Before the

PENNSYLVANIA PUBLIC UTILITY COMMISSION

PPL Electric Utilities Corporation

Smart Meter Technology Procurement and Installation Plan

Docket No. M-2009-2123945

August 14, 2009

1. Introduction

In this filing, PPL Electric Utilities Corporation ("PPL Electric" or the "Company") is submitting its smart meter technology procurement and installation plan ("Smart Meter Plan" or the "Plan") with the Pennsylvania Public Utility Commission ("PUC" or the "Commission") for approval. This filing is being submitted pursuant to the requirements of Section 2807(f) of Act 129 of 2008 ("Act 129" or the "Act") and the Commission's Implementation Order entered on June 24, 2009 at Docket No. M-2009-2092655 ("Implementation Order").

As discussed below, PPL Electric has been a leader among Pennsylvania electric distribution companies ("EDCs") in the deployment of smart meter technology. The Company is presently the only major EDC with extensive operational functionality that provides the benefits required under the Act and Implementation Order. In the spring of 2002, the Company began deployment of its Advanced Meter Infrastructure ("AMI"). Ultimately, the meters for all of its approximately 1.4 million metered retail customers were replaced with new or refurbished meters. PPL Electric continues to expand the capability of its AMI with enhanced meters, communications equipment, data systems and billing systems. The Company recognizes that smart meter technology is one of the keys to creating a state of the art electric utility grid. This "smart grid" will help customers use energy wisely, facilitate the development of competition in the electric utility industry, help customers use energy wisely, support development of renewable resource generation and reduce the overall cost of electricity in Pennsylvania. PPL Electric welcomes this challenge, and is moving forward with additional smart meter technology procurement and distribution initiatives to leverage its existing AMI, enhance the capabilities of the system, and cost-effectively provide customers with better service and opportunities to manage their electricity use.

This Plan describes PPL Electric's smart meter technology procurement and installation strategy for the next five years. The Company believes that five years is an appropriate period for its initial Plan. Smart meter technology and customers' responses to that technology are evolving rapidly. Because the future in this area is so uncertain any effort to develop a longer term strategy would require an excess level of speculation.

PPL Electric's AMI currently meets or exceeds all of the minimum requirements for smart meter technology set forth in Act 129 and the Commission's Implementation Order. Moreover, as discussed in the Plan, the Company's AMI also meets many of the additional capabilities. To further enhance these capabilities, PPL Electric proposes to use the 30 month grace period provided by the Commission in the Implementation Order to conduct a series of pilot programs and technology evaluations. The objective of these efforts will be to extend the capabilities of the current AMI deployment. PPL Electric estimates that the cost of these studies would be approximately $16.4 million. If justified by the results of the pilot programs and the technology evaluations, the Company would deploy additional or

alternative technologies. PPL Electric estimates that the incremental cost of this deployment would be approximately $45.6 million, for a total cost over the five year period of approximately $62 million.

It is not clear whether the Company's Plan will be subject to evidentiary hearings. Act 129 does not require hearings. In addition, the Commission's Implementation Order talks in terms of "any hearings that may be necessary" leaving open the distinct possibility that hearings will not be required. Accordingly, the Company has not included any written direct testimony in its filing. As an alternative, PPL Electric has appended to the Plan, in Attachment 5, affidavits supporting all aspects of the Plan from the following PPL Electric managers:

- Douglas A. Krall, Manager -- Regulatory Strategy
- Michael S. Godorov, Manager -- AMR Operations
- Joseph M. Kleha, Manager -- Regulatory Compliance and Rates

In the event PPL Electric's Plan is set for evidentiary hearings, the Company will submit, at the appropriate time, written direct testimony.

2. Background

A. Act 129

On October 15, 2008, Governor Rendell signed Act 129 into law, with an effective date of November 14, 2008. Among other things, Act 129 requires Pennsylvania EDCs to develop smart meter technology procurement and installation plans. Specifically, the Act requires EDCs to:

- Furnish smart meter technology to customers upon request, in new building construction and in accordance with a depreciation schedule not to exceed 15 years;
- Offer one or more time-of-use rates and real-time price plans; and
- Make available to third parties direct meter access and electronic access to meter data.

Act 129 explicitly permits EDCs to recover the reasonable and prudent costs of providing smart meter technology, including capital-related costs, through base rates or an automatic adjustment clause. Finally, the Act requires EDCs to file, within nine months of the Act's effective date, a smart meter technology procurement and installation plan for Commission approval.

B. PUC Implementation Order

On June 24, 2009, the Commission issued its Implementation Order to provide guidance to EDCs and other stakeholders on the following matters:

- Contents of the EDC's smart meter procurement and installation plan;
- Procedures that will be followed for submittal, review and approval of each smart meter plan;
- The Commission's expectations for the deployment of smart meters;
- Minimum smart meter capabilities;
- Requirements regarding access to smart meters and data; and
- Smart meter technology cost recovery and cost allocation.

In this filing, PPL Electric addresses each of the issues identified in the Commission's Implementation Order. To facilitate review of its Smart Meter Plan, the Company has organized the Plan to be consistent with the structure of the Commission's Implementation Order.

C. Definition of "Smart Meter Technology"

The key to successfully implementing the smart meter technology provisions of Act 129 is a full understanding of the definition of "smart meter technology" contained in the Act. Act 129 defines smart meter technology as follows:

> "Definition -- As used in this section, the term "smart meter technology" means technology, including metering technology and network communications technology capable of bidirectional communication, that records electricity usage on at least an hourly basis, including related electric distribution system upgrades to enable the technology. The technology shall provide customers with direct access to and use of price and consumption information. The technology shall also:
>
> (1) Directly provide customers with information on their hourly consumption.
>
> (2) Enable time-of-use rates and real-time price programs.
>
> (3) Effectively support the automatic control of the customer's electricity consumption by one or more of the following as selected by the customer:
>
> (i) the customer;
>
> (ii) the customer's utility or
>
> (iii) a third party engaged by the customer or the customer's utility."

It's interesting to note that this definition does not describe in any detail the hardware that comprises smart meter technology. Rather, the statutory

definition is based primarily upon a description of the capabilities and functionality of smart meter technology.

In its Implementation Order, the Commission elaborated upon the definition in the Act. Specifically, the Commission stated:

> "The Commission recognizes that a fully functional smart meter involves more than just the meter hardware attached to the customer's premises. A fully functional smart meter that supports the capabilities required by Act 129 and as outlined below, involves an entire network, to include the meter two-way communication, computer hardware and software, and trained support personnel."

With this statement, the Commission incorporates the functional definition of smart meter technology contained in Act 129, and then adds recognition of the facilities and personnel required to realize those capabilities.

These definitions guided PPL Electric's preparation of its Smart Metering Plan and, as discussed below, the Company is working to enhance the functionality of its existing smart meter network by acquiring the new facilities and personnel necessary to successfully implement its smart meter technology plan.

3. PPL Electric Current AMI Deployment

A. Review of Scope and Key Milestones

PPL Electric initiated studies in 2000 that led to the decision to deploy its AMI to improve service to customers. Actual deployment of refurbished and new meters and network communication capabilities began in the spring of 2002 with a small-scale test involving the meters of about 10,000 customers served by four specific substations in the Allentown/Bethlehem area. The purpose of this test was to confirm the technical capabilities of the equipment, develop and refine installation techniques, and establish procedures that would ultimately support the replacement of over 1.3 million meters, the installation of communications equipment at over 300 substations, and the modification of meter data and billing systems to permit readings obtained in this fashion to be used for billing. Building on the results of this test, full scale deployment began in earnest in 2002 and continued to completion in September, 2004.

The system consisted of meters, communications infrastructure, computer servers, and applications that enable the Company to remotely read the meters of its 1.4 million customers. Logic built into the meters allows them to record readings at appropriate times; i.e., hourly, daily, or monthly. The meters send their recorded data in response to prompts to facilitate various functions including the billing system (in the case of billing reads), an individual user such

as a Customer Service Representative ("CSR") responding to customer inquiries, or another meter information need (such as load research). Investment through December 31, 2004, totaling about $164 million, was reflected as an addition to rate base in PPL Electric's request for an increase in distribution rates filed March, 2004. At the same time, the expense reductions made possible by the automation of meter reading arising from the elimination of meter readers, a reduction in the number of servicemen, a reduction in the number of customer service representatives, and a reduction in expenses associated with those positions was reflected in the future test year and in rates. (Docket No. R-00049255 approved by Commission Order entered December 22, 2004)

In 2005, the Company completed a second set of studies that led to the installation of a Meter Data Management System ("MDMS") that includes the following:

- A customer interface that permits customers to analyze and better understand their electricity usage and bills,
- A data repository capable of storing two years of hourly reads from all of its customers,
- A complex billing engine capable of billing customers using hourly data,
- An energy settlement system that will permit electric generation suppliers to serve customers based on actual hourly usage rather than usage determined by a load profile of the average usage of a broad population of customers, and
- Load analysis capabilities that the Company can use to analyze customer use patterns, aid in distribution planning, and identify potential theft of service.

A portion of the cost of the MDMS was reflected in the Company's 2007 filing for an increase in distribution rates (Docket No. R-00072155 approved by Commission Order entered December 6, 2007). The Company did not forecast at the time, nor has it realized, any expense reductions associated with the installation of these additional functionalities. Benefits will accrue to customers through their use of these capabilities and savings that they may be able to achieve through their more efficient use of electricity, ability to take advantage of time varying rates, and ability to shop for lower priced generation.

It should also be noted that the Company does maintain about 20,000 unmetered accounts consisting of lighting accounts and amplifiers/repeaters. In these cases, usage can be reliably predicted, thereby, avoiding the cost of a meter. However, even in these circumstances, the calculated hour-by-hour use is used in applications such as energy settlement.

B. Goals of AMI Deployment

PPL Electric had two goals associated with the initial AMI deployment. The first goal was to establish an infrastructure that would provide customers the benefits associated with being able to read meters remotely and automatically. Those benefits included reducing the cost of obtaining monthly reads for billing purposes, as well as improved accuracy of reads. Those benefits were achieved with the completion of the initial deployment in September, 2004. The second goal was to cost-effectively develop the information gathering and communications functionality of the basic infrastructure to provide customers with the benefits generally associated with smart meters. Those benefits included more detailed usage information, the ability to analyze that information, the availability of innovative rate options, the opportunity to control usage, and enhanced reliability. As described below, many of these benefits have already been realized. Additional benefits will be attained through the completion of the Plan after review by the Commission.

C. Summary of Capabilities

The following summarizes the capabilities of PPL Electric's current AMI deployment. The discussion is organized under two headings to facilitate review and explanation. The first heading addresses the minimum requirements that are outlined on pages 29-30 of the Implementation Order. The second heading addresses the additional 9 capabilities provided on page 30 of the Implementation Order.

Minimum Requirements

(a) Bidirectional data communications capability.

PPL Electric's current AMI deployment employs two different approaches to communicating with meters. The first method is deployed to most of the 1.4 million customers and relies on communications through the power lines themselves. The second communications approach is employed for customers who are served at higher voltages. Wireless communication is used to communicate with the meters in these instances since power line communication cannot function with the voltage transformation associated with metering these customers. Both systems are bidirectional. A signal is sent to the meter and the meter responds by either taking an action or by transmitting information back to the Company. PPL Electric employs this bidirectional network communication infrastructure to communicate with customers and third-parties. For example, usage information is available to customers and third parties either directly on the web or via Electronic Data Interchange ("EDI").

(b) Record electricity usage on at least an hourly basis.

PPL Electric's current AMI deployment captures hourly reads for all of its customers. For most of the meters, i.e., those for which the aforementioned power line communication is employed, meters are interrogated three times per day. Data captured by the meter is transmitted and stored in the data repository within the MDMS. The large power meters; i.e., those that employ wireless communication, are interrogated once per day. Data captured by these meters is transmitted and stored in the data repository within the MDMS.

(c) Provide customers with direct access to and use of price and consumption information.

PPL Electric's current AMI deployment provides customers with access to price information in several ways. Fixed-rate and time-of-use information that is traditionally available in the Company's tariff is provided to customers in a number of formats on Company websites. The tariff itself can be found on the web. In addition, specialized websites have been developed for participants in the Company's time-of-use programs that provide pricing in a format which can be readily used by customers to perform bill calculations and to estimate savings. More significantly, the Company's web-based Energy Analyzer provides customers with pricing information as an integral part of its analytical capabilities. As part of its consumer education efforts, the Company has developed and made available to customers a website that posts both day-ahead and real-time hourly prices. Historical day-ahead and real-time hourly prices are also archived and available for customers who wish to understand trends or perform analysis. The Company intends to deploy a specialized version of this website specifically aimed at the needs of customers who will be taking default service under the Company's real-time price option in 2010.

PPL Electric's current AMI deployment also provides customers with access to consumption information in several ways. The web-based Energy Analyzer provides most customers with electricity usage information to the hourly level. Larger customers; i.e., those at higher voltages, can obtain consumption in 15-minute intervals. The Company can provide meter pulses for customers who require consumption in shorter intervals.

(d) Provide customers direct information on their hourly consumption.

PPL Electric's current AMI deployment provides hourly consumption information to any customer who desires it through the Company's website.

(e) Enable time-of-use rates and real-time price programs.

PPL Electric's current AMI deployment provides the price and consumption information necessary to support time-of-use and real-time price programs. The Company has demonstrated this capability through two different residential time-of-use pilot programs, as well as its experimental Price Response Service for industrial customers. The Company is in the final stages of installing necessary programming to link consumption data and pricing data in its billing system. On July 31, 2009, the Company filed a tariff supplement with the Commission requesting approval of time-of-use default service rates to be available to residential and small commercial and industrial customers starting January 1, 2010. The Company has also committed in the settlement of its Competitive Bridge Plan (Docket No. P-00062227, Order entered May 17, 2007) to provide a real-time default service option for large commercial and industrial customers starting January 1, 2010.

(f) Support the automatic control of electricity consumption by the customer, the EDC or a third-party, at the customer's request.

PPL Electric's current AMI deployment supports automatic control of electricity consumption by the customer, by PPL Electric or a third party at the customer's request. On July 1, 2009 the Company filed its Energy Efficiency and Conservation Plan ("EE&C Plan") under Act 129 (Docket No. M-2009-2093216) and that Plan includes both direct load control and load curtailment programs that are likely to involve third parties automatically controlling electricity consumption via network communications infrastructure. The communications capability that already exists in the Company's current AMI deployment is also capable of communicating through a meter to control the consumption of end-use equipment with upgrades that will be part of the pilot studies proposed in the Plan subject to Commission approval.

Additional Capabilities

(a) Remote disconnection and reconnection.

PPL Electric's current AMI deployment permits remote disconnection and reconnection through the use of a meter with a service disconnect integrated into the meter or a disconnect collar installed at the customer's premise. While PPL Electric's communication infrastructure is capable of communicating with devices installed either on or within the Company's meters, PPL Electric chose not to install the devices with every meter during initial deployment, instead, believing that a targeted deployment focusing on high-turnover premises would be more cost effective. The Company has conducted a pilot of the disconnect collar option and has confirmed that such capability exists and that such capability can reduce

the need for servicemen trips and avoid associated costs. This pilot only included accounts where payment was current and did not address remote disconnect associated with non-payment.

(b) Ability to provide 15-minute or shorter interval data to customers, EGSs, third-parties and the regional transmission organization ("RTO") on a daily basis, consistent with the data availability, transfer and security standards adopted by the RTO.

PPL Electric's current AMI deployment supports the provision of 15-minute or shorter interval data. PPL Electric's large power customers are equipped with meters that record 15 minute interval data. The remainder of PPL Electric's meter population records data in 60 minute intervals. In those cases where shorter intervals are desired (i.e., less than 15-minutes for large customers and less than 60 minutes for other customers) the Company's current approach is to make pulse data available which can be aggregated by the customer or a third-party acting on behalf of the customer to satisfy whatever specific need the customer may have. The Company believes that this approach cost-effectively addresses the needs of a few more sophisticated customers while providing an appropriate degree of granularity to the large number of customers whose needs are much less sophisticated and, as yet, not as well defined. With regard to the transfer of data to the RTO, PPL Electric only communicates data to the RTO as part of the conduct of energy settlement. It is the responsibility of customers (or third-parties acting on behalf of customers) to communicate data necessary to the administration of any program that the customer may have chosen to join.

(c) On-board meter storage of meter data that complies with nationally recognized non-proprietary standards such as ANSI C12.19 and C12.22 tables.

PPL Electric's current AMI deployment complies with all ANSI C12 physical standards. The Company's infrastructure is in full compliance with ANSI C12.19 for all meters with the infrastructure providing support for ANSI C12.22 tables. As stated in the Implementation Order, "The intent of a minimum number of storage days is to ensure that adequate monthly billing data is retrieved before the data is overwritten." PPL Electric's metering infrastructure is currently retrieving 99.8% of monthly billing data and 99% of hourly data for all of its customers.

(d) Open standards and protocols that comply with nationally recognized non-proprietary standards, such as IEEE 802.15.4.

PPL Electric's current AMI deployment can support the open standards and protocols that are nationally recognized. Presently, PPL Electric has not exercised the use of the IEEE 802.15.4 standard, but equipment is

being made available in the market to incorporate into the Company's metering infrastructure.

(e) Ability to upgrade these minimum capabilities as technology advances and becomes economically feasible.

PPL Electric's current AMI deployment can be upgraded as technology advances. A key factor in the ability of a system to withstand technological and functional obsolescence is whether it employs an architecture that (1) isolates elements of the system that are exposed to different obsolescence mechanisms and (2) permits portions of the system to be upgraded selectively without the need to replace the entire system every time an upgrade is needed. As an example, a system built using a single communications infrastructure from the utility, to the meter, and to proprietary equipment in the customers' premises may be more exposed to obsolescence driven by developments in consumer communications than a system that is capable of interfacing with various customer-facing applications. While it is difficult to predict all possible technology advances and consumer preferences, PPL Electric believes that the architecture it has employed, wherein, utility functionality (including the counting of usage, the billing of usage, and monitoring and operating the distribution system) is separate from consumer functionality (including the operation of appliances and HVAC equipment, personal budgeting, and display options), will make the system more resistant to obsolescence and more likely to be able to incorporate technology advances cost-effectively. As an example, PPL Electric believes that its smart meter infrastructure is fully compatible with Act 129 energy efficiency and conservation programs that were not necessarily envisioned at the time deployment began.

(f) Ability to monitor voltage at each meter and report data in a manner that allows EDC to react to the information.

PPL Electric's current AMI deployment has the ability to capture voltage data at the individual meter level. The Company has used this information on a case-by-case basis to analyze power quality issues that have been identified by means other than analysis of the voltage data itself. The Company does not have infrastructure in place, however, to capture voltage data on regular intervals from all meters, to store that data, to analyze that data, or to use that data to support the real-time operation of the distribution system.

(g) Remote programming capability.

PPL Electric's current AMI deployment has the capability to be reprogrammed remotely. The Company has employed this capability to download time synchronization signals to the meters, to change from Standard time to Daylight Saving Time and back, to accommodate the change to the Daylight Savings Time calendar mandated by the Federal

Energy Policy Act of 2005, and to install firmware upgrades in advanced meter infrastructure equipment.

(h) Communicate outages and restorations.

PPL Electric's current AMI deployment of smart meter infrastructure is integrated with the Company's Outage Management System (OMS). This integration permits a more accurate determination of the extent of an outage and the ability to restore customers more quickly than would be otherwise possible. Upon receipt of a customer call, the OMS requests the AMI to "ping" the meter for confirmation that service has been interrupted and is not, instead, a failure on the customer side of the meter. The ping is sent back through the AMI to the OMS with confirmation that an outage is present. Logic within OMS then generates additional "pings" to other meters to determine the extent of the outage and the device (or devices) that is most likely the cause. In parallel, an order is generated for field personnel to investigate and take actions necessary to restore customers. During restoration efforts, and particularly in the case of storms where multiple devices may have failed and outages may be imbedded within outages, meter pinging is used to confirm that customers have been restored.

(i) Ability to support net metering of customer-generators.

PPL Electric's current AMI deployment supports the net metering of customer-generators under two separate tariff provisions - the Renewable Energy Development Rider and the Net Metering for Renewable Customer-Generators Rider. Different meter configurations are used consistent with the specific electrical configuration and the need to meter generation separately.

4. PPL Electric Future Deployment

A. Network

(1) 30 Month Grace Period

As described in Section 3, PPL Electric's current AMI deployment meets the minimum requirements set forth in the Implementation Order. PPL Electric's deployment also meets many of the additional capabilities that are identified. The Company has obtained an order-of-magnitude estimate of $380 million to $450 million for a complete replacement of the current deployment. Based on its initial investigation, the Company does not believe that such a wholesale replacement would provide sufficient expanded functionality to justify its cost. Accordingly, the Company believes that, given the advanced capabilities of the current deployment, the prudent course of action is to explore opportunities to extend the capabilities of the current AMI. The Company, therefore, intends to use

the 30 month grace period as a time to study, test and pilot technologies and applications that extend the capabilities of the current AMI. PPL Electric will implement a three pronged study approach to cost effectively accomplish this purpose. The Company will identify ways to 1) further enhance its ability to meet certain of the minimum requirements described in the foregoing sections as appropriate, and 2) evaluate each of the additional capabilities described in the foregoing to further enhance those capabilities the AMI already meets, as well as address any gaps. Finally, the Company has identified some capabilities that may better serve customer needs and/or improve PPL Electric's operational effectiveness. Several of these have been considered in a different context by the PUC staff, while others have been identified by the Company. These additional enhanced capabilities will be proposed for evaluation to determine whether benefits can be cost-effectively achieved.

Due to the extensive operating experience the Company has with its currently deployed AMI, a number of potential applications and types of technologies have been identified. Thus, the Company's approach is straight forward. PPL Electric will conduct a series of pilots and technology evaluations for the three sets of capabilities that merit further evaluation. For the relevant minimum requirements or additional capabilities, PPL Electric has included the estimated high level costs, benefits and expected timeline for deployment. In some cases, the Company has also included costs for continued deployment of some of the piloted applications. This is based on PPL Electric's experience with its AMI, and the expectation that these applications will be determined to be cost effective. In other cases, system wide applications may not be cost effective and as such would ultimately result in the purchase and installation of unnecessary new meters for all customers. The currently deployed AMI has allowed PPL Electric and its customers to achieve the majority of the operational savings. As a consequence, system wide replacement is not expected to be cost effective.

In order to better focus and optimize resources, the start up of certain pilot studies and technical evaluations, especially those that may go beyond the PUC suggested enhancements, will begin after the 30 month period. Provided is Attachment 1, "PPL Electric Smart Meter Program Milestone Plan" which is appended to the Plan, outlines the list of specific implementation targets, and anticipated start dates in PPL Electric's Smart Meter Plan.

(2) Key Milestones (Proposed Schedule and Reporting Deadlines)

- Assessment of needs and technological solutions.

  The needs and technological solutions are addressed in the "PPL Electric Smart Meter Program Milestone Plan" that is provided as

Attachment 1. The Company will report periodically to the Commission on the specific technology pilots and associated evaluation objectives as they are developed for testing during the 30 month grace period.

- Selection of technologies and vendors.

  PPL Electric will leverage the existing power line smart meter network and associated technologies from its current AMI vendor Aclara. However, the Company will evaluate other vendor products and applications for use either in conjunction with the existing power line network or independent of this network, i.e. home area networking applications. In some cases, the large power meter system may be expanded to enable more granularity in interval data as required. To the extent that PPL Electric will be leveraging its existing power line smart meter network, some pilots and evaluations will be sole sourced, and where appropriate, the Company will competitively bid technology and applications that expand on the minimum requirements and supports the additional capabilities.

- Establishment of network designs.

  PPL Electric's currently deployed AMI meets the basic requirements of the Act and Implementation Order, and can demonstrate the functionality for the Additional Capabilities addressed in the Secretarial Letter dated June 24, 2009.

- Establishment of plans for training personnel.

  These plans will be addressed during pilot development and after each pilot and evaluation is completed, and a decision is reached on wider deployment. As appropriate, the training plans will be included in subsequent technology implementation during and after the 30 month grace period.

- Establishment of plans for installation, testing and rollout of support equipment and software.

  These details will be included in the development of each of the pilot and evaluation objectives and reported to the Commission as they are established during the 30 month grace period.

- Installation, testing and rollout of support equipment and software.

  These details will be included in the development of each of the pilot and evaluation objectives and reported to the Commission as they are established during the 30 month grace period.

- Establishment of plans to design, test and certify EDI transaction capability consistent with this order.

The Company already has in place most of the EDI transactions necessary to transmit interval data for both historical usage and billing purposes. The Company has proposed a schedule for the completion of EDI transactions in response to the Commission's Tentative Order at Docket No. M-2009-2104271 regarding retail market mechanisms in the PPL Electric service territory. The Commission entered an Order at this docket on August 11, 2009.

- Establishment of plans for installation of meters consistent with the rollout requirements described below.

  The PPL Electric Smart Meter Program Milestone Plan (Attachment 1) provides details on the schedule for the rollout of pilots and associated technologies over the next 5 years.

B. Customer Request

All of PPL Electric's customers currently have smart meters that meet the minimum requirements of Act 129. As noted above, the Company has proposed a series of pilot tests and technology evaluations to assess the operating requirements, costs and benefits associated with certain enhanced capabilities. In compliance with the Commission's Implementation Order, if a customer requests a meter with a functionality outlined in the Additional Capabilities section, PPL Electric will include the customer in a pilot study as appropriate, subject to the constraints of timing and availability of equipment that provides the required functions.

PPL Electric notes that the costs associated with enhanced capabilities might be problematic if certain customers desire only some of the functionality, while other customers desire still other functionality. Pilot evaluations will allow the Company and the Commission to determine the appropriateness of wider deployment.

C. New Construction

PPL Electric's currently deployed AMI, which includes the aforementioned power line and large power smart meter systems, meets the smart meter installation requirement for new construction. The meters PPL Electric installs meet the minimum requirements of Act 129, and some of the capabilities outlined in the Commission's Implementation Order that support voltage monitoring, outage detection and restoration.

D. System-Wide

PPL Electric completed system-wide deployment of an AMI in 2004 that meets the minimum requirements of Act 129 and generally supports the additional capabilities as outlined in the Commission's Implementation Order. As such, it

will be unnecessary for PPL Electric to deploy a new smart meter infrastructure. The Company proposes instead to leverage the current AMI and to pilot and evaluate applications that enhance the minimum requirements and support the additional capabilities. The proposed pilots and technical evaluations are discussed in Section 6 under Cost Recovery.

5. Access to Smart Meters and Data

A. Standards and Formats for Electronic Data Communications

PPL Electric describes direct communication with revenue meters as providing two pathways of connection with the meter, the utility connection and the customer or third party connection.

Each pathway will likely conform to separate standards and formats. PPL Electric currently conforms to ANSI C12.19 communication for direct utility to meter communication. Those ANSI C12 standards are continuing to evolve particularly through the DOE/NIST interoperability requirements of the Smart Grid. PPL Electric will continue to conform to those standards as the requirements are developed by the ANSI, IEC and NEMA Standards Organizations.

The customer's connection for direct access to meters is also continuing to evolve. The Company will provide various levels of integration to the individual meter depending on the particular customer segment. Standards exist today for industrial meters that provide complex direct polling of data using formats and protocols such as DNP and Modbus. PPL Electric provides industrial meters that adhere to those communication protocols. In the residential and commercial market, simple communication methods are evolving using standards such as IEEE 802.15.4 for Zigbee and Homeplug compatibility. PPL Electric is monitoring the interconnectivity evolution and will offer meters that conform to those or other uniform standards as required.

B. Testing and Certification of EDI Transactions

The Company already has in place most of EDI transactions necessary to transmit interval data for both historical usage and billing purposes to licensed Electric Generation Suppliers ("EGS").The Company believes that these transactions, and the processes which support them, comply with Commission's prior orders regarding electronic data interchange with EGSs and the protocols established by the Commission's Electronic Data Exchange Working Group ("EDEWG"). The Company has proposed a schedule for the completion of EDI transactions related to the internal usage that is available through the currently deployed AMI in response to the Commission's Tentative Order at Docket No. M-2009-2104271 regarding retail market mechanisms in the PPL Electric service territory. The Commission entered a Final Order at

this docket on August 11, 2009, that accepted that Company's plan and schedule. That Order also accepted the Company's current approach to the testing and certification of EDI transaction with EGSs.

As discussed in Section 3C, the Company makes usage data available to customers via several different mechanisms including electronic formats that can be downloaded. Those mechanisms are also available to consultants, conservation and load management providers, and other third parties with the approval of the customer.

6. Cost Recovery

A. Summary of Capital Costs, Expenses and Administrative Costs

PPL Electric has included cost estimates for enhancements that can be deployed to increase the functionality of the Company's AMI relative to the minimum requirements, as well as to investigate additional capabilities. These high level estimates are shown in Attachment 2, titled "PPL Electric Smart Meter Program Budget", and reflect a series of pilots and technology evaluations that would be implemented within the first 30 months following approval of the PPL Electric plan by the Commission. Within the first 30 months, the Company proposes to spend approximately $16.4 million on the aforementioned pilots and evaluations, and will seek cost recovery of those expenditures over this period. As the pilots are conducted and results evaluated, specific recommendations will be made for continued deployment, implementation of alternative technology applications or termination of the pilot. Based on preliminary estimates, the anticipated cost to implement the pilots and technology evaluations over the next 5 years is estimated at $62 million. PPL Electric notes that the estimates that have been provided are based upon the Company's extensive experience in implementing and operating its AMI system. However, the evaluations and programs proposed herein do not begin until 2010 at the earliest, many continue for several years, and PPL Electric's actual costs may be higher or lower than its estimates. Therefore, the Company requests that the Commission state in its Order approving the Plan that PPL Electric can recover its actual costs for implementing evaluations and programs that are approved by the Commission.

Included herein as Attachment 3 are summaries of the pilots and evaluations that PPL Electric proposes to conduct. This attachment summarizes the detailed information provided in Sections 6B and 6C on the Company's proposals to expend its AMI system's minimum requirements and additional capabilities included in the Tentative Order.

Because recovery of the expenditures associated with this Smart Meter Plan will involve capital and operating costs, PPL Electric will, on a going forward

basis, provide an appropriate segregation of these costs based on existing cost accounting practices and procedures. This segregation will include the facilities and equipment placed in service, the applicable annual depreciation associated with facilities and equipment, return on those investments, applicable Operation and Maintenance ("O&M") expenses related to the Company's Plan, and applicable taxes.

Benefits and savings associated with PPL Electric's state-of-the-art AMI, including expense reductions, which were made possible by the automation of meter reading activities, were reflected in the determination of the Company's distribution base rates at Docket No. R-00049255. In addition, PPL Electric's MDMS provides other direct benefits and savings to customers based on their use of the capabilities of this system to use electricity more efficiently, take advantage of time-varying rates, and shop for lower-priced generation supply.

B. Incremental Costs -- Minimum Requirements

(1) Bidirectional data communications.

PPL Electric's currently deployed AMI is capable of bi-directional communications as discussed in Section 2C above. Full two-way communication exists today on both PPL Electric's power line system and in the wireless based system used with our high voltage meters. The power line system's network is capable of full communication with each meter communicating daily, hourly, momentary voltage losses, potential loss of power, and voltage data upon request from the network. The Company has demonstrated the ability to request information from the meters through the smart meter network with success. This success is evident in the monthly billing data capture rate in excess of 99.8% as well as hourly data capture rates that exceed 99%.

The infrastructure can communicate and provide the protocols to end use devices to affect load control and to provide usage to in-home displays and home area networks. Additionally, for commercial and industrial customers, a legacy standard known as KYZ demand pulse data is provided to EGSs, customers and third parties for load aggregation purposes and to support energy management systems on customers' premises. KYZ data is provided through a simple wired connection from the meter that sends a stream of pulses to customer equipment with each pulse equal to a predefined amount of consumed energy.

The Company does not expect to conduct specific pilots in this area, but may perform evaluations using in-home displays with home area networks in conjunction with the pilot discussed in section 6C below.

(2) Recording usage data on at least an hourly basis once per day.

As discussed above under Section 2C, PPL Electric's currently deployed AMI meters record usage data on at least an hourly basis once per day. Daily data is also recorded and collected. As such, PPL Electric does not anticipate any incremental costs except for meter replacement under normal conditions such as damage to the meter, defective meters, and for new construction.

(3) Providing customers with direct access to and use of price and consumption information.

As described in Section 2C, PPL Electric provides access to price and consumption information to various groupings of customers and individual customers through Energy Analyzer, PPL Electric's website, and pulse data. As a way to enhance this capability and to provide such data more rapidly, PPL Electric plans to pilot communications into the home through an in-home display (IHD). This pilot test is discussed further in Section 6C below.

Another initiative is intended to evaluate and pilot various communication mediums. PPL Electric already provides electronic access to price and consumption information today to customers via its website. However, the Company proposes to experiment with enhancements that include alerts on price and/or consumption, as well as rate comparisons. These proposed pilot evaluations would include tests of communication channels such as near real-time e-mail and text messages to customers.

This pilot includes the costs for a 2010 evaluation and if feasible, an implementation of this enhancement in 2011 to customers who ultimately desire this capability. The Company estimates the cost at $160,000 which includes (1) the evaluation in 2010 and implementation in 2011 of multiple communication channels, (2) implementation of rate comparison tool in 2010 to provide customers with the ability to compare rate options, and (3) software and licensing. The high level benefit that customers will derive from this initiative is increased understanding and awareness of energy usage and pricing, which will lead to better energy management.

(4) Providing customers direct information on their hourly consumption.

As discussed in Section 3C, PPL Electric provides its customers with access to information on hourly consumption from its AMI. This data is provided on a daily basis to the PPL Electric meter data management system to enable customers to access their individual information on the web.

However, the Company understands that this information may not be in a format that is easily usable for certain customer applications. Thus, during the 30 month period, the Company plans to work with customers, EGSs and third parties to develop presentations of hourly consumption that are compatible with their needs. The high level costs of this effort have not been quantified at this point, but will be provided through the periodic reviews the Company expects will be scheduled with the Commission during the 30 month grace period.

(5) Enabling time-of-use rates and real-time price programs.

As discussed in Section 3C, PPL Electric's currently deployed AMI is capable of providing hourly data to enable the Company to offer time-of-use rates and real-time price programs to its customers. The existing meter population is already delivering billing quality hourly data at a high success rate for TOU applications as part of a pilot involving over 800 customers. The Company is currently working to enhance the processes and systems used in the pilot to accommodate a larger number of participants and in 2010 will provide TOU rate options to all residential and small commercial and industrial customers who desire this option. Therefore, PPL Electric expects that modest investments may be incurred over the 30 month period to potentially further enhance TOU and hourly data delivery based on its actual experience.

Regarding real time pricing programs, PPL Electric's currently deployed AMI is capable of accommodating the delivery of hourly data in accordance with PJM hourly pricing. Starting, January 1, 2010, these programs will be offered to large industrial and commercial customers taking delivery at primary voltage and above. In 2010, the Company will conduct a performance evaluation within its infrastructure to determine the feasibility of collecting and delivering 15-minute data at a high success rate for RTP billing for industrial and commercial customers with greater than 500 KW in demand. This evaluation will be conducted in conjunction with Evaluation #1 discussed in Section 6C below.

(6) Supporting the automatic control of the customer's electric consumption.

As discussed in Section 3C, PPL Electric will be conducting a pilot to exercise the capabilities of the AMI currently deployed to automatically control individual customer's electric consumption. This will be accomplished by installing load control devices on various customer equipment including heating, ventilation and air conditioning systems, water heaters and other appliances. The pilot is expected to be started in 2010 and will be completed in 2011.

The estimated cost of the pilot is $436,000 and includes, (1) establishment of pilot objectives, (2) invitations to 500 customers to participate in the pilot, (3) purchase and installation of load control devices, (4) software,

programming and licensing, (5) evaluation of pilot results, (6) establishment of an implementation plan if so indicated by the evaluation, and (7) reporting of results and proposed implementation plan to the Commission.

If the pilot is successful, wider potential deployment with an anticipated 5,000 customer enrollment annually may result in estimated implementation cost of $4,200,000 from 2011-2014.

The high level expected benefits of automatic control include (1) allowing customer to take advantage of TOU rate options, (2) enabling customers to shed load during periods of peak pricing, and (3) providing the capability for PPL Electric to shed load during emergency load reduction events called by PJM to maintain system reliability. As envisioned, this effort is different from the load control programs proposed in PPL Electric's EE&C Plan. As proposed in the EE&C Plan, those programs would be conducted by Conservation Service Providers and would employ technology and communications capabilities that are not a part of PPL Electric's AMI. To the extent that the proposed pilots demonstrate that additional cost effective usage and demand reductions may be achievable, the Company will propose revisions to its Act 129 EE&C Plan to incorporate such programs.

C. Incremental Costs -- Additional Requirements

(1) Ability to remotely disconnect and reconnect.

As discussed in Section 3C, this functionality is supported by PPL Electric Utilities' current AMI deployment. Remote disconnection and reconnection can be accomplished through the use of a meter with a service disconnect integrated into either the meter or a disconnect collar installed at the customer's premise.

Remote disconnection and reconnection in the infrastructure supports many different functional objectives for PPL Electric such as the ability to enable "hard" blocking at premises where there is frequent residential and small commercial turnover. Hard blocking is a term used to describe the physical disconnection that prevents current from flowing through the meter. Such hard blocking can be accomplished by sending service personnel to manually block the meter or remotely through the AMI. The ability to do this remotely results in reduced operational costs by avoiding the dispatch of personnel when a customer contacts PPL to disconnect or connect their service. Also, the ability to remotely connect and disconnect enhances the Company's ability to comply with Chapter 56/14 regulations in normal connect/disconnect situations except for terminations for non-payment. Other areas where this functionality has merit for PPL Electric is in the capability to accommodate rolling brownouts in case of reliability problems and where automated substation switching of feeders is not

available. Remote connect and disconnect capability also enables cold load pickup resulting from emergency load reductions or in large storm restoration efforts. The Company plans to explore these functional objectives through the pilots and testing being planned for the proposed 30 month period.

PPL Electric proposes to conduct a remote disconnection/reconnection pilot in 2011 to connect and disconnect premises where frequent move ins/move outs occur in its service territory. The pilot will enable "hard" blocking of all accounts in the pilot, excluding terminations for non-payment.

The estimated cost of the pilot is $210,000, and includes: (1) establishment of pilot objectives, (2) invitation to 500 customers to participate in the pilot, (3) meter hardware and installation, (4) software and programming, (5) evaluation of pilot results, (6) potential establishment of an implementation plan if required, and (7) reporting of results and proposed implementation plan to the Commission.

If the pilot is successful, wider deployment to an estimated 50,000 customer locations from 2012-2014 may result in estimated implementation cost of $13,225,000.

The expected high level benefits are that remote disconnect/reconnect will, (1) contribute to the reduction in consumption on inactive meters, (2) eliminate the need to dispatch personnel to disconnect and reconnect and associated costs. (3) enhance PPL Electric's ability to comply with Commission regulations in normal connect/disconnect situations except for terminations for non-payment, (4) enhance the capability to perform cold load pickup following emergency load reductions or in a large storm restoration effort, (5) automate the process for completing connects and disconnects, and (6) have the potential to support emergency load reductions as directed by PJM and/or PPL Electric's System Operations; especially, where automatic switching is not available.

(2) Ability to provide 15-minute or shorter interval data to customers, EGSs, third parties and an RTO on a daily basis, consistent with the data availability, transfer and security standards adopted by the RTO.

As discussed in Section 3C, PPL Electric's smart meter infrastructure system can support the provision of 15-minute or shorter interval data. PPL Electric understands that 15-minute interval data may have benefits to EGSs and third parties in designing rates and in demand reduction programs. However, more granular 5 and 10 minute intervals appear to have value only in specialized applications. The Company has also used higher resolution data captured from a premise for short periods to

investigate customer complaints or power delivery issues rather than dispatching a technician and leaving expensive equipment at the premise. However, to provide data in a more granular format will significantly increase the cost of the system especially from a data storage standpoint. Therefore, the Company believes it is not likely practical or economical to implement higher resolution interval data for the entire meter population but, instead to pursue situations where it makes economic sense and where third parties may require it for dispatch, energy consumption reconcilement or billing.

PPL Electric will be conducting performance evaluations during the 30 month grace period to expand the application of 15-minute data collection and retrieval from its meters. These evaluations will identify any problems regarding the ability to collect this data at the meter level, as well as the system level and retrieve it at a high success rate for use by customers, EGSs and third parties.

The objectives of the evaluations are to determine (1) the ability of the currently deployed power line smart meter infrastructure to consistently provide 15-minute interval data on commercial and industrial accounts, (2) the ability of the power line smart meter infrastructure to consistently provide 15-minute interval data using new meters with additional functionality at the residential and small commercial customer level, and (3) the need to use the large power smart meter system as the provider of 15-minute or less interval data.

One evaluation will monitor the approximately 800 Rate Schedule GS-3 accounts with greater than 500 KW demand to determine the power line smart meter infrastructure's ability to deliver 15-minute interval data consistently and at a high success rate for real-time pricing. The estimated cost of this evaluation is $65,000. This evaluation will be performed in 2010 and will include: (1) remote reconfiguration of the meters from 60 minute to 15-minute interval data collection, (2) evaluation of pilot results, (3) development of recommendations, and (4) reporting results and an implementation plan to the Commission.

If this evaluation results in a determination that either currently deployed or new power line meters cannot reliably provide the necessary data, these industrial and commercial meters will be read with the large power meter wireless system. The estimated cost to complete this implementation is $990,000, which includes, (1) meter hardware and installation totaling $510,000 in 2010 for approximately 800 GS3 accounts with greater than 500 KW demand and (2) ongoing telecommunication costs of $120,000 per year.

A second evaluation will be conducted in 2012 to assess the capability to consistently provide 15-minute interval data using power line meters that have the capability to be configured for 15-minute data collection at the residential and small commercial customer level. The estimated cost to perform this evaluation is $35,000, which includes:, (1) the remote reconfiguration of newer power line meters from 60 minute to 15-minute collection, (2) evaluation of pilot results, (3) development of recommendations, and (4) reporting of results and an implementation plan to the Commission.

The expected high level benefits are that (1) the needs of customers, third party aggregators and EGS's for interval data of 15-minutes or less will be met reliably and (2) customers will be able to improve their ability to manage their energy use and shop for a generation supplier with more precise load data.

(3) On-board meter storage of meter data that complies with nationally recognized non-proprietary standards such as ANSI C12.19 and C12.22 tables.

As discussed in Section 3C, PPL Electric's existing AMI utilizes meters with sufficient storage to provide billing data when required even though only 24 hours of data is stored in the meter itself. Additionally, the infrastructure complies with nationally recognized non-proprietary standards that are referenced in the Implementation Order.

The Company's plans will be to upgrade its meter population for new construction, meter replacements and customer requests through normal annual purchases. The upgrades will include purchases of meters capable of storage at the meter level of at least 7 days of daily data and 30 days of hourly data.

Residential meters that are currently deployed in PPL Electric's AMI store 24 values of hourly load profile data. The Company's power line smart meter system acquires that information every 8 hours on a daily basis. Newer meter modules can store over 30 days of hourly values. A pilot will be conducted beginning in 2011 and concluding in 2012 to test the ability to acquire any or all of those 30 days of data and revalidate it in the meter data management system (MDMS). The pilot includes changes in read schedule and validation processes at an estimated cost of $130,000. The pilot includes (1) software application changes and upgrades to the smart meter infrastructure and the MDMS, (2) changes to business processes for validation, editing and estimation of billing and presentation data, (3) software and programming, (4) evaluation of pilot results, (5) development of an implementation plan, and (6) reporting of results and an implementation plan to the Commission.

The expected high level benefits are that the pilot will, (1) test the operation and performance of the meters' extended memory capabilities, (2) demonstrate the ability to support the on-board storage capability, and (3) provide the ability to re-acquire lost data for more accurate billing information and data presentment.

(4) Open standards and protocols that comply with nationally recognized non-proprietary standards, such as IEEE 802.15.4.

As discussed in Section 3C, the Company's current AMI deployment can support the open standards and protocols that are recognized nationally. However, PPL Electric has not, at this point, exercised the use of the IEEE 805.15.4 standard.

PPL Electric plans to continue incorporating open standards and protocols into the Company's use of smart meter technology. It will accomplish this by monitoring the progress of Smart Grid Standards as guided by NIST and incorporate those evolving standards into the smart meter and smart grid system. One area the Company plans to explore is the incorporation of an IEEE 802.15.4 compliant Zigbee communications system into a home area network through a pilot beginning in 2010 and concluding in 2011. The goal of this pilot will be to develop the appropriate technology that meets customer requirements and expectations. The estimated cost of this pilot is $410,000 which includes (1) establishment of pilot objectives, (2) providing price and consumption information to the customer, (3) assessing the potential to control customer end use devices, (4) evaluate bidirectional communications to end use devices, (5) inviting 500 customers to participate in the pilot, (6) providing the meter and home control/display hardware including any equipment installation, (7) software and programming, (8) evaluation of pilot results and development of an implementation plan, and (9)reporting of results to the Commission.

If the pilot is successful, then a potential annual deployment to an anticipated 10,000 customer enrollment from 2012-2014 may result in a total estimated implementation cost of $6,000,000.

The expected high level benefits are that the pilot will (1) contribute to the reduction of energy consumption through "smart" automated home controls, (2) provide the basic hardware foundation for special rate initiatives such as critical peak pricing, and (3) enable the customer to understand and control their consumption.

(5) Ability to upgrade these minimum capabilities as technology advances and becomes economically feasible.

As discussed in Section 3C, PPL Electric's smart meter infrastructure possesses the ability to upgrade firmware and communication systems for compliance with new standards and protocols. The Company's plan addresses technology advances in five areas. Each is discussed below.

General Obsolescence and Upgrade Issues

Over the next five years, PPL Electric will conduct technological and economic evaluations on potential applications that can enhance the performance of the existing AMI components as well as the next generation smart meter system technologies and Smart Grid integration. These evaluations will consider the obsolescence of the communications infrastructure equipment and meters and replacement with new technology that enables PPL Electric to extend the minimum requirements and support the additional capabilities described in the Secretarial Letter dated June 24, 2009. Additionally, the Company will consider new applications that complement the capabilities of the existing system.

The estimated costs to conduct these evaluations are $350,000, which includes, (1) evaluation of the existing power line smart meter infrastructure in 2011 that extend the minimum requirements and support the other capabilities as well as the PPL proposed enhancements, (2) evaluation of Smart Grid Integration over the period from 2011 to 2014 that extend the communication infrastructure's capability to backhaul AMI/Smart Grid data more effectively, (3) consideration of additional or new equipment to enhance data capture and accommodate new end use devices, (4) continual evaluation of the next generation of AMI technologies for applicability at PPL Electric over the 2010 through 2014 time period, and (5) reporting results and potential implementation plans to the Commission. If the evaluations result in recommendations to implement technologies that improve system performance, the potential cost to deploy is estimated at $9,660,400.

The results of these evaluations could enable PPL Electric to avoid the complete replacement of its AMI, which is estimated to cost between $380 and $450 million depending on the functionality and system deployed. The Company believes that the implementation costs for simply upgrading its existing AMI's meter reading application and associated IT related hardware will only be approximately $3 million.

The expected high level benefits are that these evaluations will: (1) aid in managing obsolescence of existing smart meter infrastructure, (2) position PPL for additional capabilities including Smart Grid related applications and operations, (3) improve efficiency in backhauling advanced meter data, and (4) avoid significant investment to deploy a new smart meter

systems and meters resulting in lower costs to customers than would otherwise result.

Service Limiting/Service Extending

This functionality is supported by PPL Electric smart meter infrastructure. Service extending can be accomplished through the use of a meter with a service disconnect and service limiting intelligence at the customer's premise. This functionality limits the current (amps) level to the premise, thereby allowing essential loads to stay on for the customer. A service extender allows a customer to maintain a minimum level of service rather than termination of service due to non-payment of bills. The Company recognizes that, while this capability was included in the Commission's Tentative Order, the PUC has not required EDCs to evaluate this capability. Neither, however, does the Implementation Order preclude further consideration of this functionality. Therefore, PPL Electric desires to work directly with Commission staff and interested parties on the objectives for a pilot to evaluate a service extending program. The objectives would take into consideration the design guidelines approved by the Commission in its June 20, 1985 Secretarial Letter, which approved BCS's recommendations related to service limiters.

PPL Electric will conduct a pilot to deploy this enhanced capability at 500 customer accounts from 2013 through 2014. This pilot will enable PPL Electric to evaluate the effectiveness and potential benefits of this capability for payment troubled customers, while addressing the public policy issues dealing with Commission regulations.

The estimated cost to conduct this pilot is $220,000, which includes, (1) establishment of pilot objectives (2) deployment at 500 selected customer locations, (3) meter hardware with an integrated disconnect and service extending feature and installation, (4) software and IT programming, (5) evaluation of pilot results, (6) development of recommendations for implementation, and (7) reporting of results and an implementation plan.

The expected high level benefits are that service extending (1) maintains service to and reduces revenue loss from customers with an inability to pay their bills, (2) improves customer payment behavior resulting in lower service termination and revenue loss, and (3) provides basic current (amperage) levels for essential loads to keep customers in service from April 1st to November 30th resulting in a lower revenue loss and (4) lowers costs by reducing the need to dispatch personnel to disconnect and reconnect meters.

Prepay Metering

Prepay metering will enable a customer to make wise energy consumption decisions based on a "pay-as-you-go" approach. PPL Electric recognizes that, while this capability was included in the Commission's Tentative Order, the Commission has not required EDCs to evaluate this capability in the Implementation Order. Neither, however, does the Implementation Order preclude further consideration of this functionality. In fact, the Commission's proposed revisions to 52 Pa. Code Chapter 56 do include a section on the use of pre-pay meters. PPL Electric desires to work directly with Commission staff and interested parties on the objectives for a pilot to evaluate the benefits of this type of program.

A pilot will be conducted in 2013 that will be offered to 500 residential customers. The program will be non-discriminatory and promoted as an energy conservation initiative similar to programs at Salt River Project and Brunswick EMC. These companies have demonstrated that customers become much more aware of their electric consumption if they experience the actual purchase in near real time. Through the planning and pilot implementation the Company will also assure that public policy issues dealing with Commission regulations are addressed.

The estimated cost to conduct this pilot is $240,000, which includes, (1) establishment of pilot objectives (2) deployment and invitations to 500 customers, (3) meter hardware and installation, (4) software and IT programming, (5) evaluation of pilot results, (6) establishment of an implementation plan, (7) reporting of results and a plan.

If the pilot is successful, PPL Electric expects to offer an opt in program to all customers with an expected enrollment of 10,000 customer in 2014. The cost to implement this program is estimated at $3,162,000.

The expected high level benefits are that pre-pay metering will (1) contribute to reduction in the customer's energy consumption, (2) enable customers to effectively learn how to manage their electric energy payments, (3) enhance customer payment behavior, and (4) reduce the need to dispatch personnel to disconnect and reconnect and associated costs.

Momentary Outage Monitoring

PPL Electric currently captures and reports customer "blink" counts which can be used to resolve customer power quality issues. In fact, PPL personnel are currently using these blinks to resolve customer complaints to satisfaction. The Company expects to continue the use of these blink counts and become more proactive in understanding emerging power

quality issues prior to a customer contacting PPL Electric to apprise of an issue.

PPL Electric plans to further refine the use of momentary interruption (blink count) information to determine how it can be provided proactively. This would be accomplished through the aggregation of blink count data in a meaningful way to aid in determining the approximate date, time, and location of the device that operated. A pilot will be conducted beginning in 2011 with potential implementation of initiatives in 2012. The objectives of the pilot will be to (1) develop and enhance business processes that actively review customer blink information, (2) determine the most likely time and location of a momentary operation, (3) ascertain how the customer blink information can be incorporated into PPL Electric's outage management system to refine PPL Electric's outage detection analysis and post outage restoration, and (4) assure that automation of the processes is implemented for ease of application of the information for all business users.

The estimated cost to conduct this pilot is $100,000, which includes, (1) establishment of evaluation objectives, (2) software and IT programming, (3) evaluation of the results, (4) establishment of recommendations for implementation, (5) reporting results and plan to the Commission. If the pilot is successful, implementation of proactive momentary outage capture will result in an estimated cost of $100,000 in the 2012 to 2013 period.

The expected high level benefits are that momentary outage monitoring will, (1) enable proactive messaging to Company engineers when the blink counts reach a specific threshold limit, (2) alert Company engineers that an issue may be occurring at the customer location or the feeder servicing that customer or group of customers, (3) enable Company engineers to take action to begin their investigation and contact the customer(s) to query if they are experiencing any issues as well as informing them that PPL is working on it, (4) identify and resolve device issues which have frequent momentary operations and (5) improve customer satisfaction of customers who experienced significant numbers of momentary interruptions.

Feeder Meters

This enhanced capability requires installation of standard meters along the Company's radial feeder circuits to secure voltage, current, KWH, KW and blink count information for the circuit. The information will be used to identify hot spots on the circuit and potential current diversion, as well as enable Company personnel to develop a better understanding of circuit losses and performance. PPL Electric's AMI is capable of interfacing with this technology today and the Company proposes to evaluate how best to

integrate these capabilities into its reliability, maintenance, and smart grid activities.

PPL Electric proposes to install feeder meters as part of a pilot program to evaluate the benefits of the aforementioned capabilities. The pilot will be conducted in two phases on both of the PPL Electric AMI communication platforms, i.e., power line and wireless systems. In 2011, a total of 5 feeders will be addressed with the installation of 20 meters on each feeder. These meters will be read using the wireless platform. A similar pilot will be conducted using the power line platform. Objectives of the pilots will be to (1) determine the optimal system to backhaul the data to a central database, (2) evaluate the application of the data for smart grid-based applications and (3) establish an implementation plan that optimizes operational efficiency and reliability of service to customers.

The estimated cost to conduct these pilots is $600,000 ($300,000 each), which includes, (1) establishment of pilot objectives, (2) meter hardware and installation, (3) software and IT programming, (4) evaluation of results, (5) establishment of recommendations for future implementation, and (6) reporting of results and the plan to the Commission.

If the pilot is successful, deployment of feeder meters on the remaining 1090 feeders will result in an estimated cost of $43,600,000 over a 4 year period with $8,000,000 and $10,000,000 expended in 2013 and 2014, respectively. The remaining $25,600,000 is expected to be spent in 2015 and 2016.

The expected high level benefits are that feeder meters will (1) significantly reduce the need to install recording voltmeters at customer locations and along a feeder, (2) result in reduced dispatch of personnel to install and remove the voltmeters, (3) provide momentary blink count information over a wider circuit area in concert with premise level metering to more accurately pinpoint the electrical distribution hot spots, (4) provide sensor information for distribution automation and smart grid processes and applications, and (5) enable identification of potential current diversion.

(6) Ability to monitor voltage at each meter and report data in a manner that allows an EDC to react to the information.

As discussed in Section 3C voltage information is available from PPL Electric's installed base of meters and is currently collected as required for specific engineering review. Industrial and commercial meters also offer more precise voltage, current and relational phase angle information and the Company uses it for diagnosing meter and service issues.

PPL Electric will use the power line carrier based existing smart meter technology and infrastructure to further the measurement, collection and analysis of voltage information to enhance PPL Electric's distribution system reliability. Also, its wireless based large power meters offer more precise voltage, current and relational phase angle information and the Company will be enhancing the use of that information for diagnosing meter and service issues. To further the use and expansion of these two systems for voltage monitoring and reporting, the enhancement will be implemented in 2010 for the large power meters and a pilot will be conducted in 2011 with the power line carrier (PLC) based system. The estimated cost of the large power meter information enhancement is $100,000 and the pilot is $100,000 which includes, (1) determining the feasibility of gathering this new information by performing an impact analysis on the smart meter infrastructure to ensure there are no performance issues, (2) exporting the data collected into a meter data management system to provide a facility for engineers to access and apply the data in business applications, (3) software and IT programming, (4) establishment of implementation plan, and (5) reporting the results and implementation plans to the Commission. If the PLC based pilot is successful, it is expected that implementation will occur in 2012 at an estimated cost of $125,000.

The expected high level benefits are that (1) application of voltage profiling information at a customer, transformer and circuit level will provide information on the health of an entire circuit, (2) use of this information will alert PPL Electric to customer voltage problems, thereby increasing customer satisfaction by correcting voltage issues on a proactive basis, (3) measurement, collection and analysis of voltage information will enable improved voltage control, (4) it will provide pertinent information to a smart grid strategy that will enable PPL Electric to reduce voltage when needed to maintain distribution system reliability and (5) it will provide a framework for an accurate operational model, which will provide faster customer restoration, and more efficient system utilization.

(7) Ability to remotely reprogram the meter.

As discussed in Section 3C, PPL Electric has the ability with its smart meter infrastructure to remotely program equipment and meters in the system. The Company has demonstrated this capability in several applications.

In its plan, PPL Electric proposes to evaluate ways to continue refining the power line smart meter infrastructure's remote programming capabilities. This will include enhanced ability to reprogram meters, upgrade the system's equipment firmware to improve performance, and potential equipment hardware upgrades to accommodate enhanced functionality. These evaluations are associated with the work described in Section 6C

(5). Therefore the costs to complete these evaluations are included in Section 6C (5).

(8) Ability to communicate outages and restorations.

As discussed in Section 3C, the Company's current deployment is integrated with its OMS to permit a more accurate determination of the extent of an outage and provide the ability to restore customers more quickly than would otherwise be possible. As it moves forward with its smart meter plan, PPL Electric will continue to seek ways to incrementally improve proactive outage detection over the life of the systems.

PPL Electric will define roadmaps and conduct a pilot to further enhance use of the existing AMI's capabilities in 2010. The objective of the pilot will be to determine the system-wide feasibility of using the power line system for proactive meter outage detection for the purpose of distribution system health checks and active outage detection.

The estimated cost of the pilot is $100,000, which includes (1) improving the accuracy of existing pings through the investigation and mediation of performance issues, (2) modification of the OMS to proactively "ping" customers' meters for service health, (3) Optimize ping services to more actively assess outage conditions and dispatch personnel where required. If the pilot is successful, it is expected that implementation will occur in 2011 at an estimated cost of $115,000.

The expected high level benefits are that (1) proactive pinging of customers' meters to determine their outage status will help reduce outage times for customers, specifically for smaller outages, or outages where a customer would not normally report that they are out of service, (2) knowing outage types and locations will allow PPL Electric to more quickly report that information to customers who may not call in, and, (3) it will provide a framework for more quickly performing proactive outage notification feature in the future for customers to elect that option.

(9) Ability to support net metering of customer-generators.

As discussed in Section 3C, the smart meter infrastructure employed by PPL Electric supports this capability and is utilized today to acquire all the point of contact and generation quantities.

PPL Electric will pilot, in 2010, the functionality and performance of the new bidirectional meters in its infrastructure that measure energy flow at the PPL Electric point of contact and the output of the customer's generator. The pilot will consist of using 100 bidirectional meters in the power line smart meter system that will provide two channels of energy

profile data measuring both delivered and received energy flowing to the PPL EU grid.

The estimated cost to conduct this pilot is $234,000, which includes, (1) selection of 100 customer locations in existing and new net metering situations, (2) meter hardware and installation, (3) software and IT programming, (4) evaluation of pilot results, (5) development of an implementation plan and (6) reporting results and an implementation plan to the Commission. If the pilot is successful, implementation of approximately 500 meters annually will result in an estimated cost of $125,000 per year.

The expected high level benefits of this pilot are that it (1) supports the functional operation and performance capabilities of the power line smart meter infrastructure and bi-directional meters, (2) meets the intent of the Commission's Net Metering tariffs, and (3) provides a feasible and economical meter solution to monitor AEPS renewable energy requirements through measurement of the generation output of applicable generation sources.

D. Cost Recovery Mechanism

Act 129 explicitly authorizes EDCs to recover the costs of providing smart meter technology to their customers:

> "An electric distribution company may recover reasonable and prudent costs of providing smart meter technology under paragraph (2) (ii) and (iii), as determined by the Commission. This paragraph includes annual depreciation and capital costs over the life of the smart meter technology and the cost of any system upgrades that the electric distribution company may require to enable the use of the smart meter technology which are incurred after the effective date of this paragraph, less operating and capital cost savings realized by the electric distribution company from the installation and use of the smart meter technology. Smart meter technology shall be deemed to be a new service offered for the first time under section 2804 (4) (vi)."

An EDC may elect to recover the cost of smart meter technology through base rates or an automatic adjustment clause.

In its Implementation Order, the Commission clarified the types of costs of smart meter technology that an EDC can recover under Act 129, as follows:

> "These costs will include both capital and expense items relating to all plan elements, equipment and facilities, as well as an

> analysis of all related administrative costs. More specifically, these costs would include, but not be limited to, capital expenditures for any equipment and facilities that may be required to implement the smart meter plan, as well as depreciation, operating and maintenance expenses, a return component based on the EDC's weighted cost of capital, and taxes. Administrative costs would include, but not be limited to, incremental costs relating to plan development, cost analysis, measurement and verification, and reporting."

In designing a proposed cost recovery mechanism, PPL Electric was guided by both the provision in Act 129 and the language in the Commission's Implementation Order quoted above.

Provided as Attachment 4 to this Plan, is a pro forma automatic adjustment clause that PPL Electric is proposing for recovery of its smart meter technology costs. As shown in that attachment, PPL Electric is proposing to recover its smart meter technology costs through the Act 129 Compliance Rider ("ACR") that it submitted in its EE&C Plan filing at Docket No. M-2009-2093216. In Attachment 4, the Company is providing both a final version of the expanded ACR and a "track changes" version to facilitate review of the modifications required to recover smart meter technology costs. It is important to note that some details of the initial ACR are being litigated in the proceeding at Docket No. M-2009-2093216. If the Commission makes any changes to the ACR in its final order in that proceeding, the Company will incorporate those changes in the expanded ACR proposed in this Plan.

Costs recovered through the automatic adjustment clause will include all costs incurred by PPL Electric to implement its Smart Meter Plan. These costs will include both expense items and capital items. Expense items will be taken directly from PPL Electric's books and records. With regard to capital items, only the annual cost of those items (i.e., depreciation and return) will be included in the clause. The annual depreciation expense will be based on the applicable asset lives contained in the Company's most recent life study. The annual return expense will be based on the capital structure and cost of capital allowed in the Company's most recent fully litigated distribution rate case.

Consistent with the approach PPL Electric proposed for recovery of its EE&C Plan costs, the Company proposes that this clause not appear as a separate line item on customer bills. Rather, it would be applied as an adjustment to the distribution base rates of participating customers.

The clause would be adjusted annually to reflect the Company's estimates of future costs to provide smart meter technology to its customers. The annual adjustment also would include a reconciliation of costs incurred to deploy

smart meter technology and revenue collected under the automatic adjustment mechanism during the previous application year.

Rates under the proposed mechanism would be calculated separately for the three major customer classes served by PPL Electric - residential, small commercial and industrial, and large commercial and industrial. The rates for the residential and small C&I customer classes would be stated in cents per kWh. The rate for the large C&I customer class would be stated in dollars per kW.

E. Allocation of Costs to Customer Classes

In its Implementation Order, the Commission provided guidance on how EDCs should allocate the costs of their smart metering plans, as follows:

> "In order to ensure that proper allocation takes place, it will be necessary for the utilities to determine the total costs related to their smart metering plans, as discussed in E.1. Once these costs have been determined, we will require the EDC to allocate those costs to the classes whom derive benefit from such costs. Any costs that can be clearly shown to benefit solely one specific class should be assigned wholly to that class. Those costs that provide benefit across multiple classes should be allocated among the appropriate classes using reasonable cost of service practices."

In allocating the costs of its smart meter plan, PPL Electric followed this guidance from the Commission.

The Company will directly assign all costs to the extent possible. Any common costs or administrative costs that cannot be directly assigned will be allocated among the three customer classes described above. To accomplish that allocation, the Company will use a ratio of direct costs assigned to that class divided by direct costs for the entire system. As a result, costs will be properly recovered from the customer class realizing the benefits of smart meter technology.