This will be accomplished entirely by the AMI, MDM and other KCP&L back office systems, it does not require additional hardware in the home.

3.C.3.b) In-Home Display Device

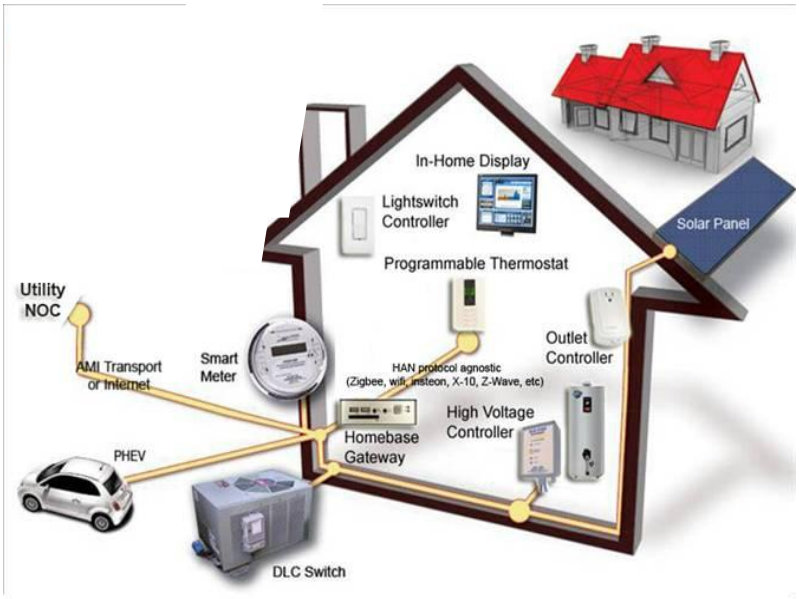
KCP&L will be able to provide customers with real-time energy information on a portable presentment device. Component requires a portable device to be registered to the customer's meter. Once registered, it will provide the customer with real-time energy use and cost information along with pricing signals and other messages communicated through the AMI infrastructure.

This will provide the capability to demonstrate an end-to-end integration of pricing signals from the wholesale ISO market to retail dynamic tariff while considering distribution charges and other required conversion factors. This will be accomplished through the integration of the AMI/CIS, webSmartEnergy, and the wholesale markets.

3.C.3.c) Residential HAN with Web EMS Portal

This initiative provides customers with advanced energy analytics and diagnostics through authenticated real-time information on their energy consumption and cost, including kWhs consumed and the current energy costs for the upcoming bill period. The residential EMS leverages home area network (HAN) communications technology as well as HAN compatible technology, such as thermostats or wireless relay and monitoring devices of circuits and wall plugs, to provide not only whole house consumption data, but also individual load consumption data. In this phase, customers can opt-in to utility SmartGrid programs, enabling customers to manage appliances and other devices via their Web-based portal.

Figure 8: Fully Integrated SmartHome



3.C.3.d) PHEV & Public Charging Stations

As part of the proposed demonstration project, KCP&L will explore using SmartGrid technology to manage the charging behavior of plug-in EVs via the GridPoint Platform's Electric Vehicle Management (EVM) System, which establishes intelligent, two-way communication between plug-in vehicles and/or EVSE equipment (e.g. charging stations) and the utility grid. By deploying the EVM system, KCP&L will implement smart charging strategies – controlling the flow of electricity to plug-in vehicles, balancing real-time grid conditions with the needs of individual drivers.

The GridPoint EVM will be interfaced with the webSmartEnergy DR/DER management platform to support forecasting of PHEV load. This load will be mapped to distribution circuits with feeder operating limits assessed and PHEV load coordinated with available DR/DER capabilities.

A fully integrated SmartHome solution is shown in Figure 8 above.

3.D. Interoperability & Cyber Security

KCP&L fully understands that one of DOE's top SmartGrid priorities is the work with NIST and FERC on a framework for interoperability standards. KCP&L and our Team have been active participants in the NIST SmartGrid Interoperability Standards Roadmap effort. To that end, we believe that our project has special merit as we propose to implement five of the six use cases presented in the EPRI's report to NIST on SmartGrid Interoperability Standards [1]. Working in conjunction with the NIST standards acceleration efforts the project offers an ideal opportunity to provide field demonstration and experience of the interoperability standards, thus accelerating the industry adoption of the standards as rapidly as possible.

3.D.1) Interoperability

The Green Impact Zone demonstration project is based on an integrated end-to-end solution that demonstrates interoperability of the key Smart Grid components and the five SmartGrid use cases that provided the basis of the in the proposed NIST Interim Smart Grid Interoperability Standards Roadmap.

- Demand Response
- Electric Storage
- Electric Transportation
- AMI Systems
- Distribution Grid Management

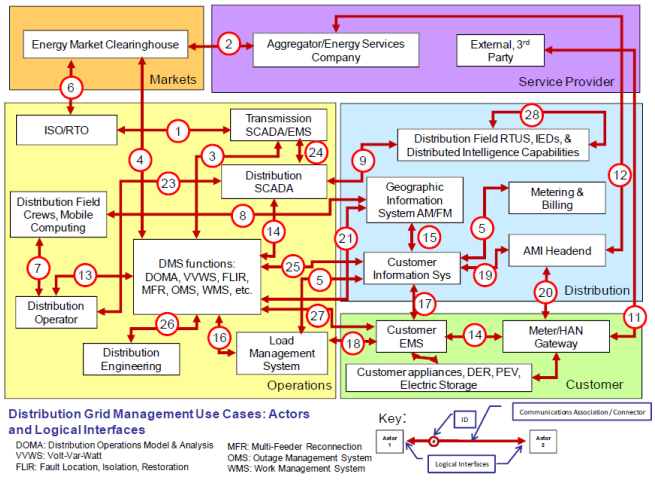
The SmartGrid demonstration will implement bulk power energy management, scheduling and market systems, enterprise systems, distribution network management system, substation, feeder and distribution automation systems, distributed resource and demand-side management systems, advanced metering infrastructure and customer-based energy management and behind-the-meter resources and loads. The proposed solution architecture follows the EPRI IntelliGrid Architecture [3] and GridWise Architectural Council [4] recommendations, as well as the NIST Interim Smart Grid Roadmap.

3.D.1.a) Systems Integration and Interoperability Design

As a member of EPRI's five-year Smart Grid demonstration project, our system integration and interoperability requirements definition and design will be coordinated through EPRI's formalized smart grid demonstration project. We will leverage EPRI's IntelliGrid[SM][2] methodology to support the technical foundation for a smart power grid that links electricity with communications and computer control to achieve tremendous gains in reliability, capacity, and customer services. The IntelliGrid Architecture is an open-standards, requirements-based approach for integrating data networks and equipment that enables interoperability between products and systems. This methodology provides tools and recommendations for standards and technologies when implementing systems such as advanced metering, distribution automation, and demand response and also provides an independent, unbiased approach for testing technologies and vendor products.

Figure 9 provides a visual depiction of the interoperability and integration defined by the Distribution Grid Management use case EPRI developed for NIST.

Figure 9: Distribution Grid Management Use Case: Actors and Logical Interfaces



3.D.1.b) NIST SmartGrid Interoperability Standards Compliance

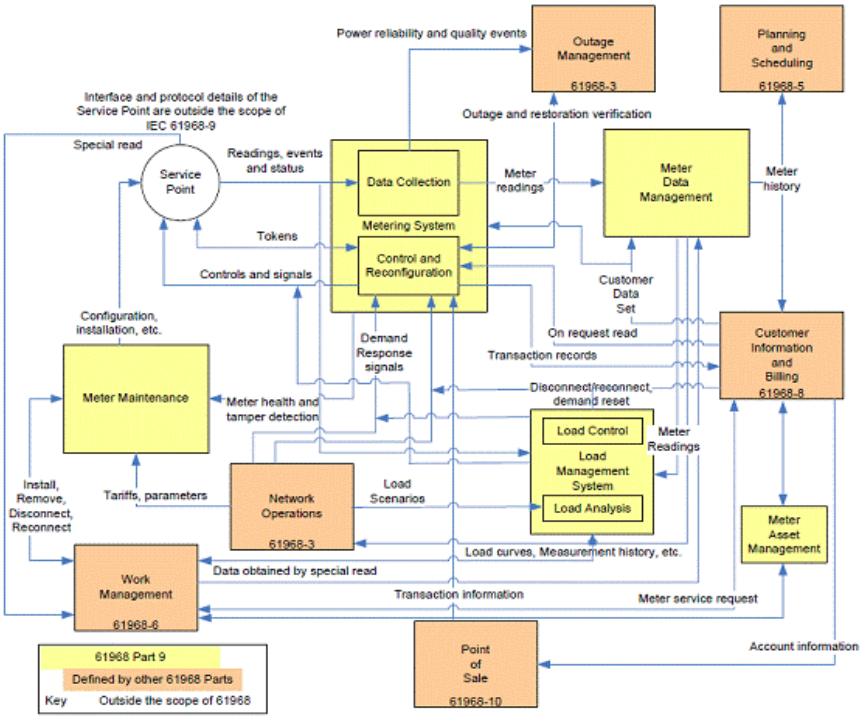
The development of the SmartGrid T&D infrastructure involves many standards and numerous levels of integration. One of the objectives of the proposed project is to demonstrate end-to-end interoperability using the following NIST identified "low-hanging fruit" interoperability standards.

- IEC 61968-1[5] for general systems level application level interface architecture.
- IEC 61968-3[6]/61970[7] for application level interfaces with the DMS
- IEC 60870-6/TASE.2 (ICCP) [8] for real-time control center to control center communications
- IEC 61968-9[9] for application level interfaces with AMI, MDM, CIS, and DMS systems
- IEC 61850[10] for substation automation and communication with distributed resources
- DNP3.0/IP[11] for communication to DA devices over the FAN
- OpenADR[12] protocols for price responsive DR and direct load
- Open HAN[13] for Home Area Network device communication, measurement, and control
- Smart Energy Profile[14] protocol for Home Area Network (HAN) Device Communications

The Project Team will assess the applicability and the gaps of the NIST standards, and will adopt, and extend where necessary, these standards in this project. To the extent feasible, our project will coordinate our implementation efforts with NIST and the Standards Development Organizations acceleration efforts. A diagram of the interoperability components of the IEC 61968-9 NIST standard is shown in Figure 10.

3.D.1.c) Integration and Interoperability with Production Systems

Figure 10: IEC61968-9 Reference Model



Ideally the SmartGrid demonstration system to be deployed would be electronically isolated from all production systems. With the scope and magnitude of this regional demonstration that is impractical. While the deployed demonstrations systems will be highly integrated, they will have limited integration with production systems at KCP&L. Where the demonstration systems require integration with production systems they will be rigorously defined, tested and monitored. We currently anticipate the following integration points with production systems.

- CIS – Daily batch file transfer of billing data from MDM to support billing
- CIS – As-needed batch file transfer of outage incidents from MDM to support OMS
- EMS/SCADA – Establish substation communication controller rules that EMS/SCADA has control authority over existing devices. DMS only has monitoring capability for existing SCADA controlled devices.

3.D.2) Cyber Security

Securing the networked communications, intelligent equipment, and and information is critical to the operation of the future SmartGrid. Due to the complexity and far-reaching aspects of the SmartGrid, planning for physical and cyber security, in advance of deployment, is essential to provide a more complete and cost effective solution. Cyber security is an ever-evolving process and is not static. It takes continual work and education to continue to evolve security processes to keep up with increasing demands on the systems. Security will continue to be a race between corporate security policies/security infrastructure and hostile entities. By definition there are no systems that are 100% secure. There will always be residual risks that must be taken into account and managed.

3.D.2.a) SmartGrid Cyber Security Requirements Definition and Design

As a member of EPRI's five-year Smart Grid demonstration project, our cyber security requirements and design will be coordinated through EPRI's formalized Smart Grid demonstration project. Cyber security is a concept of EPRI's IntelliGrid[SM] Architectures' strategic vision and we will leverage this methodology to support our technical approach on cyber security. Cyber security of advanced automation and consumer communications systems is one of the most important and challenging technical issues of our time. Increasing demand for information technology and reliance on advanced automation has created substantial challenges for system administrators as they try to keep their cyber systems secure from attack. Higher levels of integration across the industry and using open systems combine to raise the challenges of securing systems. Security policy implementation, a recommended practice, requires many of the concepts that architectures bring forward including system documentation, and structure. The IntelliGrid Architecture will support identification of impact and aid in the selection of the appropriate security service and technologies.

3.D.2.b) NIST SmartGrid Cyber Security Standards Compliance

The development of the SmartGrid T&D infrastructure will involve cyber security considerations in every aspect and phase of the project and will involve numerous standards at all levels of the IT and grid infrastructure. One of the objectives of the proposed project is to demonstrate end-to-end cyber security and incorporate the appropriate NIST identified "low-hanging fruit" standards. These will include:

- AMI-SEC[15] for AMI System Security Requirements
- NERC CIP 002-009[16] Cyber security standards for the bulk power system
- NIST SP800-53[17] and SP800-82[18] Cyber security standards and guidelines for federal information systems
- IEC 62351 Parts 1-8[19] for information security for power system control operations
- IEEE 1686-2007[20] for security for intelligent electronic devices (IEDs)

The Project Team will assess the applicability and the gaps of these and other standards, and will adopt, and augment where necessary, these standards in this project. To the extent feasible, our project will coordinate our implementation efforts with NIST and the Standards Development Organizations acceleration efforts.

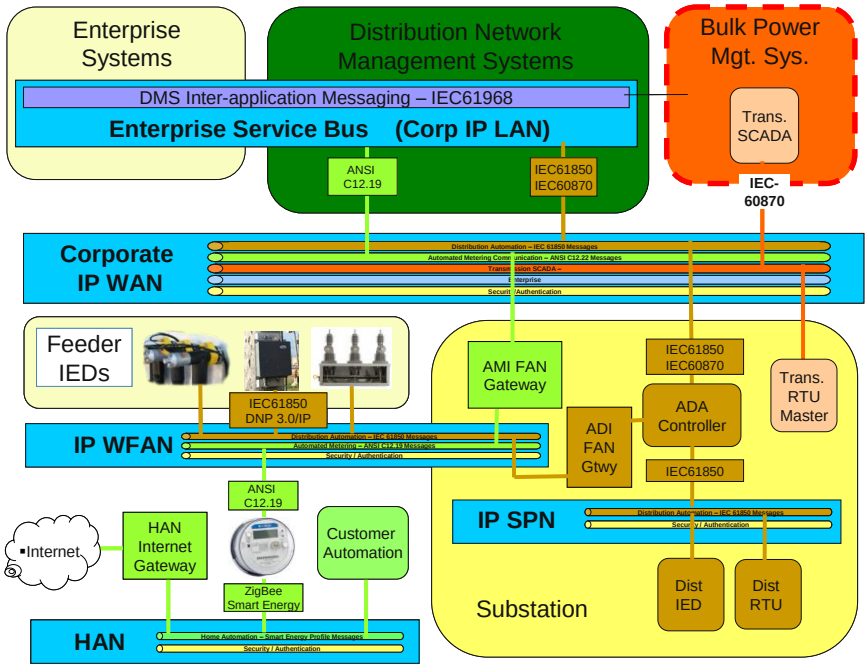
3.D.2.c) SmartGrid Communications Network

The public Internet is a very powerful, all-pervasive medium. It can provide a very inexpensive means of exchanging information with a variety of other entities. The Internet is being used by some utilities for exchanging sensitive market information, retrieving power system data, and even issuing some control commands to generators. Although standard security measures, such as security certificates, are used, a number of vulnerabilities still exist.

KCP&L has chosen to implement the demonstration using private communications media wherever practical. By using the Corporate IT WAN and utility-owned FAN, the KCP&L SmartGrid system designs can still leverage the vast amount of research and development into Internet Protocols (IP) and technologies. They will just be implemented over a private intranet instead of the public Internet to

minimize the exposure to cyber security attacks. The communications and information networks proposed to support the deployment of the Smart Grid demonstration project are depicted in Figure 11.

Figure 11: SmartGrid Demonstration Communications Network



The far-reaching and complex nature of the SmartGrid dictates that no single security policy can be developed to properly secure the SmartGrid. The hierarchical nature of the technologies that will be implemented to create the SmartGrid Communication Network, illustrated in Figure 11, provides for security "check-points" between control and network layers that may have different security requirements. Therefore, it is a natural extension for the Security Architecture to be constructed around Security Domains.

A Security Domain represents a set of resources (e.g. network, computational, and physical) that share common security requirements and risk assessment. For example; within the 'bulk power system' there are two distinct Security Domains: NERC-CIP and NERC-nonCIP. While having different security requirements, all Security Domains will be secured and managed through a consistent set of security policies and processes. Secure connectivity, data encryption, firewall protection, intrusion detection, access logging, change control and the audit reports associated with these applications will likely be required for all SmartGrid security domains.

3.E. Data Collection, Management, and Presentation

Our Team will collect, organize, and deliver grid performance and customer consumption data throughout the duration of the SmartGrid demonstration project. In the early stages of the project, data will be collected to establish the baseline that will be used as a reference point for the analysis of the impacts of the project. The collected data will be with respect to key performance indicators for the project as indicated below and in the attached Project Management Plan. The key performance indicators will cover the following general categories:

- Impacts on system reliability
- Impacts on energy use and efficiency
- Impacts on the environment
- Impacts on system economics

During the course of the project, as new capabilities are implemented and rolled out, the same set of data will be collected that will be used to analyze the impacts of such capabilities. At the termination of the project, the collected data will be compared with the baseline data, analyzed and reports on the impacts of the project with respect to the key performance indicators will be generated.

3.E.1) Baseline Data Collection

In this task, a range of baseline data will be compiled and/or collected for the project area. This baseline data will be the basis for measuring the impact on grid performance, system efficiencies, and

end-use consumption patterns achieved by the demonstrated technologies. KCP&L will collaborate with the DOE to determine the distribution feeder and customer data needed to support the DOE standardized cost-benefit analysis methodology.

- KCP&L has a large amount of historical feeder loading and performance data available for the Midtown demonstration area that has been recorded by the EMS/SCADA and OMS systems. KCP&L will compile and document baseline distribution feeder loading and customer performance statistics for a two-year baseline period.
- Data collected by the existing AMR system will be used to establish two years of historical base-line of customer consumption data that corresponds directly to the historical feeder loading and performance data. Due to limitations of the AMR system, only historical daily consumption information is available.
- KCP&L and L+G will implement and use new AMI SmartMeters to establish baseline daily usage patterns for all customers in the demonstration area. The data will include utility and key customer load data, and will serve as a baseline for comparing the performance of the total integrated configuration.

3.E.2) Project Data Collection

The project team will develop a grid monitoring and test plan for the two-year demonstration. The plan will address various modes of grid, DR and DER operation; validate key operating features of the distributed resources (e.g., stand-alone and parallel operation); validate the key operating and control features of the distributed-hierarchical grid control systems; and confirm the safe and reliable operation of the electric grid with integrated distributed resources. The monitoring plan will provide for compilation of the necessary data to measure improvements in grid efficiency, grid performance, reduced consumer energy consumption and demand reduction.

During the 24-month demonstration, our team will collect the detailed data in different operational modes, including normal and contingency switching configurations. Grid performance, consumption and meteorological data will be collected, compiled and analyzed for the project area. The following tables characterize the types of data that will be collected.

Table 1: Performance Measurement and Analytical Data

Type of Data	Use of Data
Project Performance Data	
Percentage and frequency of the population using the consumer portal	Success of outreach program
Percentage of DR participation vs. users opting out of DR	Success of outreach program
Estimates of energy saved / peaks shaved by our DR events	Overall SmartGrid program success
Number of users changing their behavior in response to price signals or other rate-based incentives	Overall SmartGrid program success
Others as identified in conjunction with DOE	
Grid Performance Data	
Substation Monthly O&M expenditures	Measure reduction in O&M expenditures
Circuit interval KW, KVAR, and KWHR	Correlate to end-use interval load data to calculate grid losses and efficiency statistics under various operating conditions
Outage Occurrence and Duration	Measure change in SAIDI & SAIFI
Transformer DGA and temperature	Possible avoidance of major outage
Others as identified in conjunction with DOE	
End-Use Performance Data	
Whole house 15 minute interval consumption	Customer usage patterns for may analysis

data	
Thermostat settings, schedules, and activity	
Circuit level 15 minute interval load data	Calculate grid efficiency
Average whole house consumption pre- or post-trials	Captured DR versus real DR
Real-Time Amps	Correlate with Environmental Data to calculate dynamic equipment ratings
Others as identified in conjunction with DOE	
Environmental Data	
Temperature	• Draw correlations between consumer energy consumption and environmental conditions • Further correlate this data to execution of DR events • Calculate equipment ratings based on real-time local conditions
Humidity	
Heating-degree days	
Cooling-degree days	
Solar Intensity	
Others as identified in conjunction with DOE	

This data will be compared against the baseline data to measure the impact on grid performance, system efficiencies, and end-use consumption patterns achieved by the demonstrated technologies. KCP&L will submit this data to the SmartGrid Information Clearinghouse.

3.E.3) Data Management

The amount of data being collected or capable of being collected by utilities will increase exponentially with the implementation of the Smart Grid. This rapid expansion of data management results from the fact that more field devices are being installed and that these field devices are becoming more "intelligent" both in what power system characteristics they can capture, and also in what calculations and algorithms they can execute which result in even more data. As distribution automation extends communications to devices on feeders; as substation automation expands the information available for retrieval by substation planners, protection engineers and maintenance personnel; and as more power system asset information is stored electronically in Geographical Information; even more varieties and volumes of data will need to be maintained and managed.

Data management is a complex issue, encompassing many aspects of data accuracy, acquisition and entry, storage and access, consistency across systems, analysis, maintenance, backup and logging, and security. KCP&L proposes to implement a MDM system to meet the data management requirements of the project and provide

- Scalable Meter Data Repository
- Validate, Estimate and Edit Interval and Hourly Data
- Meter Lifecycle Management and Service Orders and Work Flows
- Integration
- Advanced Analytics & Reports

3.E.4) Quantify SmartGrid Benefits

We will leverage expertise from EPRI to apply the DOE cost-benefit analysis (CBA) methodology. Additional CBA framework development and evaluation from EPRI will include evaluating SmartGrid investments for the purposes of ascertaining the value of technologies and systems. The CBA framework will devise a robust and universally applicable means for relating the functional capabilities of SmartGrid projects to specific benefits streams. A functional perspective is essential because many technology configurations can be used in a variety of ways. Specifying the role of a system's function provides a means for establishing how its operation reduces costs or produces more benefits compared to the technology it replaces, or both. In the case where the SmartGrid system or technology is an enhancement to the conventional system design, it is essential to indentify what additional benefits are anticipated.

Once the framework is developed and vetted, EPRI intends to develop protocols to identify, measure, and monetize the benefits attributable and costs associated with investments in resulting system. Benefits include avoided electricity sector capital and operating costs, improved reliability, cleaner air, less reliance on imports of primary energy products, and a contribution to the creation of a sustainably robust economy. The ultimate goal is to establish standards that will inform SmartGrid investment decision-making at all levels throughout the electric sector from technology developers to utilities and other public service entities to consumers, so that the full potential of the SmartGrid concept becomes a reality.

3.E.5) Data Delivery

As a member of EPRI's five-year SmartGrid demonstration project, our project data transfer activities will be coordinated through EPRI's formalized SmartGrid demonstration project. Specifically, EPRI will coordinate the sharing of field results, lessons learned, architectural challenges, issues impacting standards, key technology gaps, and useful tools to help interoperability of SmartGrid technologies and systems related to the project. Project data including scope, schedule, and results of the project will be supplied to the "SmartGrid Information Clearinghouse."

3.E.6) Project Analysis and Data Collection Report

EPRI will assess the results of the demonstration program based on data gathered. Data from the demonstration project should characterize:

- Installation and configuration issues for infrastructure to support distributed resource integration
- Operational performance of the distributed resource integration technologies
- Operational performance of the communications infrastructure and protocols to support the distributed resource integration
- Information system integration issues for data collection, data management, and reporting on the distributed resource integration
- Market integration issues (innovative pricing programs, ancillary services, effect on spinning reserves, etc.)
- Security issues identified and solutions implemented for communications and information infrastructure to support the integration
- Customer response and customer preferences for demand response technologies, pricing, etc.

3.F. Public Outreach and Education

KCP&L's SmartGrid initiative and associated partnerships in the Green Impact Zone create a tremendous opportunity for the region and nation to understand the power of efficiency and reinvestment in an urban setting. In addition to KCP&L's interaction with technical partners, this investment allows for enhanced interactions and collaboration between utilities, governments, businesses, neighborhood groups and others.

With the plentiful opportunities also come significant challenges to foster the community engagement needed to make this project the success it can be. The overall strategy KCP&L will employ includes many grassroots methods and non-traditional (at least from a utility perspective) communications options. The key to the strategy will be effective collaboration and partnership with established organizations in the Green Impact Zone, such as neighborhood groups, community development corporations, churches, the city and other governmental entities. Additional details on the strategy are outlined in this section.

Our Team's communications and community affairs professionals are experienced in executing business-to-business and business-to-consumer led generation campaigns of all sizes, using a wide array of communications tools. We will provide comprehensive end-to-end services to develop a campaign, including market analysis and segmentation, campaign strategy, planning, creative execution as well as management and lead tracking. Our Team's experience with other utility programs and best practices will play an important role in this effort.

KCP&L sees three primary education needs through this demonstration project: sharing information throughout the utility industry; educating and engaging the end recipients in the Green Impact Zone; and, educating the remainder of KCP&L's customer base about how SmartGrid investments will ultimately impact them.

3.F.1) SmartGrid Technology Transfer with Utility Industry

As a member of EPRI's five-year SmartGrid demonstration project, our technology transfer activities will be coordinated through EPRI's formalized SmartGrid demonstration project. Specifically, EPRI will coordinate the sharing of field results, lessons learned, architectural challenges, issues impacting standards, key technology gaps, and useful tools to help interoperability of SmartGrid technologies and systems related to the project. In addition, detailed project information will be communicated via EPRI's SmartGrid resource center (www.smartgrid.epri.com) and additional technology transfer activities including workshops, webcasts, and periodic publications. The workshops will include presentations on status of field demonstrations, lessons learned to date, architectural challenges, issues impacting standards, and common interest areas to explore. Technical summaries in the form of presentations and white papers/articles will be prepared for public dissemination. These publications will include a synthesis of contributions to standards bodies and common messages to deliver to industry and public entities such as state and federal agencies.

3.F.2) Green Impact Zone Partnership initiatives

We believe the proposed demonstration program is unique in that most SmartGrid demonstrations have focused primarily on relatively affluent, suburban or small town service areas. We propose this initiative to demonstrate specifically how it will work in an urban setting, understand benefits to individual customers and communities, and determine the parties that need to be involved and the nature of their involvement. To this end, KCP&L is teaming with a number of federal, state and local agencies, including, among others, U.S. Representative Emmanuel Cleaver (D-Missouri), the State of Missouri, local Kansas City government officials, and the Mid-America Regional Council to focus American Recovery and Reinvestment Act (ARRA) funding in an area of Kansas City known as the Green Impact Zone of Missouri. The Green Impact Zone consists of 150 inner-city blocks bordered by 39th Street on the north, 51st street on the south, Troost Avenue on the west and Prospect Avenue to 47th Street over to Swope Parkway on the east. This particular section of Kansas City has been devastated by the economic recession and suffers from high levels of unemployment, poverty, and crime.

The goal of the Green Impact Zone initiative is to demonstrate a focused effort by a number of partners and neighborhood organizations to achieve multiple interconnected goals, all of which center on improving a central-city, urban area to make it an attractive place to live and work. Despite its challenges, the Zone includes some substantial assets, including several strong neighborhood groups; community, cultural and health centers; and proximity to an important health sciences cluster and major roadways. To build on these assets and develop others, the Zone is pursuing a multi-faceted strategy— motivated by stimulus funding opportunities— around enhancing the area's sustainability, public safety, stabilization, housing conditions, access to jobs and services, and economic vitality. Efforts in the Green Impact Zone will focus on training and employing area residents to implement weatherization and energy efficiency programs to reduce utility bills, conserve electricity and create sustainable jobs.

Working with the city and other Green Impact Zone partners, KCP&L will invest in and deploy advanced generation, distribution and customer technologies and solutions to the Zone's electrical infrastructure. This "SmartGrid" program will provide area businesses and residents with enhanced reliability and efficiency through real-time information about electricity supply and demand. It will also enable customers to manage their electricity use, and save money, by providing useful information about electricity prices. Finally a SmartGrid will enable renewable energy sources, such as solar and other parallel generation, to be located in the Zone and seamlessly feed into the energy grid. By developing an end-to-end solution rather than demonstrating specific components such as DMS or AMI technologies

alone, KCP&L will be able to test and evaluate the solution's ability to achieve a complete suite of prospective SmartGrid benefits - greater energy efficiency, reduced cost, improved reliability, more transparent information and an improved environmental footprint.

To achieve our outreach and education goals, KCP&L will partner with community leaders to raise awareness of the company suite of energy efficiency related products and services. Through these partnerships we will broaden KCP&L community engagement by increasing our involvement and implementing solutions that help our customers reduce their energy consumption.

The demonstration area for SmartGrid will allow KCP&L to team with several key business partners in the surrounding areas. These partners may be able offer demographic information (UMKC), research (Stowers) and funding. We will also leverage our trade ally relationships to reduce the program, implementation and customer contribution costs.

KCP&L has formed a strategic alliance with the Mid America Regional Council (MARC), Brush Creek Community Partners, Congressman Cleaver's organization and many others to coordinate efforts in the Green Impact Zone that will ultimately achieve project goals. KCP&L will participate in outreach programs under the direction of MARC's Coordinating Council to ensure consistency and to avoid redundancies.

The customer demographics of the Green Impact Zone make it necessary to develop a non-traditional marketing/outreach approach to reach customers where they seek information with a message that resonates. Our initial communication plan for the customer outreach and education in the Green Impact Zone is included in the Project Management Plan. It is incumbent upon KCP&L to provide educational opportunities for the rest of its customer base. With the industry working toward most sustainable options, a large number of KCP&L customers are very interested in the progression of energy services. Investments in SmartGrid in the Green Impact Zone provide KCP&L the opportunity to speak authoritatively about the benefits and challenges in this arena. KCP&L will use the opportunity to provide periodic updates in bill inserts, on its web site and through various media outlets and public forums to educate customers about the SmartGrid experience.

4. MERIT REVIEW & CRITERIA DISCUSSION

4.A. PROJECT APPROACH

4.A.1) Comprehensiveness and completeness of the Statement of Project Objectives (SOPO) that describes the proposed interrelated tasks and of the Project Management Plan that includes a schedule with milestones and explains how the project will be managed to achieve objectives on time and within budget

The Company has established an aggressive, yet achievable SmartGrid Demonstration project organized into five phases. These phases along with specific tasks and their associated deliverables are thoroughly described in the Statement of Project Objectives (SOPO) below and in the Project Management Plan (see attached "pmp.pdf"), which is attached in a separate file to this Application. This plan was developed by the KCP&L SmartGrid Demonstration project team along with the assistance of experienced KCP&L managers and strategic partner experts. This plan is explicitly linked, project by project, to the Project Budget and will be funded in accordance with the Project Funding Profile.

The SmartGrid Demonstration is organized into five distinct, yet interrelated phases, which align with the DOE's expectation with regard to approval stages, operations and reporting. These five stages were specifically designed to manage the SmartGrid Demonstration deployment in the most expeditious and cost-effective manner possible over the expected project time frame.

The SmartGrid demonstration architecture will evolve over time as additional applications, requirements, and technologies evolve. Throughout the execution of the Demonstration, the Company

will access the capabilities of industry resources and associates such as EPRI as well as the expertise, capabilities and planning resources of its strategic partners..

4.A.2) Completeness of the proposed demonstration approach to effectively address each of the goals of the SmartGrid Demonstration Initiative.

The SmartGrid Demonstration has been explicitly designed to be a complete end-to-end SmartGrid demonstration program in a geographically defined area of Kansas City. By focusing on the circuits and distribution feeders surrounding its Midtown Substation, the Company will be able to assess the potential benefits of a SmartGrid solution from SmartGeneration through to SmartEnd-Use in a regionally unique, controlled "laboratory" environment. The goals of this demonstration are in sync with those of the SmartGrid Demonstration Initiative – to quantify SmartGrid costs, benefits and cost-effectiveness as well as verify SmartGrid technology viability, and validate new SmartGrid business models, at a scale that can be readily adapted and replicated around the country. Each of these goals in the context of KCP&L's demonstration is addressed below:

- Quantify SmartGrid costs, benefits and cost-effectiveness**:** A key objective in our SmartGrid Demonstration will be to quantify the costs and benefits of each of our solutions separately and as a complete solution. The Demonstration is designed as a regionally unique effort to display the benefits of single initiatives and the overall synergies and interrelations that can occur as a result of building complete programs. In our budgeting process, we have defined the operating and capital costs of each of the initiatives along with an estimate of potential benefits. These benefits include operational, economic, customer and environmental improvements. Where possible, specific, quantifiable methodologies were developed to translate benefit metrics into potential monetary value. For the overall solution, additional program management costs were included and synergistic benefits were estimated. These costs and benefits will be periodically evaluated during the Demonstration as part of the required DOE reporting process. Additionally, where possible, we will quantify the cost-effectiveness of the technology solutions developed for the demonstration vs. existing and / or alternative technologies and solutions to determine the cost-effectiveness of our demonstration vs. existing and emerging alternatives.
- Verify SmartGrid technology viability: As part of the Demonstration, we are implementing a number of new and emerging technologies and combining and integrating both new and existing technologies in unique ways to form an end-to-end solution. Such technologies include the installation of DCADA/SmartSubstation components, the integration of DER and DR Management systems, the addition of a complete DMS system, an AMI system implementation along with associated smart meters and Field Area Network (FAN), and Smart Home devices including DR thermostats and residential and commercial EMS. Each of these technologies will be tested against anticipated net benefits and their ability to generate sufficient savings or other benefits to justify their cost of implementation and use. Each of these systems will be evaluated separately and as part of a complete solution to determine their most optimal use and application, either as separate systems or as part of the more holistic demonstration.
- Validate new SmartGrid business models: A key reason we designed the Demonstration as an end-to-end solution from SmartGeneration through SmartEnd-Use is to test and evaluate the potential for a variety of business models. For example, with SmartGeneration applications such as roof-top solar, we will test the viability and practicality of eventual customer-owned generation assets and capabilities with the potential to sell excess capacity back to the grid. The Company expects to test this concept in other DER applications as well such as parallel generation and potential PHEV vehicle-to-grid applications.

4.A.3) Adequacy of the proposed demonstration approach to quantifiably advance program metrics.

The SmartGrid Demonstration has been specifically designed to address as many program metrics as possible. The complete solution approach to the SmartGrid Demonstration will allow KCP&L to evaluate, test and report on the program's effect on a wide variety of metrics, including economic (e.g. T&D system losses, % of MWh served by DG), reliability and power quality (e.g. SAIFI, SAIDI, CAIDI, MAIFI), and environmental (% of MWh served by renewables, % of feeder peak load served by renewables). This testing process will be further enabled by focusing on one substation for which substantial historical data already exists. Prior to receiving approval for Final Design and Construction, we will establish a formal baseline of all metrics to be measured.

4.A.4) Validity of the proposed approach and likelihood of success based on current technology maturity and regulatory / stakeholder acceptance of the technology. Innovativeness of the project, including introduction of new technologies and creative applications of new and state-of-the-practice SmartGrid technologies

Our Project Team seeks to demonstrate the value of using SmartGrid technology and communications to manage distributed energy resources within a utility's service territory. In particular, we are targeting edge of grid resources using a comprehensive SmartGrid platform in order to integrate and manage distributed grid assets. In developing the scope, objectives and approach for this project, KCP&L explicitly balanced the inclusion of widely accepted technologies with new and emerging concepts and approaches. We also evaluated innovative combinations and applications of best of breed technologies rather than single solutions or the implementation of single vendor platforms.

The goal of the Demonstration is to design, develop, and deploy a next generation end-to-end (or top-to-bottom) distribution grid management infrastructure, which will be based on distributed-hierarchical control concepts, an emerging technology. Our approach is centered on the upgrade of our Midtown Substation, an existing urban substation, to create a next-generation Smart Substation with IEC-61850 communication protocols and control processors to implement distributed, unattended control with automated "first responder" monitoring and control functions. Ten distribution circuits served by the Midtown Substation will be upgraded with a variety of feeder based monitoring and control IED to evaluate the impact of a variety of Advanced Distribution Automation (ADA) functions and leading edge smart customer initiatives will provide consumers with enhanced information regarding energy use and cost. Finally, SmartGeneration initiatives including emerging photo-voltaic solar technologies and PHEV charging stations and vehicles will be implemented to test the potential for distributed generation and innovative business models. Each of these initiatives utilizes some combination of existing and accepted technologies combined with emerging technologies, protocols or systems. In addition, we believe the combination of best of breed technologies and the unique application of these technologies in an end-to-end, regionally-defined urban application is unique and could serve as an urban renewal blueprint for future applications.

4.A.5) Appropriateness and completeness of the demonstration plan including performance objectives of the demonstration, the criteria and requirements used in selecting demonstration site(s), the data collection and evaluation plan, the metrics for success, and the measurements that will be made to confirm success. Adequacy and completeness of the proposed approach in delivering demonstration project data and information to the SmartGrid Clearinghouse, the DOE and the public.

KCP&L has a rich history of performance data in the region and has begun work on establishing a set of baseline parameters on the economic, operational and environmental performance metrics to be reviewed. As we prepare for the execution of the demonstration, a preliminary performance and cost model will be developed to define a baseline case for this project. A complete range of baseline data will

be collected by individual project teams and across projects as defined in the project plan. This will include both operational/performance (reliability, usage, etc.) and financial (cost to serve, rates, etc.) information. This baseline data will be the basis for measuring the impact on grid performance, system efficiencies, and end-use consumption patterns achieved by the demonstrated technologies. KCP&L will collaborate with the DOE to determine the distribution feeder and customer data needed to support the DOE standardized cost benefit analysis methodology.

The defined site for the project – the Company's Midtown substation along with multiple circuits served by the substation – will provide a very efficient testing and demonstration environment. The Company has served this area for many years and has a rich history of data for the region as well as the capabilities to collect and report data to the SmartGrid Clearinghouse on a regular basis. The final demonstration solution will be compared with this baseline case to measure the benefits of the approach and quantify performance relative to expectations.

The project team will develop a grid monitoring and test plan for the two-year demonstration. The plan will address various modes of grid, DR, and DER, operation; validate key operating features of the distributed resources (e.g., stand-alone and parallel operation); validate the key operating and control features of the distributed-hierarchical grid control systems; and confirm the safe and reliable operation of the electric grid with integrated distributed resources. The monitoring plan will provide for compilation of the necessary data to measure improvements in grid efficiency, grid performance, reduced consumer energy consumption and demand reduction.

During the 24 month demonstration, our team will collect the detailed data in different operational modes, including normal and contingency switching configurations. Both grid performance and consumption data will be collected, compiled and analyzed for the project area (see page ___ for detailed examples of the type of data to be collected and utilized to demonstrate project success). This data will be compared against the baseline data to measure the impact on grid performance, system efficiencies, and end-use consumption patterns achieved by the demonstrated technologies.

As a member of EPRI's five-year SmartGrid demonstration project, our project data transfer activities will be coordinated through EPRI's formalized SmartGrid demonstration project. Specifically, EPRI will coordinate the sharing of field results, lessons learned, architectural challenges, issues impacting standards, key technology gaps, and useful tools to help interoperability of SmartGrid technologies and systems related to the project. Project data including scope, schedule, and results of the project will be supplied to the "SmartGrid Information Clearinghouse."

4.A.6) Suitability and availability of the proposed project site(s) to meet the overall program objectives for scope and scale appropriate for the technology(ies) being demonstrated.

As noted above, the Demonstration Area is an ideal project site for this type of demonstration as it consists of 10 circuits served by one substation across 2 square miles with approximately 14,000 customers comprising both commercial and residential customers with a broad array of demographics, income levels and energy usage and needs. Since this area is explicitly defined and served by one substation, it can provide the ideal "laboratory" environment from which to demonstrate and test program results.

Part of the Demonstration Area also contains the Green Impact Zone, a wider urban revitalization project designed as a means to use Federal funds to redevelop an urban core. Key to this redevelopment is the provision of a modern energy infrastructure. The Green Impact Zone has significant political and community support which will provide the catalyst for high customer engagement to better demonstrate our integrated view of the SmartGrid.

4.A.7) Adequacy of plans for data collection and analysis of project costs and benefits, including the following aspects:

- **Thoroughness of the discussion of data requirements (including what types of data and their availability) and how that data will be provided to the DOE so that project costs and benefits can be properly analyzed**
- **Logic and completeness of the discussion of how the data can be used by the DOE to develop estimates of project costs and benefits, including the discussion of the Applicant's quantified estimates of project benefits**
- **Comprehensiveness of the plan for determining the baseline against which the costs and benefits will be assessed**

A range of baseline data will be collected by individual project teams and across projects as defined in the Project Management Plan. This will include both operational / performance (e.g. reliability, usage, etc.) and financial (cost to serve, rates, etc.) information. As much as possible, we will include metrics that not only show monetary benefits, but also progress on demonstrating SmartGrid "characteristics" as defined in the FOA. Based on historical data on our performance in the Demonstration Area, a preliminary performance and cost model will be developed to define a baseline case for this project. The final demonstration solution will be compared with this baseline case to measure the benefits of the approach and quantify performance relative to expectations.

The Company intends to provide a variety of data to the SmartGrid Clearinghouse using the DOE's cost-benefit analysis methodology or an approach that is very similar and provides the input data required for the DOE to evaluate project success along a wide variety of metrics. The Company plans to actively track and measure a complete set of performance data at regular intervals and report results to the DOE versus the project baseline.

4.A.8) The degree of the proposed estimates of project benefits

KCP&L expects this demonstration to show significant improvements in monetary benefits and the progress of the Demonstration Area toward exhibiting SmartGrid characteristics. This information is not all-inclusive and the estimates will be further refined and quantified over the next few months and will be formalized with the DOE after Notice of Award and prior to the Operational Readiness Review Approval. Specific benefits, sources, metrics and potential degree of impact are shown below:

4.B. SIGNIFICANCE & IMPACT

4.B.1) Significance of the proposed demonstration application vs. current practices – Completeness of this assessment to consider benefits in terms of anticipated performance improvements (technical, operational, and environmental aspects) and the cost savings of the proposed application over current practices

This Demonstration effort is designed as a means to test and evaluate a potential step change improvement in KCP&L's electricity distribution system. Specifically, we are designing a system with a communication architecture that will facilitate automated system monitoring and control with open systems that will allow the integration of technologies and components from multiple vendors in a "best-of-breed" solution along with a new electrical architecture and protection system that will enable an interoperable, secure network of components.

We expect this Demonstration to display significant performance improvements as a result of the technologies and solutions considered. Substation and distributed feeder line automation systems can significantly reduce O&M costs, improve reliability and enhance the environmental footprint through automated fault location detection, automated switch operation, improved voltage control and regulation, improved Outage Management System communications, enabled two-way end-user communication and

information flow and the integration of distributed energy resources, allowing for a greater role of renewable energy generation into grid operations.

4.B.2) Degree to which the demonstration project is broadly applicable and adaptable throughout the region or the nation, including the completeness and adequacy of the deployment plan for large-scale deployment in and/or beyond the proposed region

As noted above and throughout this Narrative, the Demonstration Area is a self contained distribution network anchored by KCP&L's Midtown Substation within the Green Impact Zone. The Demonstration will design, deploy, test and report on the implementation of a complete end-to-end SmartGrid system within multiple circuits served by the Midtown Substation over a 2 square mile area with approximately 14,000 commercial and residential customers. Both the commercial and residential customer base is very diverse with large public institutions such as the University of Missouri at Kansas City and the Midwest Research Center as well as a residential population from virtually all demographics and income groups.

By designing this Demonstration as a complete end-to-end SmartGrid research and testing project in a geographically defined area, the Company has effectively designed a demonstration program that could either be scaled up as a large scale SmartGrid "Investment" program or deployed in different urban areas of the United States. It is truly a transferable and scalable solution.

4.B.3) Adequacy and impact of the public outreach and education plan on public acceptance of SmartGrid transformation

In order to promote this Demonstration in the Green Impact Zone and the Demonstration area in general, we have worked with our partners to design a comprehensive marketing, education and training program. In addition, as part of the Demonstration, we have designed a number of end-use programs.. In order to demonstrate the full value of these programs, KCP&L has developed both a business-to-business and business-to-consumer marketing and education campaign.

KCP&L will serve as the primary point-of-contact for our Demonstration Partners and will manage and coordinate all resources required, including KCP&L marketing and customer service professionals and third-party service providers (i.e., advertising agency, call center and printer). KCP&L will also work with our Demonstration Partners' marketing teams to create a highly targeted customer enrollment program that achieves goals and meets brand objectives and preferences for interacting with customers.

For more information and description of the Company's public outreach and education plan, please see Section 3 (Project Description) above.

4.B.4) Completeness of the proposed commercialization strategy for the technology(ies) being demonstrated

In designing this demonstration, KCP&L's initial goals are similar to those under this Application – to quantify SmartGrid costs, benefits and cost-effectiveness, verify SmartGrid technology viability, and validate new SmartGrid business models, at a scale that can be readily adapted and replicated around the country. We have explicitly incorporated the advanced digital technologies that support the SmartGrid Regional Demonstration Initiative, as described under section 1304 (b) (2) (A)–(E) of the Energy Independence and Security Act (EISA) of 2007. As such, we believe that this is a demonstration project and not a commercial endeavor. However, certain solutions that are developed as part of this demonstration could be commercialized in the future, particularly by our strategic partners, and also may become readily transferrable and applied as use cases for national implementation and replication.

4.B.5) Extent to which demonstration advances research and demonstration objectives of the program

The SmartGrid Demonstration is explicitly designed to advance the research and demonstration objectives of the SmartGrid Demonstration Initiative. Specifically, we have developed a proposed

SmartGrid architecture that employs and integrates emerging technologies being developed for use in the planning and operations of the electric power system. Such technologies include microprocessor-based measurement and control, advanced two-way communications, and next generation computing and information systems. These systems (e.g. electronic substation relays, DA automation circuits, electronic capacitor controls, communicating faulted circuit indicators, voltage monitors and two-way communication devices throughout the distribution test area) will be combined in a unique and innovative manner to enable distribution automation and facilitate the integration of end-use and SmartGeneration add-ons to form a self contained complete "SmartGrid". This regional "laboratory" will serve as a research and demonstration site for the explicit testing of these advanced technologies as specified under the EISA.

4.B.6) Viability and practicality of the proposed technology to meet the needs of the target market in a cost effective manner.

The SmartGrid Demonstration is explicitly designed to advance the research and demonstration objectives of the SmartGrid Demonstration Initiative. Specifically, we have developed a proposed SmartGrid architecture that employs and integrates emerging technologies being developed for use in the planning and operations of the electric power system. Such technologies include microprocessor-based measurement and control, advanced two-way communications, and next generation computing and information systems. These systems (e.g. electronic substation relays, DA automation circuits, electronic capacitor controls, communicating faulted circuit indicators, voltage monitors and two-way communication devices throughout the distribution test area) will be combined in a unique and innovative manner to enable distribution automation and facilitate the integration of end-use and SmartGeneration add-ons to form a self contained complete "SmartGrid". This regional "laboratory" will serve as a research and demonstration site for the explicit testing of these advanced technologies as specified under the EISA.

4.C. Interoperability & Cyber Security

4.C.1) Adequacy and completeness of approach to address interoperability, including the description of the automation component interfaces (devices and systems), how integration is supported to achieve interoperability, and how interoperability concerns will be addressed throughout all phases of the engineering lifecycle, including design, acquisition, implementation, integration, test, deployment, operations, maintenance and upgrade

KCP&L fully understands that one of DOE's SmartGrid priorities is to use its work with NIST and FERC on a framework for interoperability standards. KCP&L has been an active participant in the development of the NIST SmartGrid Interoperability Standards Roadmap and believes that this SmartGrid Demonstration provides an ideal opportunity to field test the interoperability standards.

The SmartGrid Demonstration project is based on an integrated end-to-end solution that demonstrates interoperability of key Smart Grid components and will provide a commercial application for five (5) SmartGrid use cases – Demand Response, Electric Storage, Electric Transportation, AMI Systems, and Distribution Grid Management – that form the basis of the proposed NIST' Interim Smart Grid Interoperability Standards Roadmap.

The SmartGrid Demonstration will implement bulk power energy management, scheduling and market systems, enterprise systems, distribution network management system, substation, feeder and distribution automation systems, distributed resource and demand-side management systems, advanced metering infrastructure and customer-based energy management and behind-the-meter resources and loads. We will leverage EPRI's IntelliGrid^{SM} methodology to support the technical foundation for a smart power grid that links electricity with communications and computer control to achieve tremendous gains in reliability, capacity, and customer services. The IntelliGrid Architecture is an open-standards,

requirements-based approach for integrating data networks and equipment that enables interoperability between products and systems. This methodology provides tools and recommendations for standards and technologies when implementing systems such as advanced metering, distribution automation, and demand response and also provides an independent, unbiased approach for testing technologies and vendor products.

The Project Team will assess the applicability and the gaps of the NIST standards, and will adopt, and extend where necessary, these standards in this project. To the extent feasible, our project will coordinate our implementation efforts with NIST and the Standards Development Organizations acceleration efforts.

4.C.2) Adequacy and completeness of approach for cyber security concerns and protections and how they will be addressed throughout the project, including the adequacy of the discussion of the integration of the new SmartGrid application into the existing environment, and how any new cyber security vulnerabilities will be mitigated through technology or other measures.

Securing the networked communications, intelligent equipment, and information is critical to the operation of the future SmartGrid. Due to the complexity and far reaching aspects of the SmartGrid, planning for physical and cyber security, in advance of deployment, is essential to provide a more complete and cost effective solution.

As a member of EPRI's five-year Smart Grid demonstration project, our cyber security requirements and design will be coordinated through EPRI's formalized smart grid demonstration project. KCP&L intends to leverage EPRI's IntelliGrid^{SM} Architectures' strategic vision to support our technical approach on cyber security.

The development of the SmartGrid T&D infrastructure will involve cyber security considerations in every aspect and phase of the project and also numerous standards at all levels of the IT and grid infrastructure. One of the objectives of the proposed project is to demonstrate end-to-end cyber security and incorporate the appropriate NIST identified "low-hanging fruit" standards. The Project Team will assess the applicability and the gaps of these and other standards, and will adopt, and augment where necessary, these standards in this project. To the extent feasible, our project will coordinate our implementation efforts with NIST and the Standards Development Organizations acceleration efforts.

KCP&L has also chosen to implement the demonstration using private communications media wherever practical. By using the Corporate IT WAN and utility owned FAN, the KCP&L SmartGrid system designs can still leverage the vast amount of research and development into Internet Protocols (IP) and technologies. They will just be implemented over a private Intranet instead of the public Internet to minimize the exposure to cyber security attacks.

The far reaching and complex nature of the SmartGrid dictates that no-single security policy can be developed to properly secure the SmartGrid. The hierarchical nature of the technologies that will be implemented to create the SmartGrid Communication Network provides for security "check-points" between control and network layers that may have different security requirements. Therefore, it is a natural extension for the Security Architecture to be constructed around Security Domains.

These Security Domain represent a set of resources (e.g. network, computational, and physical) that share a common security requirements and risk assessment. For example; within the 'bulk power system' there are two distinct Security Domains: NERC-CIP and NERC-nonCIP. While having different security requirements, all Security Domains will be secured and managed through a consistent set of security policies and processes. Secure connectivity, data encryption, firewall protection, intrusion detection, access logging, change control and the audit reports associated with these applications will likely be required for all SmartGrid security domains.

4.D. PROJECT TEAM

4.D.1) Completeness and qualifications of the proposed project team, with defined roles and responsibilities for each team member and with appropriate members committed to the demonstration or technology verification

The implementation of the Smart Grid Demonstration will be executed using a disciplined Program Management methodology and approach. This approach will involve a coordinated effort between program management, leadership, cross functional, and individual project areas. The Smart Grid Demonstration leadership will be comprised of a Program Management Director from KCP&L, various KCP&L subject matter experts, members of a Partner Leadership Team and members of the KCP&L Executive Advisory Team.

Each cross functional and individual project area will have an assigned Project Area Lead that reports to the Program Management Director. Each program will be required to utilize a disciplined project management approach to provide integration into the overall program management responsibilities and deliverables. The Program Management Director will provide project management requirements, guidance, oversight, and have overall responsibility for the direction and performance of the project. The Program Management Director and Project Area Leads will provide periodic updates to the Partner Leadership Team and KCP&L Executive Advisory Team. The primary role of the Program Management Director is to:

- Provide overall day-to-day leadership, including determining project priorities, setting meeting and project discussion agendas, determining roles and responsibilities and managing the overall Project Management Plan
- Provide overall quality control oversight and manage the activities of various Partner and internal KCP&L project teams

The primary role of the Partner Leadership Team is to:

- Guide and provide leadership on the technical and process aspects of the project, including the selection and review of results of pilot technologies, and the conduct of the project meeting future energy industry needs; and
- Ensure that the project's vision is brought to bear through the collaboration of the projects partners and stakeholders.

The primary role of the KCP&L Executive Advisory Team is to:

- Provide overall leadership to the project and assumes primary responsibility for the project to assure project budget, resources are available and supporting project scope and vision, and
- Periodically review project risk plan, project milestones, and quality of project deliverables to assure project performance.

4.D.2) Demonstrated level of corporate commitment to the proposed project and proposed cost share as evidenced by letters of intent from all proposed team members

KCP&L and its strategic partner team have each provided a substantial commitment to the proposed project. KCP&L has provided a cash commitment of approximately $___ million over the next five (5) years to develop and implement the SmartGrid Demonstration. KCP&L has also committed extensive executive, engineering, marketing, customer service, IT and other resource time to the project.

Additionally, the strategic partner group has provided substantial "in-kind" project contributions in the form of discounted services, labor and equipment. Altogether total in-kind partner contributions and investments total $___ and represent approximately ___% of total project value. Many of the partners will also commit significant senior project management and subject matter expertise, both from the

dedicated resources shown above as well as from other individuals within their organizations. These resources have worked and will continue to collaborate with KCP&L in determining project direction, goals, timelines and overall project management services

Each of the proposed partner contributions is outlined in the letters of commitment letters attached to this Application.

4.D.3) Demonstrated level of corporate commitment to commercialization of the proposed technology by providing convincing examples of the Applicant's efforts to commercialize the technology in addition to the proposed project

As noted throughout this Narrative, the SmartGrid Demonstration is a regionally-focused, complete effort to demonstrate, test and report on the feasibility of combining, integrating and applying existing and emerging SmartGrid technologies into one holistic solution and to demonstrate, measure, and report on the costs, benefits, and business model viability of the demonstrated solution. The SmartGrid Demonstration is explicitly designed as complete, stand-alone best-of-breed solution that can be replicated in other geographies or scaled up to service a larger distribution territory. Hence, we expect that there will be several potential commercial applications resulting from our efforts.

While we are initially focused on demonstrating the net benefits and advancement of SmartGrid characteristics resulting from the solution, we will work with our partners to advance and commercialize any potential technologies that could arise from the Demonstration. To that end, we have engaged with strategic partners who will play critical roles in developing such applications and solutions and expect to negotiate specific commercial terms and conditions with them after this Application filing and / or Notice of Award. A component of such terms and conditions will address the mechanisms and procedures whereby KCP&L will work its partners and other specific entities to ensure the technologies have the greatest potential impact on SmartGrid development and their associated net benefits are realized by as many industry participants and stakeholders as possible.

5. RELEVANCE AND OUTCOMES / IMPACTS

5.A. RELEVANCE

KCP&L's Green Impact Zone SmartGrid Demonstration initiative is a collaborative effort by all parties focused on addressing prevalent challenges with integrating distributed resources in grid and market operations as well as in system planning. Multiple demonstration components will be designed and implemented to address the variety of barriers and incompatibilities associated with the integration of distributed resources (e.g., local storage, demand response, distributed generation, renewable resource, and grid management) into system operations. These barriers include lack of appropriate technical operations and decision-aiding models, insufficient communication and control infrastructure, incompatible market and pricing structures, and the lack of interoperability standards. The project will demonstrate a variety of approaches for overcoming these barriers and identify appropriate standards and best practices for distributed resource integration.

Electric utilities around the world are assessing the technical issues and the related benefits and costs of modernizing the grid. Many are already investing in the communication and information infrastructure that is expected to be the backbone of the SmartGrid. These infrastructures will require tens of billions of dollars of capital investment in equipment and new technologies. Investors and regulators want to know if the investments will be a technical and financial success. Customers want to understand if benefits will justify the costs that may ultimately be borne by them as ratepayers. Our project contributes to addressing these concerns by leveraging the investments in communication infrastructure to demonstrate effective integration of multiple components and systems.

The scope of the demonstrations encompasses numerous SmartGrid network component, grid management and control systems, and distributed resources that operate together including:

- AMI - Advanced Metering Infrastructure including RF mesh FAN providing IP based AMI and ADA field communications
- MDM – Meter Data Management for management and analysis energy consumption patterns.
- DMS – Distribution Management System with D-SCADA and OMS functions
- ESB – Enterprise Service Bus providing IEC61968 integration for all distribution management systems components
- SA – Distribution Substation Automation with IEC61850 protocols and advanced IEDs
- ADA – Advanced Distribution Automation with automated "first responder" monitoring and control functions with substation DCADA controller.
- Adopting distributed, hierarchical control methods between DCADA, DMS, and DERM
- DERM – Distributed Energy Resource (DR/DER) Management system that interoperates with DMS, MDM
- DER – A variety of utility managed DER components will be integrated including DVC, DR thermostats, roof-top solar, grid-connected battery, and conversion of stand-by to parallel generation.
- DSM- A variety of consumer demand side management technologies will be integrated including In-home Display, EMS-Web Portal, HAN, experimental TOU rates, PHEV charge management and critical peak signals.

Enabling widespread penetration of SmartGrid systems and technologies in support of grid operations requires overcoming prevalent integration barriers. Integration barriers range from technical and economic to institutional and customer-driven barriers. Technical barriers relate to lack of infrastructure, accepted standards and processes/protocols to aggregate and automate distributed resources in a fashion that meets system operator requirements. The requirements themselves need to be carefully defined to achieve system operator confidence in relying on distributed resources on the one hand, yet not overly burden the demand-side and thereby discourage aggregation and demand-side participation. Economic type barriers include establishing justification for integration costs and designing retail incentive structures to incent sufficient response from distributed resources in support of grid needs. Institutional barriers surround the need to better connect wholesale with retail electricity markets and to bridge organizational silos to better achieve end-to-end integration, from wholesale to retail markets and down to end-use.

The Smart Grid project will demonstrate a variety of approaches for overcoming these barriers and identify appropriate standards and best practices for distributed resource integration. Lack of standards and associated high integration costs are prevalent challenges in enabling widespread penetration of distributed resources. Other challenges include lack of appropriate decision-aiding models, insufficient communication and control infrastructure, incompatible market and pricing structures, and the lack of interoperability standards. EPRI's IntelliGrid methodology will be applied to identify approaches for interoperability and integration. Methods, processes, and technologies will be researched, developed, and applied to demonstrate and measure project effectiveness in overcoming integration barriers.

5.B. OUTCOME/IMPACTS

The primary outcome/impact of the SmartGrid Demonstration project will be multifaceted:

- (a) When combined the individual project components will implement and demonstrate a next-generation, end-to-end SmartGrid that will include Distributed Energy Resources, enhanced customer facing technologies, and a distributed-hierarchical control system of a significant regional distribution grid serving 14,000 customers, the Kansas City Green Impact Zone, and UMKC with 69.5 MVA demand.
- (b) Demonstration, measurement, and reporting on the costs, benefits, and business model feasibility of the demonstrated solution. The project will demonstrate certain operational, economic, consumer, and environmental benefits that can be enabled by single SmartGrid technologies and further

enhanced by integrated solutions as proposed for this demonstration.

- Our project will use existing and emerging integration technologies and standards for implementing the T&D SmartGrid Infrastructure. By applying NIST identified SmartGrid interoperability, the project can help NIST and relevant SDOs identify issues and gaps associated with the standards (e.g., common object models, communications interfaces, etc.). This effort is focused on an accelerated timetable for the development of a standards development roadmap and a process for getting standards for interoperability in place as rapidly as possible.

In addition to the above specific Smart Grid metrics and impacts, the project will demonstrate the following key capabilities:

5.C. SMARTGRID METRICS

The following table lists the relevant SmartGrid statistics that have been established by the DOE to measure the progress SmartGrid adoption and what will be demonstrated and or quantified by our project related to each of these statistics

Table 2: DOE SmartGrid Statistics

Relevance and Outcomes/Impacts	What will be demonstrated
Transmission and Distribution Infrastructure	
• D.3.1 - T&D system reliability: duration and frequency of power outages	• Using DR/DER capabilities to relieve load on distribution equipment and facilities
	• Utilizing DR/DER for balancing variable generation (solar PV), e.g., dispatching the proposed 1MW storage capability.
	• Provision of ancillary services from demand-side DR/DER • DMS real-time information and model will be used to track SAIDI/SAIFI and provide before/after comparison using 12 months of data for demonstrating the magnitude of improvements.
• D.3.2 - T&D automation: percentage of substations using automation	• Rate of feeders automated for the selected substation will be measured as a model for further deployment.
• D.3.3 - Advanced meters: percentage of total demand served by advanced metered customers	• The ability for the substation and control center to track and manage demand based on improved load models and Distribution Network Management will be measured/assessed per feeder.
• D.3.5 - Capacity factors: yearly average and peak-generation capacity factor	• By utilizing DR/DER including storage, the project will be able to flatten the Load Factor and thus improve the capacity factors of the generating resources serving the load.
• D.3.6 - Generation and T&D efficiencies: energy conversion efficiency of electricity generation, and electricity T&D efficiency	• Line losses will be optimized through better monitoring and management of feeder/circuit Voltage/VAr and phase balances. This will be achieved in part through scheduling and dispatch of DR/DER on distribution circuits.

• D.3.7 - Dynamic line ratings: percentage miles of transmission circuits being operated under dynamic line ratings	Dynamic line/facility rating will be demonstrated on distribution feeders through monitoring of the equipment loading and environmental conditions.
• D.3.8 - Power quality: percentage of customer complaints related to power quality issues (e.g., flicker), excluding outages	• PQ will be improved through proper planning, deployment, interconnection and operation of distributed energy resources (DER)
Information Networks and Finance	
• D.4.2 - Open architecture/standards: Interoperability Maturity Level – the weighted average maturity level of interoperability realized between electricity system stakeholders	• Interoperability between DMS and DR/DER Management using IEC 61968/61970 application integration & IEC 60870/TASE.2 (ICCP) communications
	• Integration of DR/DER Management with AMI system using applicable IEC 61968/61970 protocols
	• Adaptation and extensions of IEC 61850-7-420 for interfaces and management of DER
	• Adaptation and demonstration of NERC CIP and applicable AMI SEC cyber security for DR/DER management
	• Integration
	• Adaptation and extensions of the Open ADR protocols for demand response.
Interoperability:	• Demonstrates an end-to-end interoperable solution that supports a general architecture with product component options. The number, type and system level of interoperable applications and devices communicating through standard protocols to achieve the defined solution functionality will be measured as the project progresses. This will be expressed as a number and a percentage of total components within the proposed project.
Cyber Security:	• Demonstrates an end-to-end solution that extends cyber security methodology and protection to ensure required security
Distributed energy resources technology	
• D.2.1 - Load participating based on grid conditions: fraction of load served by interruptible loads, utility-directed load control, and incentive-based, consumer-directed load control	• This will be extensively demonstrated through the implementation of the DR programs in the Green Impact Zone, including utility-directed load control, incentive-based and customer-directed load control
• D.2.2 - Load served by microgrids: fraction of entire load served by microgrids	• The project will assess microgrid potential in the Green Impact Zone including self-sustainable building with local generation/storage.

• D2.3 - Grid-connected distributed generation (renewable and non-renewable) and storage: percentage of all generation capacity that is distributed generation and storage	• The demonstration project will include both renewable (solar PV) and non-renewable (customer distributed generation) resources. Also included will be a 1MW Feeder level storage capability.
• D.2.4 - EVs and PHEVs: percentage shares of on-road, light-duty vehicles comprised of EVs and PHEVs	• The demonstration project will include a representative set of PEVs and PHEV Charging stations. These capabilities will be fully integrated with the proposed solution in a scalable manner. The demonstration will include all aspects of managing the charging process, tracking the state of charge, monitoring the distribution network loading, as well as assessing the utilization of the PEV storage capability for grid support.
• 2.2.5 - Grid-responsive, non-generating, demand-side equipment: total load served by smart, grid-responsive equipment (smart appliances, industrial/commercial equipment including motors and drivers)	• The project will include integration of HAN based devices as well as in-home displays. Also included are integration of commercial/industrial customer demand-side resources and on-site energy management systems.

6. ROLE OF PARTICIPANTS

KCP&L has developed a 'distributed' solution partnership model – rather than working with a limited number of end-to-end SmartGrid solution providers, working with a set of best-in-breed partners. The vision for the SmartGrid Demonstration is to bring these partners and their capabilities together to develop leading edge, scalable SmartGrid solutions. In selecting partners, KCP&L has partnered with leading companies with either U.S. headquarters or significant operations in the country.

To further the cause of SmartGrid technology development, partners who have agreed to contribute in-kin to the effort have been classified and treated as 'strategic partners'. In addition to these strategic partners, KCP&L will work closely with selected vendors to ensure a successful deployment of the demonstration. These strategic partners and vendors are shown in Figure 12 and described below.

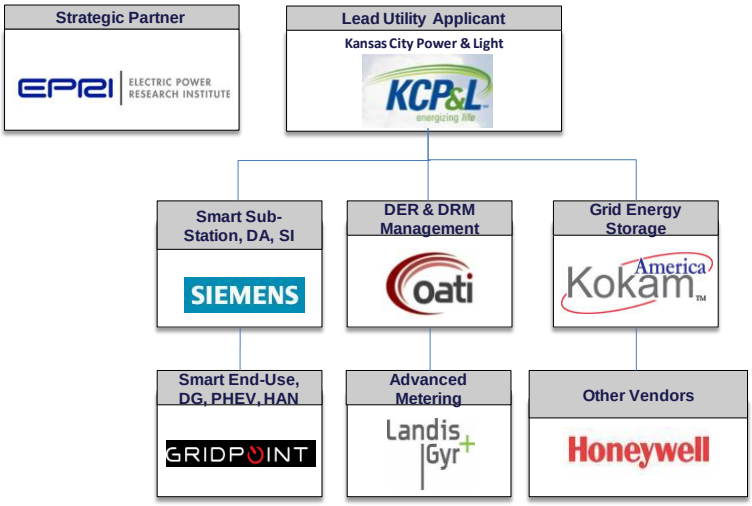
6.A. KANSAS CITY POWER & LIGHT COMPANY (KCP&L)

KCP&L has a long history of being a progressive industry leader in the area of distribution automation. These long standing efforts are evident in KCP&L's Tier-1 standing in reliability performance when KCP&L was named the most reliable electric utility nationwide and awarded the 2007 and 2008 Reliability One™ National Reliability Excellence Award by the PA Consulting Group.

Since 2001, EPRI has managed a collaborative research, development, and demonstration process that has accelerated the industry's migration towards a SmartGrid. KCP&L has been an active funder and participant in this RD&D effort. KCP&L has leveraged EPRI's extensive work in developing a SmartGrid vision and roadmaps for other utilities in developing the SmartGrid Architecture Vision for KCP&L.

In this application, KCP&L is the lead (and only) utility that is leading the SmartGrid Demonstration effort.

Figure 12: Selected Strategic Partners and Vendors



6.B. SUBAWARDEES

6.B.1) Siemens

Siemens' is a multi-billion dollar provider of products and services whose experience spans the entire energy network, including generation, transmission, distribution, and the market. We focus on reliable, efficient, and practical innovation and implementation in each segment. For KCP&L we focus on the automation of the distribution network, Smart Substation controllers, and integration with Distribution SCADA, full Distribution Management System (DMS) capabilities as well as integration with the existing Geographic Information System (GIS), Advanced Metering Infrastructures (AMI), Meter Data Management Systems (MDMS), Distributed Energy Resource Management (DERM) Systems, and Demand Response Management (DRM) Systems.

Siemens extensive expertise, experience, and leadership in the energy industry directly correspond to SmartGrid advancements. Overall, Siemens has embraced the SmartGrid paradigm shift and is dedicating significant resources to create lasting products and solutions for its customers.

6.B.2) OATI

Open Access Technology International (OATI) Inc. has been serving the Energy Industry since 1995 and has had steady growth since its inception and currently has more than 400 staff members. Today, the privately owned OATI, headquartered in Minneapolis, Minnesota with branch offices in San Mateo, California, and Houston, Texas, provides innovative solutions and services to the electric and gas industry to meet challenges in energy scheduling, trading, and risk management; transmission reservations, scheduling, and congestion management; compliance monitoring. In addition, OATI offers a variety of products under its web SmartEnergy suites of applications which are modular solutions to address the requirements for the emerging SmartGrid. OATI web SmartEnergy products include software and services for Demand Response and Distribution Resources Management, Renewable Management, and Asset Management

6.C. CONTRACTORS & VENDORS

6.C.1) Electric Power Research Institute (EPRI)

EPRI conducts research and development relating to the generation, delivery and use of electricity for the benefit of the public. An independent, nonprofit organization, EPRI brings together its scientists and engineers as well as experts from academia and industry to help address challenges in electricity,

including reliability, efficiency, health, safety and the environment. EPRI also provides technology, policy and economic analyses to drive long-range research and development planning, and supports research in emerging technologies. EPRI's members represent more than 90 percent of the electricity generated and delivered in the United States, and international participation extends to 40 countries.

The EPRI will provide technical expertise and advice on defined portions of the project. In addition, we are a member of the five-year EPRI SmartGrid Demonstration Initiative, which is focused on SmartGrid projects that integrate distributed energy resources (www.smartgrid.epri.com). One of the main objectives of this initiative is to identify approaches for interoperability and integration that can be used on a system-wide scale to help standardize the use of DER as part of overall system operations and control. As part of this Initiative, EPRI will support this project in several areas including, but not limited to cost-benefit analysis efforts, use case documentation per the IntelliGrid methodology, data analysis and benefits estimation, CO2 impact assessment and technology transfer.

6.C.2) Intergraph

Intergraph provides a suite of electric industry specific solutions to address work design, network asset management, outage management, and integrated mobile work force management. The foundational component, a Geographic Information System (GIS) is a comprehensive, enterprise-capable, network asset infrastructure management platform that houses a connected data model of the entire energy network or communications infrastructure. This project will leverage an existing Intergraph (GIS) model in the development of the proposed advanced grid monitoring and control environment.

6.C.3) Landis+Gyr

Landis+Gyr has over 100 years of history in the energy space, including 60 years of direct load management expertise and 25 years of smart metering innovation. It is also a leader in integrated energy management solutions, with a commitment to improving energy efficiency and environmental conservation. L&G operates in more than 30 countries on all five continents, having over 15 million endpoints actively managed in long-term contracts

6.C.4) GridPoint

GridPoint will provide a residential Energy Resource Management (ERM) and Home Area Network (HAN) platform to grid which will provide energy consumers and utilities an intelligent network of distributed energy resources that can control load, store energy and produce power. The platform aggregates distributed energy resources and provides consumer and utility control through a single Web-based interface, thereby providing the equivalent performance of central station generation.

6.C.5) Kokam America

Kokam America, will leverage existing lithium polymer battery technology development and manufacturing expertise to develop and deploy a grid-scale energy storage system to supply peak-shaving, demand-management, and Micro-Grid restoration capabilities to the KCP&L grid. The installation will function as a part of a larger Distribution Management System, controlled remotely and programmed to function automatically in conjunction with other SmartGrid components.

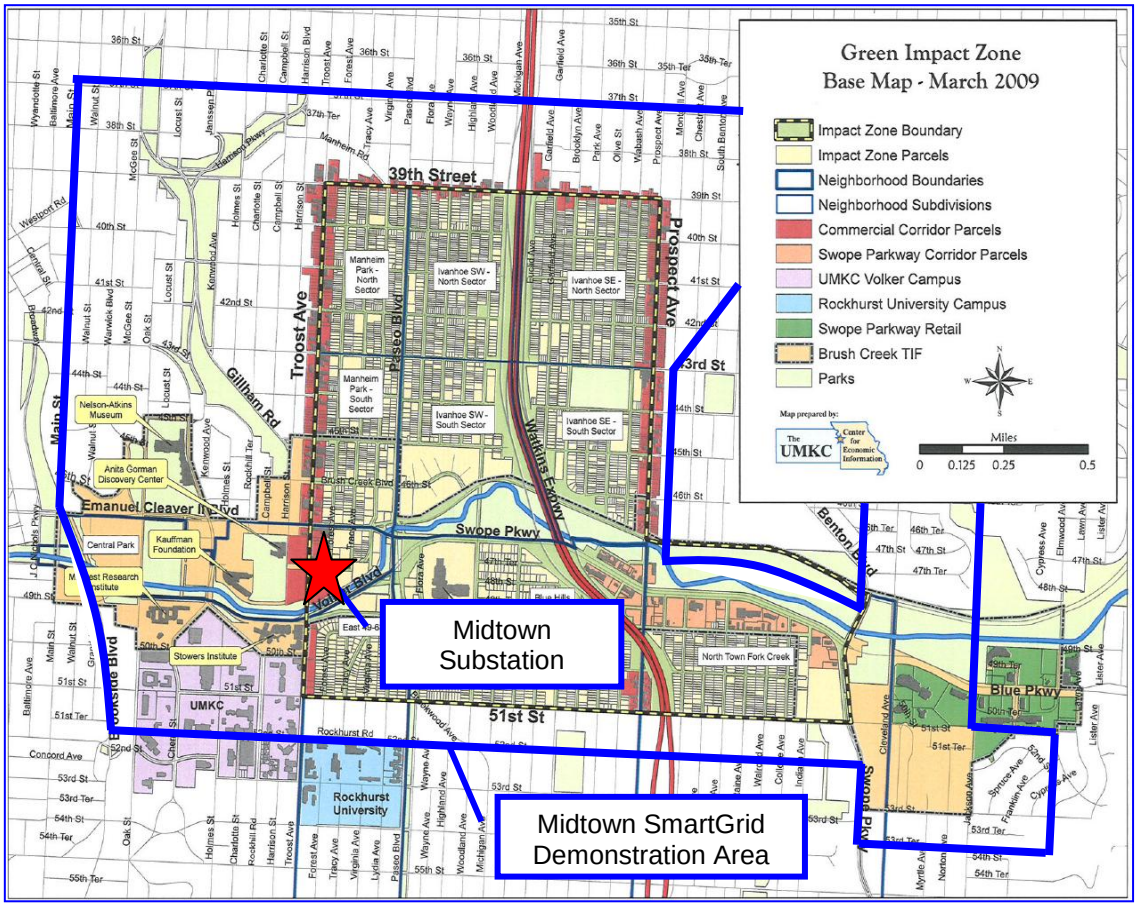
6.C.6) Honeywell

Honeywell will provide a ZigBee-enabled programmable communicating thermostat that will be used for executing demand response events and controlling peak system load. The thermostats will be installed in residential and small commercial applications. Honeywell will also provide field installation services, coordinating the receipt of applications, setting appointments, coordinating vendors and installing thermostats, home area networks and in-home displays.

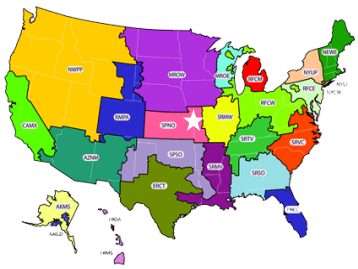
7. PROJECT PERFORMANCE SITE

7.A. PRIMARY WORK LOCATION

The proposed site for the proposed SmartGrid Demonstration Project is the KCP&L Midtown Substation and the immediately surrounding distribution circuits. The following graphic depicts the geographic location of the SmartGrid Demonstration Project and its relationship to the Kansas City Green Impact Zone.



- NERC Regional Entity: Southwest Power Pool
- eGrid Subregion: SPNO
- Latitude, Longitude: 94:34:16.689, 39:02:21.292
- Street Address of Substation:
  1223 E, 48th Street, Kansas City, MO, 64112-1312
  Corner of 48th and Tracey, 2 blocks East of Troost



- The proposed demonstration location is within the Kansas City urban core and is bounded by Main Street on the West; Swope Parkway on the East; 37th Street on the North and 52nd Street on the South.
- The Midtown Substation is conveniently located with easy access from Troost Ave and the new Climate Sustainability Center is planned for the property adjacent to the substation. Additionally UMKC and Rockhurst campuses are within a few blocks of the substation.

7.B. Additional KCP&L Work Locations

KCP&L will provide project engineering and administrative services from the following company offices located in metropolitan Kansas City, Mo.

- Corporate Headquarters Office – 1201 Walnut, Kansas, City MO, 64106-2124
- T&D Engineering Office – 4400 E. Front St. Kansas City, MO, 64120-1039
- T&D Operations Dispatch Center – 801 Charlotte, Kansas City, MO, 64106-3032

7.C. SubAwardee Work Locations

7.C.1) Siemens Energy, Inc.

Siemens will provide technical project support and administrative services from their company offices at the following locations:

- Orlando Facility - 4400 Alafaya Trail, Orlando FL 32826-2399
- Minnetonka Facility - 10900 Wayzata Boulevard, Suite 400,Minnetonka, MN 55305-1534
- Wendell Facility - 7000 Siemens Road, Wendell, North Carolina 27591-8309

7.C.2) Open Access Technologies, Inc. (OATI)

OATI will provide technical project support and administrative services from their company offices at the following locations:

- Corporate Office – 2300 Berkshire Lane North, Minneapolis, MN 55441-4540

7.D. Consultant, Vendor, and Contractor Work Locations

7.D.1) Electric Power Research Institute (EPRI)

EPRI will provide technical project support and administrative services from their company offices at the following locations:

- Knoxville Office - 942 Corridor Park Blvd, Knoxville, TN 37932-3723

7.D.2) Landis+Gyr

L+G will provide technical project support and administrative services from their company offices at the following locations:

- Network Operations Center - 11146 Thompson Ave., Lenexa, KS 66219-2301 CD-KS-003

7.D.3) Intergraph Corporation

Intergraph will provide software implementation service, technical project support and administrative services from their company offices at the following location:

- CG&I Division Office – 170 Graphics Drive, Madison, AL 35758, USA CD-AL005

7.D.4) GridPoint, Inc.

GridPoint will provide software development, technical project support and administrative services from their company offices at the following locations:

- Operations Office – 2801 Clarendon Blvd., Suite 100, Arlington VA, 22201 CD-VA008

8. STATEMENT OF PROJECT OBJECTIVES

TITLE OF WORK TO BE PERFORMED

KANSAS CITY GREEN IMPACT ZONE –
SMARTSUBSTATION & SMARTGRID DEMONSTRATION

PROGRAM AREA OF INTEREST

SMARTGRID REGIONAL DEMONSTRATIONS
TRANSMISSION AND DISTRIBUTION (T&D) INFRASTRUCTURE

8.A. PROJECT OBJECTIVES

Working with the City of Kansas City, Green Impact Zone participants and its solution partners, KCP&L will invest in and deploy an end-to-end SmartGrid that will included advanced generation, distribution and customer technologies and solutions to the Demonstration Area's electrical infrastructure. This "SmartGrid" demonstration project will provide area businesses and residents with enhanced reliability and efficiency through real-time information about electricity supply and demand. It will also enable customers to manage their electricity use, and save money, by providing useful information about electricity prices. Co-located renewable energy sources, such as solar and other parallel generation, will be placed in the Demonstration Area and seamlessly feed into the energy grid. By developing an end-to-end solution rather than demonstrating specific components such as DMS or AMI technologies alone, KCP&L will be able to test and evaluate the solution's ability to achieve a complete suite of prospective SmartGrid benefits - greater energy efficiency, reduced cost, improved reliability, more transparent information and an improved environmental footprint. To this end, KCP&L is proposing to implement an innovative demonstration project through five project phases, each with the following objectives:

Phase 1 – Project Definition and NEPA Compliance objective will be to refine project scope, definition and ongoing project management.
Phase 2 – Project Performance Baseline objective is be to compile and/or collect baseline grid and end-use data for the demonstration area.
Phase 3 – T&D SmartGrid Infrastructure Deployment objective is to implement the SmartSubstation, DMS and Advanced Distribution Automation components.
Phase 4 – Distributed Energy Resource Deployment objective will be to implement the SmartEnd-Use, SmartGeneration, and DER/DR Management components.
Phase 5 – Data Collection, Reporting & Project Conclusion objective is to operate the integrated end-to-end SmartGrid demonstration systems and collect 24 months of grid and end-use data.

8.B. PROJECT SCOPE (SCOPE OF WORK)

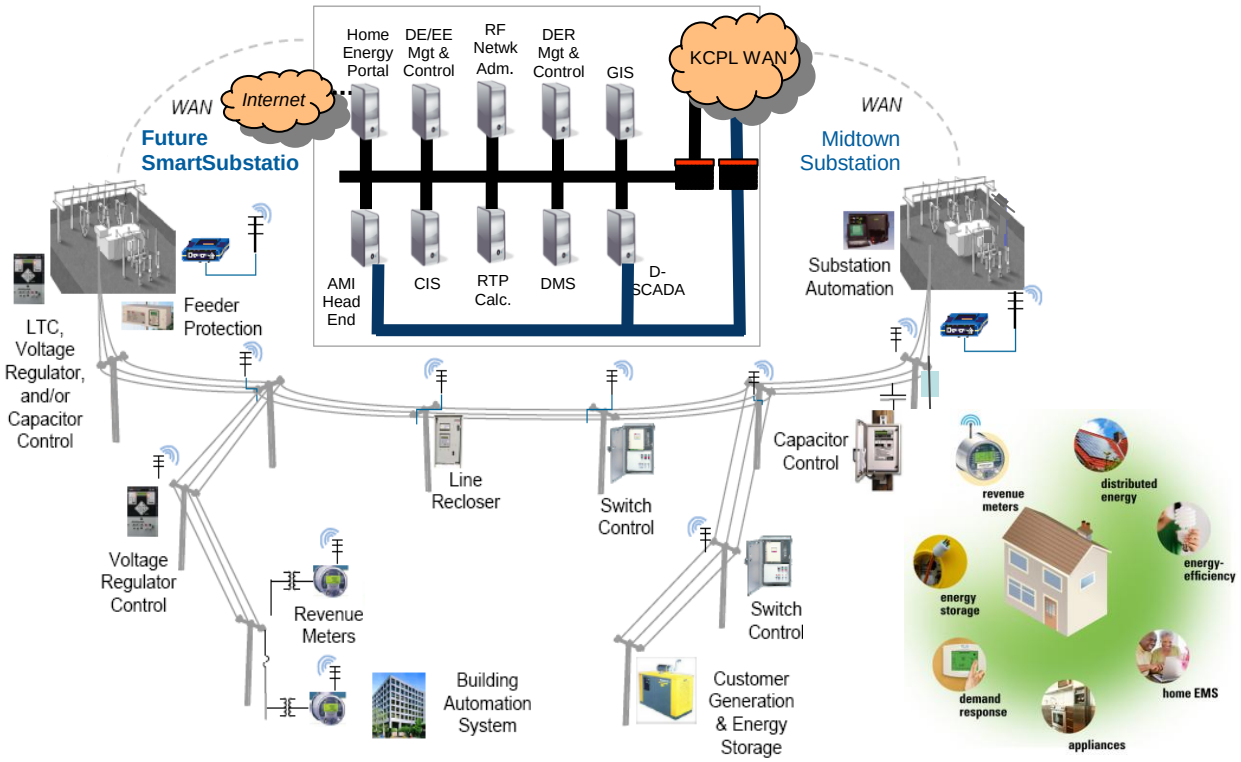
The SmartGrid Demonstration will focus on the Company's Midtown Substation and multiple distribution circuits serving approximately 14,000 customers across 3.75 square miles with total demand of up to approximately 69.5 MVA. Our scope of work, illustrated in Figure 13, will touch every functional area of the electricity supply chain, including:

- SmartGeneration: KCP&L will work with select partners to demonstrate and test renewable energy and distributed generation sources such as rooftop solar, distribution voltage reduction, demand response, stand-by to parallel generation conversion and through a separate grant application, large scale energy storage. Each of the sources will be developed in such a way as to provide benefits to an underserved population while enabling KCP&L and other key stakeholders to better understand and demonstrate the technologies, business models, and prices required to further commercialize the concepts. A Distributed Energy Resource Management (DERM) system will be developed and implemented to manage these resources and provide the needed

resource availability to the DMS and energy trading operators.

- SmartSubstation: KCP&L will replace and augment existing electro-mechanical relays with state-of-the-art solid state relays and install numerous other upgrades to the Midtown Substation that will enhance the operating performance, reliability and productivity of this asset. The SmartSubstation will be based on the latest NIST Interoperability Framework Standards; incorporate a high-speed IEC61850 compliant substation LAN; and incorporate leading edge Open Standard IT Network Technologies to ensure accurate operation and the appropriate level of cyber security. The SmartSubstation will implement a Distributed Control and Data Acquisition (DCADA) system through peer-to-peer device communications and enable "first responder" device control operations.
- SmartDistribution: To extend the SmartGrid functionality beyond the SmartSubstation, KCP&L will deploy a 2-way AMI system, a Distribution Management System (DMS) and Advanced Distribution Automation (ADA) components and functionality on selected feeders. The SmartDistribution component will implement a distributed, hierarchical system monitoring and control infrastructure. The DMS will coordinate with the SmartSubstation DCADA system to perform centralized operations monitoring and control functions and will be electronically isolated from the production EMS/SCADA and OMS systems. The AMI communication infrastructure will establish 2-way communication between distribution line devices and the DMS and the SmartSubstation DCADA processors. The ADA component will deploy distributed automation solutions to enable more effective grid monitoring and automated voltage control and self repair functionality. The upgrades to the substation and the surrounding distribution network will also lay the foundation to incorporate the renewable generation solutions and enable new and innovative end-user programs and solutions.

Figure 13: Proposed Solution



- SmartEnd-Use: The key to demonstrating the viability of the wider SmartGrid is developing solutions that will enable end-users to change their energy consumption behavior for the positive. Several Smart Home/Building technologies will be deployed to demonstrate and test several methods of consumer energy usage information communication; several levels of energy management sophistication, and grid operation integration. The systems and technologies deployed will be based on the NIST SmartGrid Interoperability Framework and Standards. It is KCP&L vision that multiple paths will be needed to meet the wide variety of customer expectation. The AMI meter based HAN gateway will provide rudimentary connectivity for all customers. KCP&L will provide additional programs, and tariffs that will be designed to test different dimensions of each solution. The goal will be to identify the most effective solutions that can deliver the hoped for savings in terms of consumption, efficiency and cost. A diagram of the proposed solution is shown in Figure 13 below:

8.C. TASKS TO BE PERFORMED

As noted above, the proposed project is organized into five phases. In Phase 1, we will further develop our project approach, install a formal project management structure and ensure we meet NEPA compliance requirements. In Phase 2, implementation of the AMI solution will take place, which will be foundational to gather baseline information around operational and financial performance of the network area covered by the SmartGrid demonstration. In Phase 3, we will deploy the T&D SmartGrid infrastructure components, including building our SmartSubstation implementing the ADA capabilities. Phase 4 is focused on deployment of DER applications such as SmartGeneration components, end-user incentive programs and the DERM systems implementation. Phase 5 will involve the actual operation, testing and demonstration of the solution and is expected to last approximately two years from mid 2012 to mid 2014. Specific tasks and milestones associated with each phase are discussed below:

Figure 14: Demonstration Project Phases

Phase	Task Name	2010				2011				2012				2013				2014			
		1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
PHASE 1	**Project Definition and NEPA Compliance**																				
Task 1.0	Update PMP for SmartGrid Demonstration																				
Task 2.0	National Environmental Protection Act (NEPA) Compliance																				
Task 3.0	SmartMetering Implementation																				
Task 4.0	Project Management, Administration & Reporting																				
PHASE 2	**Project Performance Baseline**																				
Task 5.0	Project Integration Architecture Definition & Design																				
Task 6.0	Public Outreach and Education Planning																				
Task 7.0	Performance Baseline Data Collection																				
PHASE 3	**T&D Smart Grid Infrastructure Deployment**																				
Task 8.0	SmartSubstation Implementation																				
Task 9.0	Distribution SmartGrid ADA Implementation																				
PHASE 4	**Distributed Energy Resource Deployment**																				
Task 10.0	Smart EndUse Implementation																				
Task 11.0	Smart Generation Deployment																				
Task 12.0	Smart DER/DR Management Implementation																				
PHASE V	**Commissioning & Operations**																				
Task 13.0	Integrated System Operational Test & Demonstration																				
Task 14.0	Operate Integrated Solution																				
Task 15.0	Program Data Collection																				

8.C.1) Phase I – Project Initiation and NEPA Compliance

Task 1.0 – Update Project Management Plan (PMP)

After Notice of Award, the KCP&L SmartGrid Program Management Office (PMO) will meet with the NETL Project Officer and staff to review the proposed PMP. As a result of these discussions and negotiation, the PMP will be revised and a baseline PMP will be created to reflect the details from the contract negotiation process with the vendors, updates on risk management plans, resource plans and related items. The updated PMP will be submitted to DOE within 60 days of the Notice of Award.

Task 2.0 – National Environmental Protection Act (NEPA) Compliance

In reviewing the NEPA Compliance Checklist, KCP&L believes that the DOE will determine that our project qualifies for Categorical Exclusion under the NEPA regulations. If, however, the DOE determines that the proposed project requires an Environmental Assessment (EA) or Environmental Impact Statement (EIS), KCP&L will work with the DOE to complete the NEPA process including performing further assessment, evaluation, analyses, and documentation to complete the EA or EIS. If needed, KCP&L will work with any assigned 3rd party contractor as prescribed by the DOE.

Decision Point 1 – Project Management Plan and NEPA Compliance Review (go/no-go decision point): Approval to proceed with Project Detail Design & Performance Baseline. (Tasks 4, 5, 6 & 7)

Task 3.0 – SmartMetering Implementation

The task includes the complete design, implementation and testing of the 2-way AMI system for the demonstration area. The AMI system vendor will be responsible for continuing to provide billing and outage information to existing production systems.

Task 3.1 – Design, Construct, & Test AMI Field Area Network
Task 3.2 – Deploy AMI SmartMeters
Task 3.3 – Implement & Test Production Billing & Outage Interfaces
Task 3.4 – Commission SmartMeter Subsystem
Task 3.5 – SmartMetering Implementation Report

Task 4.0 – Project Management, Administration, and Reporting

The Project Management Office (PMO) will be centrally responsible for the management and delivery of the SmartGrid demonstration project and the PMO tasks will be ongoing through the length of the demonstration. The following tasks will be discussed more fully in Section E below and in the Project Management Plan. (pmp.pdf)

Task 4.1 – Maintain Project Management Plan
Task 4.2 – Semi-Annual Project Review Meetings
Task 4.3 – Semi-Annual PMP Updates
Task 4.4 – DOE Peer Reviews & Reasonableness Review
Task 4.5 – Project Administration
Task 4.6 – Periodic Reporting
Task 4.7 – Topical Reporting
Task 4.8 – Technical Presentations
Task 4.9 – Final Project Technical Report
Task 4.10- Project Wrap-Up & Final Project Reporting

8.C.2) Phase II – Project Performance Baseline

Task 5.0 –Project Integration Architecture Definition & Design

In this task, the requirements for the SmartGrid Demonstration will be further defined and finalized. It will include finalizing the functional, IT, and business requirements and the data collection and reporting requirements to support the DOE SmartGrid cost benefit analysis.

Task 5.1 – Project Definition and Objectives Review and Refinement
Task 5.2 – Apply IntelliGrid Methodology for Use Case and Requirements Development
Task 5.3 – Data Collection Requirements and Data Reporting Review and Refinement
Task 5.4 – Integration Requirement Review & Refinement
Task 5.5 – Cyber Security Requirement Review & Refinement
Task 5.6 – Project Integration Architecture & Design Document

Task 6.0 – Public Outreach and Education Planning

KCP&L's marketing professionals will collaborate with our Demonstration Partners to create a highly targeted public outreach, education, and customer enrollment program that achieves program goals and meets brand objectives and preferences for interacting with customers.

Task 6.1 – Coordinate with MARC and other Green Impact Zone Participants
Task 6.2 – Refine Public Outreach and Education Plan
Task 6.3 – Develop Public Outreach and Education Materials
Task 6.4 – Develop Project Specific Web Site
Task 6.5 – Public Outreach and Education Implementation Report

Decision Point 2 – Detailed Design and Baseline Performance (go/no-go decision point): Approval to proceed with Performance Baseline Data Collection (7ask 7.0) and Phase 3 & 4 Deployments

Task 7.0 – Performance Baseline Data Collection

In this task, a range of baseline data will be collected by individual project teams and across projects as defined in the project plan. This will include both operational/performance (reliability, usage, etc.) and financial (cost to serve, rates, etc.) information. A preliminary performance and cost model will be developed to define a baseline case for this project. The final demonstration solution will be compared with this baseline case to measure the benefits of the approach and quantify performance relative to expectations.

Task 7.1 – Compile Historical System Performance Statistics
Task 7.2 – Collect Consumer Interval Usage Data
Task 7.3 – Compile Consumer Interval Usage Statistics
Task 7.4 – Baseline Data Collection Report

Decision Point 3 – Baseline Data Gathering Complete (go/no-go decision point): Approval to proceed with SmartGrid component testing

8.C.3) Phase 3 - T&D SmartGrid Infrastructure Deployment

Task 8.0 – SmartSubstation Implementation

In this task, KCP&L will replace and augment existing electro-mechanical relays with state-of-the-art solid state relays, install transformer monitors and numerous other upgrades to the Midtown Substation that will greatly improve the reliability and productivity of this asset. In addition, it also involves installing the local substation controller to provide local monitoring and control of substation IEDs.

Task 8.1 – Design, Construct, & Test Substation IEC61850 Local Area Network
Task 8.2 – Interface Substation LAN to EMS/SCADA System via Legacy Protocols
Task 8.3 – Convert Electromechanical Relays to Microprocessor IEDs
Task 8.4 – Implement & Test Distributed Control and Data Acquisition (DCADA) Controller
Task 8.5 – Commission SmartSubstation
Task 8.6 – SmartSubstation Implementation Report

Task 9.0 – Distribution SmartGrid ADA Implementation

In this task, KCP&L will deploy a Distribution Management System (DMS), install Advanced Distribution Automation (ADA) components and implement 'first responder' monitoring and control functions on selected feeders. This will involve the substation controller communicating in a coordinated manner with the central DMS and with ADA devices over a RF Field Area Network (FAN).

Task 9.1 – Design, Implement & Test the Distribution Management System (DMS)
Task 9.2 – Design, Construct, & Test Advanced Distribution Automation FAN
Task 9.3 – Design, Construct & Test the ADA Distribution Line Devices
Task 9.4 – Design, Implement & Test the ADA Functions on DCADA Substation Controller

Task 9.5 – Commission SmartGrid ADA Subsystem
Task 9.6 – SmartGrid ADA Implementation Report

8.C.4) Phase 4 - Distributed Energy Resource Deployment

Task 10.0 – SmartEnd-Use Implementation

In this task, several SmartEnd-Use technologies will be deployed to demonstrate and evaluate several methods of communicating end-use consumption and control of consumer based DER, thus enabling customers to manage their electric usage more effectively.

Task 10.1 – Design, Build, Test, & Deploy the AccountLink Interval Data Display
Task 10.2 – Design, Build, Test, & Deploy the In-Home Display Device
Task 10.3 – Design and Implement Green Impact Zone TOU Tariffs
Task 10.4 – Design, Build, Test, & Deploy the Home EMS Web Portal
Task 10.5 – Design, Build, Test, & Deploy the Commercial EMS
Task 10.6 – Design, Build, Test, & Deploy Public PHEV Charging Stations
Task 10.7 – SmartEnd-Use Implementation Report

Task 11.0 - SmartGeneration Deployment

In this task, KCP&L will work with select partners to install, demonstrate and test utility controlled renewable energy and distributed generation resources.

Task 11.1 – Design & Deploy Grid Connected Roof-Top Solar
Task 11.2 – Design, Test, & Deploy the DR Thermostat
Task 11.3 – Design, Test, & Deploy the HAN Pricing/Control Signals
Task 11.4 – Design, Convert, & Deploy Customer Parallel Generation
Task 11.5 – Design, Construct, & Deploy Grid Connected Battery Storage
Task 11.6 – SmartGeneration Implementation Report

Task 12.0 - Smart DER/DR Management Implementation

In this task a Distributed Energy Resource Management (DERM) system will be developed and implemented to manage DR/DER resources and provide the needed resource availability to the DMS and energy trading operators.

Task 12.1 – Design, Implement & Test DER Management System
Task 12.2 – Design, Implement & Test DR Management System
Task 12.3 – Commission DER/DR Management Subsystems
Task 12.4 – Smart DER/DR Implementation Report

8.C.5) Phase 5 Commissioning & Operation

Task 13.0 - Integrated System Operational Test & Demonstration

In this task, the integrated operation of all SmartGrid demonstration project, grid operations and distributed resources will be demonstrated and tested.

Task 13.1 – Develop Integrated System Operation Test Plan
Task 13.2 – Conduct Integrated System Operational Test in Accordance with the Test Plan
Task 13.3 – Perform a Field Demonstration of the Integrated SmartGrid and DR/DER Functionality.
Task 13.4 – Integrated System Testing & Field Demonstration Report

Decision Point 4 – Operational Readiness Review (go/no-go decision point): Approval to proceed with Daily Operation & Data Collection (Task 14 & 15)

Task 14.0 - Operate Integrated Solution

Upon approval to proceed, KCP&L will commence the daily operation of the SmartGrid demonstration system for the 24 month data collection period.

Task 14.1 – Operate System According to Program Plan & Procedures
Task 14.2 – Document any Grid Operational Issues and Resolutions

Task 14.3 – Document any DER Operational Issues and Resolutions
Task 14.4 – Produce an Operations Issues and Resolutions Report

Task 15.0 – Program Data Collection

In this task, 24 months of performance and consumption data will be collected, compiled and analyzed for the project area. This data will be compared against the baseline data to measure the impact on grid performance, system efficiencies, and end-use consumption patterns achieved by the demonstrated technologies. KCP&L will submit this data to the SmartGrid Information Clearinghouse (SGIC) in the form, format, and frequency required.

Task 15.1 – Collect Program Performance & Consumption Data
Task 15.2 – Compile & Manage Program Data
Task 15.3 – Analysis of Program Data
Task 15.4 – Deliver Program Data to SGIC
Task 15.5 – Data Collection Summary Report

8.D. DELIVERABLES

The following deliverables will be submitted to the DOE for this proposed project. Each deliverable is associated with its corresponding task number outlined in the "Tasks to be Performed" above:

Table 1: DOE Deliverables

No.	Task	Corresponding Deliverable
1	1.1	Baseline Project Management Plan
2	3.5	SmartMeter Implementation Report
3	4.2	Semi-Annual Project Meetings
4	4.3	Semi-Annual Project Management Plan Updates
5	4.4	DOE Peer and Reasonableness Reviews
6	4.9	Final Project Technical Report
7	4.10	Final Project Reporting
8	5.6	Project Integration Architecture & Design Document
9	6.5	Public Outreach and Education Implementation Report
10	7.4	Baseline Data Collection Report
11	8.6	SmartSubstation Implementation Report
12	9.6	SmartGrid ADA Implementation Report
13	10.7	SmartEnd-Use Implementation Report
14	11.6	SmartGeneration Report
15	12.4	Smart DER/DR Implementation Report
16	13.4	Integrated System Testing & Field Demonstration Report
17	14.3	Operations Issues and Resolutions Report
18	15.4	Data Collection Summary Report

8.E. REPORTING, BRIEFINGS AND TECHNICAL PRESENTATIONS

The KCP&L Project Management Office (PMO), will act as the lead and working with the key project teams and partners, shall prepare detailed briefings for presentation to the DOE. In fact, one of the key tasks of the PMO, as laid out in Task 5.0 and further elaborated below includes:

8.E.1) Project Management and Project Briefings:

- Task 5.1 Maintain Project Management Plan - The PMP will be updated internally on a monthly basis to reflect ongoing project status and changes in project schedule, resources, and tasks.

- Task 5.2 Semi-Annual Project Review Meetings - The KCP&L project team representatives will meet semiannually with the NETL Project Officer and staff at the Project Officer's facility in located in Pittsburgh, PA; Morgantown, WV; or Washington, or at an alternative site as designated by the Project Officer to explain the plans, progress and results of the project to date. One of the semi-annual meetings will be scheduled 30 days before completion of each Budget Period and a final briefing will be presented at least 30 days prior to expiration of the award.
- Task 5.3 Semi-Annual PMP Updates - Within 15 days of the semi-annual project review meeting, the KCP&L project team will issue a Semi-Annual PMP Update that incorporates suggestions and changes agreed to during the project review meeting.
- Task 5.4 DOE Peer Reviews & Reasonableness Review -The KCP&L project team will work openly with the Project Officer and staff to facilitate periodic DOE Peer Reviews and a DOE Reasonableness Review during the first Budget Period.

8.E.2) Project Administration and Reporting

- Task 5.5 Project Administration – This task will involve general administration of the total project including budget management, invoicing, and other administrative activities.
- Task 5.6 Periodic Reporting - Periodic reports and other deliverables will be provided in accordance with the Federal Assistance Reporting Checklist.
- Task 5.7 Topical Reporting - Topical reports and other deliverables listed previously in Section D will be submitted in draft form for review and comment. Final topical reports incorporating DOE comments will be submitted.
- Task 5.10 Final Reporting - Final project reports will be provided in accordance with the Federal Assistance Reporting Checklist.

8.E.3) Technical Presentations

Task 5.8 – Technical Presentations - KCP&L project representatives will present project results at up to five (5) appropriate technical conferences or meetings as directed by the DOE Project Officer.

TITLE OF WORK TO BE PERFORMED

KANSAS CITY GREEN IMPACT ZONE –
SMARTSUBSTATION & SMARTGRID DEMONSTRATION

PROGRAM AREA OF INTEREST

SMARTGRID REGIONAL DEMONSTRATIONS
TRANSMISSION AND DISTRIBUTION (T&D) INFRASTRUCTURE

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TITLE OF WORK TO BE PERFORMED

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Equipment Appendix

We do not anticipate using any existing DOE or other Federal equipment for this project. The following table provides a listing of significant KCP&L equipment and electrical grid facilities that will be used to conduct the Demonstration Project.

Available Equipment	Equipment Use
KCP&L Corporate LAN & Fiber WAN	Network Communication & Field Data Backhaul
DataRaker Meter Data Analysis SW license	Project meter data analysis
Midtown Substation – all 12kv equipment	Platform for SmartSubstation deployment and demonstration
Distribution Grid - all 12kv poles, wires and equipment in demonstration area	Platform for SmartDistribution deployment and demonstration