

# **ATTACHMENT 3**

## **PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6B(1)**

**Bidirectional Data Communications**

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• Perform evaluations using in-home displays with home area networks in coordination with the pilot referenced in section 6C(4)</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• Estimated cost of this evaluation is embedded in costs outlined in Section 6C(4)</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• Establish pilot objectives,</li><li>• Provide price and consumption information to the customer to aid in making energy efficient buying decisions</li><li>• Demonstrate control of customer end use devices,</li><li>• Evaluate bidirectional communications to these devices</li><li>• Invite 500 customers to participate in the pilot</li><li>• Provide the meter and home control/display hardware including any equipment installation</li><li>• Develop/implement required software and IT programming changes</li><li>• Evaluate pilot results and establish a potential implementation plan</li><li>• Report results to the Commission.</li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>• Contributes to the reduction of energy consumption through “conservation smart” automated home controls</li><li>• Provides the basic hardware foundation for special rate initiatives such as critical peak pricing</li><li>• Enables customers to understand and control of consumption</li></ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6B(2)**

**Recording hourly usage data on at least an hourly basis**

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• None to be performed because we meet this requirement with the existing power line and large power smart meter systems.</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• Not applicable.</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• Continue to deploy meters for new construction, upon customer request, and to replace damaged and defective meters.</li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>•</li></ul>

## PPL Electric Utilities Smart Meter Plan Pilot/Evaluation

### 6B(3)

#### Provide customers with direct access to and use of price and consumption information

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• Perform evaluations using in-home displays with home area networks in coordination with the pilot referenced in section 6C(4).</li><li>• Another initiative is intended to evaluate and pilot various communication mediums. PPL Electric already provides electronic access to price and consumption information today via their website and through EDI transactions. However, the Company would like 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 email and text messages to customers.</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• \$160,000 to evaluate and pilot various communications mediums.</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• Evaluation of available technologies in 2010</li><li>• Implementation in 2011 of the following:<ul style="list-style-type: none"><li>○ Messaging to multiple communication channels</li><li>○ Deploy rate comparison tool to provide customers with ability to compare rate options</li><li>○ Deployment of software and required licensing from chosen vendor</li></ul></li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>• Customers will derive increased understanding and awareness of energy usage, which lead to better energy management.</li></ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6B(4)**

**Provide customers with information on their hourly consumption**

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• PPL Electric provides its customers with information on hourly consumption from its AMI. This data is provided on a daily basis to the PPL Electric meter data management system that enables customers to access their individual information on the web.</li><li>• 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 provide hourly consumption that is in clear and understandable formats.</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• The high level costs have not been quantified presently and will be provided through the periodic reviews with the Commission during the 30 month grace period.</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• To be determined and reported back to the Commission staff within the 30 month grace period</li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>• To be determined and reported back to the Commission staff within the 30 month grace period</li></ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6 B(5)**

**Enabling TOU and RTP Programs**

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• In 2010, conduct a performance evaluation with the Company's AMI to determine the feasibility of collecting and delivering 15-minute data at a high success rate for RTP billing for large power customers greater than 500 KW in demand. This evaluation will be conducted in coordination with Evaluation #1 discussed in Section 6C(2).</li><li>• We expect modest investments may be incurred over the 30 month period to potentially enhance TOU and hourly data delivery through pilot installations of meters with additional storage. This will allow the company to evaluate the collection and capture of historical data for billing and presentation purposes. This evaluation will be conducted in 2012 in coordination with Evaluation #2 referenced in Section 6C(3).</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• Estimated cost of the 15-minute data collection is embedded in the Evaluation #1 costs outlined in Section 6C(2)</li><li>• Estimated cost of the historical data collection evaluation is embedded in Evaluation #2 costs outlined in Section 6C(3)</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• Plans are as discussed in Sections 6C(2) and 6C(3)</li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>• As outlined in Sections 6C(2) and 6C(3).</li></ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6 B(6)**

**Supporting the automatic control of the customer's electric consumption**

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• PPL Electric will be conducting a pilot to further extend the benefits of the currently deployed AMI to demonstrate how it meets this minimum requirement. This will be accomplished by installing load control devices on various customer equipment that include heating, ventilation and air conditioning systems, water heaters and other appliances in the premise. The pilot is expected to be started in 2010 and completed in 2011.</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• \$436,000</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• Establish pilot objectives</li><li>• Invite 500 customers to participate in the pilot</li><li>• Purchase and install load control devices</li><li>• Develop/implement required software and IT programming changes and licensing</li><li>• Evaluate pilot results</li><li>• Establish potential implementation plan</li><li>• Report results and proposed implementation plan to the Commission</li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>• Allows customer to take advantage of TOU rate options</li><li>• Enables customers to shed load during periods of peak pricing</li><li>• Provides capability for PPL Electric to shed load during emergency load reduction events called by PJM to maintain system reliability</li><li>• Can supplement PPL Electric peak reduction requirements mandated by the Act 129 EE&amp;C Plan.</li></ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"><li>• If the pilot is successful, then a potential deployment with an anticipated 5,000 customer enrollment annually may result in total estimated implementation cost of \$4,200,000 from 2011-2014.</li></ul>

## PPL Electric Utilities Smart Meter Plan Pilot/Evaluation

### 6C(1)

#### Ability to remotely disconnect and reconnect

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• PPL Electric will conduct a remote disconnection/reconnection pilot in 2011 to connect and disconnect premises where frequent move in/move outs occur in its service territory. The pilot would enable "hard" blocking of all accounts in the pilot, excluding terminations for non-payment.</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• \$210,000</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• Establish pilot objectives</li><li>• Invite 500 customers to participate in the pilot</li><li>• Purchase of meter hardware and installation</li><li>• Develop/implement required software and IT programming changes and licensing</li><li>• Evaluate pilot results</li><li>• Establish potential implementation plan</li><li>• Report results and proposed implementation plan to the Commission</li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>• Contributes to the reduction in consumption on inactive meters</li><li>• Eliminates need to dispatch personnel to disconnect and reconnect</li><li>• Provides ability to comply with Commission regulations in normal connect/disconnect situations</li><li>• Provides ability to enable cold load pickup resulting from emergency load reductions or in large storm restoration effort</li><li>• Automates the process for completing connects and disconnects</li><li>• Has the potential to support emergency load reductions as directed by PJM and/or PPL Electric's Systems Operations especially where automatic switching is not available.</li></ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"><li>• If the pilot is successful, then a potential deployment to an estimated 50000 customer locations from 2012 - 2014 may result in total estimated implementation cost of \$13,225,000.</li></ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6C(2)**

**Ability to provide 15-minute or shorter interval data**

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"> <li>• Evaluation #1 is to complete a performance evaluation in 2010 to monitor the approximately 800 Rate Schedule GS-3 accounts with greater than 500KW in demand to determine the power line AMI's ability to deliver 15-minute interval data consistently and at a high success rate for real-time pricing.</li> <li>• Evaluation #2 will be conducted in 2012 to consistently provide 15-minute interval data in the power line smart meter infrastructure using installed meters that have the capability to be configured for 15-minute data collection at the residential and small commercial customer level.</li> </ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"> <li>• Evaluation #1 - \$65,000</li> <li>• Evaluation #2 - \$35,000</li> </ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"> <li>• Evaluation #1:             <ul style="list-style-type: none"> <li>○ Remotely reconfiguring the meters from 60 minute to 15-minute interval data collection</li> <li>○ Evaluate pilot results</li> <li>○ Development of recommendations</li> <li>○ Report results and an implementation plan to the Commission.</li> </ul> </li> <li>• Evaluation #2:             <ul style="list-style-type: none"> <li>○ Remote reconfiguration of installed newer smart meters from 60 minute to 15-minute collection</li> <li>○ Evaluate pilot results</li> <li>○ Development of recommendations</li> <li>○ Report results and an implementation plan to the Commission.</li> </ul> </li> </ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"> <li>• Demonstrate how PPL Electric tested enhancements will meet the needs of customers, third party aggregators and EGS's for interval data of 15-minutes or less</li> <li>• Allows customers to improve their ability to shop for a generation supplier with more precise load data.</li> </ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"> <li>• If Evaluation #1 cannot meet the pilot objectives, then large power meters will be deployed. The estimated cost to complete this deployment is \$990,000, which includes:             <ul style="list-style-type: none"> <li>○ Meter hardware and installation for a total of \$510,000</li> <li>○ Ongoing telecommunication costs of \$120,000 per year.</li> </ul> </li> </ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6C(3)**

**On board meter storage of meter data**

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• 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).</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• \$130,000</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• Implement software application changes and upgrades to the smart meter infrastructure and the MDMS</li><li>• Implement changes to business process for validation, editing and estimation of billing and presentation data</li><li>• Develop/implement required Company software and IT programming changes</li><li>• Evaluate pilot results</li><li>• Development of a potential implementation plan</li><li>• Report results and proposed implementation plan to the Commission.</li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>• Tests the operation and performance of the meters' extended memory capabilities</li><li>• Demonstrates the ability to support the on-board storage capability</li><li>• Provides the ability to re-acquire lost data for more accurate billing information and data presentment</li></ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"><li>• None planned except for deploying normally purchased new meters to meet this requirement going forward in the smart meter plan. This plan will provide smart meters for new construction, customer requests, and replacement of damaged and defective meters.</li></ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6C(4)**

**Open standards and protocols that comply with nationally recognized non-proprietary standards**

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• Conduct a home area network pilot trial incorporating IEEE 802.15.4 compliant Zigbee communications beginning in 2010 and concluding in 2011 to develop the appropriate technology that meets customer requirements and expectations.</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• \$410,000</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• Establish pilot objectives</li><li>• Provide price and consumption information to the customer to aid in making energy efficient buying decisions</li><li>• Enable potential to control customer end use devices</li><li>• Evaluate bidirectional communications to the end use devices</li><li>• Invite 500 customers to participate in the pilot</li><li>• Provide the meter and home control/display hardware including any equipment installation</li><li>• Develop/implement any required software and IT programming changes</li><li>• Evaluate pilot results</li><li>• Development of a potential implementation plan</li><li>• Report results and proposed implementation plan to the Commission</li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>• Contributes to the reduction of energy consumption through "conservation smart" automated home controls</li><li>• Provides the basic hardware foundation for special rate initiatives such as critical peak pricing</li><li>• Enables the customer to understand and control their energy consumption.</li></ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"><li>• 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.</li></ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6C(5)**

**Ability to upgrade these minimum capabilities as technology advances and becomes economically feasible**

<b>Pilot/Evaluation</b>	<p><b>General Obsolescence and Upgrade Issues</b></p> <ul style="list-style-type: none"> <li>Over the next 5 years, PPL Electric will conduct technological and economic evaluations that can enhance the performance of the existing AMI components as well as on next generation smart meter system technologies and Smart Grid integration over the next five years. These evaluations will consider obsolescence of the communications infrastructure equipment and meters, replacement with new technology that enable PPL Electric to extend the minimum requirements and support the additional capabilities.</li> </ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"> <li>\$350,000</li> </ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"> <li>Evaluate the existing power line smart meter infrastructure in 2011 that extend the minimum requirements and support the additional capabilities as well as the PPL proposed enhancements</li> <li>Evaluate 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</li> <li>Consider additional or new smart meter infrastructure equipment to enhance data capture and accommodate new end use devices</li> <li>Continually evaluate the next generation of AMI technologies for applicability at PPL.</li> <li>Periodically report results and potential implementation plans to the Commission.</li> </ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"> <li>Effectively manage obsolescence of existing smart meter infrastructure</li> <li>Positions PPL electric for additional capabilities including Smart Grid related applications and operations</li> <li>Improves efficiency in backhauling advanced meter data,</li> <li>Avoids an investment of \$380 to \$450 million to deploy a new smart meter system and meters resulting in lower cost recovery from customers.</li> </ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"> <li>If the evaluations result in recommendations to implement technologies that improve system performance, the potential cost to deploy is estimated at \$9,660,400.</li> </ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6C(5)**

**Ability to upgrade these minimum capabilities as technology advances and becomes economically feasible**

<b>Pilot/Evaluation</b>	<p><b>Service Limiting/Service Extending</b></p> <ul style="list-style-type: none"> <li>• 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.</li> </ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"> <li>• \$220,000</li> </ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"> <li>• Establish pilot objectives</li> <li>• Deploy at 500 selected customer locations</li> <li>• Purchase and installation of meter hardware with an integrated disconnect and service extending feature</li> <li>• Develop/implement required software and IT programming changes</li> <li>• Evaluate pilot results</li> <li>• Development of recommendations for implementation</li> <li>• Periodically report results and a proposed implementation plan.</li> </ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"> <li>• Maintain service to and reduce revenue loss from customers with an inability to pay their bills</li> <li>• Improves customer payment behavior resulting in lower service termination and revenue loss</li> <li>• Provides basic current (amperage) levels for essential loads to keep customers in service from April 1<sup>st</sup> to November 30th resulting in a lower revenue loss</li> <li>• Lowers costs by reducing the need to dispatch personnel to disconnect and reconnect because the customer possesses the control to disconnect/reconnect themselves safely when the current threshold is exceeded.</li> </ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"> <li>• If the pilot is successful and approval is provided by the Commission, implementation will occur beyond the 5 year plan.</li> </ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6C(5)**

**Ability to upgrade these minimum capabilities as technology advances and becomes economically feasible**

<b>Pilot/Evaluation</b>	<b>Pre-pay Metering</b> <ul style="list-style-type: none"><li>• PPL Electric will conduct a pilot 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 experienced 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.</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• \$240,000</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• Establish pilot objectives</li><li>• Invite 500 customer to participate in pilot</li><li>• Purchase and installation of meter hardware with an integrated disconnect and in-home display</li><li>• Develop/implement required software and IT programming changes</li><li>• Evaluate pilot results</li><li>• Development of recommendations for implementation</li><li>• Periodically report results and a proposed implementation plan.</li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>• Contributes to reduction in the customer's energy consumption</li><li>• Enables customers to effectively learn how to manage their electric energy payments</li><li>• Enhances customer payment behavior</li><li>• Reduces the need to dispatch personnel to disconnect and reconnect because the customer possesses the control to disconnect/reconnect themselves safely when payment credits expire/recharged.</li></ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"><li>• If the pilot is successful, PPL Electric expects to offer an opt-in program to all customers with an expected enrollment of 10,000 customers in 2014. The cost to implement this program is estimated at \$3,162,000.</li></ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6C(5)**

**Ability to upgrade these minimum capabilities as technology advances and becomes economically feasible**

<b>Pilot/Evaluation</b>	<p><b>Momentary Outage Monitoring</b></p> <ul style="list-style-type: none"> <li>• PPL Electric plans to conduct a pilot in 2011 to further refine the use of momentary interruption (blink count) information to determine how blink information 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.</li> </ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"> <li>• \$240,000</li> </ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"> <li>• Develop and enhance business processes that actively review customer blink information</li> <li>• Determine the most likely time and location of a momentary operation</li> <li>• 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</li> <li>• Assure that automation of the processes is implemented for ease of application of the information for all business users.</li> <li>• Develop/implement required software and IT programming changes</li> <li>• Evaluate the results</li> <li>• Development of recommendations for potential implementation</li> <li>• Report results and implementation plan to the Commission</li> </ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"> <li>• Enables proactive messaging to Company engineers when the blink counts reach a specific threshold limit</li> <li>• Alerts the engineer that an issue may be occurring at the customer location or the feeder servicing that customer or group of customers</li> <li>• Enables 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</li> <li>• Identifies and resolves device issues which have frequent momentary operations</li> <li>• Improves customer satisfaction of customers who experienced significant numbers of momentary interruptions.</li> </ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"> <li>• 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.</li> </ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6C(5)**

**Ability to upgrade these minimum capabilities as technology advances and becomes economically feasible**

<b>Pilot/Evaluation</b>	<p><b>Feeder Meters</b></p> <ul style="list-style-type: none"> <li>• PPL Electric will be installing feeder meters as part of a pilot program to track real world benefits. This pilot will be conducted in two phases on both of the PPL Electric AMI systems.             <ul style="list-style-type: none"> <li>○ In 2011, a total of 5 feeders with 20 meters on each feeder will be installed and be read using the wireless large power AMI.</li> <li>○ Then, in 2011 a similar pilot will be conducted using the power line carrier based AMI.</li> </ul> </li> </ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"> <li>• \$600,000 (\$300,000 for each pilot)</li> </ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"> <li>• Determine the optimal system to backhaul the data to a central database</li> <li>• Evaluate the application of the data for smart grid based applications</li> <li>• Establish an implementation plan that optimizes operational efficiency and reliability of service to customers.</li> <li>• Purchase and installation of meter hardware</li> <li>• Develop/implement required software and IT programming changes</li> <li>• Evaluate results</li> <li>• Development of recommendations for potential implementation</li> <li>• Report results and proposed implementation plan to the Commission</li> </ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"> <li>• Significantly reduce the need to install recording voltmeters at customer locations and along a feeder</li> <li>• Results in reduced dispatch of personnel to install and remove the voltmeters</li> <li>• Provides momentary blink count information over a wider circuit area in concert with premise level metering to more accurately pinpoint the electrical distribution hot spots</li> <li>• Provides sensor information for distribution automation and smart grid processes and applications</li> <li>• Enables identification of potential current diversion</li> </ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"> <li>• 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.</li> </ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6C(6)**

**Ability to monitor voltage at each meters and report data in a manner that allows an EDC to react to the information**

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"> <li>• In 2010, PPL Electric will implement an enhancement that applies more precise voltage, current and relational phase angle information from the Company's large power meters for diagnosing meter and service issues.</li> <li>• A pilot will be conducted in 2011 to further the measurement, collection and analysis of voltage information to enhance PPL Electric's distribution system reliability using the power line AMI system.</li> </ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"> <li>• Large power meter information enhancement - \$100,000</li> <li>• PLC based pilot - \$100,000</li> </ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"> <li>• Determine the feasibility of gathering this new information by performing an impact analysis on the AMI to ensure there are no performance issues</li> <li>• Export the data collected into a meter data management system to provides a facility for engineers to access and apply the data in business applications</li> <li>• Develop/implement required software and IT programming changes</li> <li>• Establish implementation plan</li> <li>• Reporting results and implementation plans to the Commission.</li> </ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"> <li>• Application of voltage profiling information at a customer, transformer and circuit level will provide information on the health of an entire circuit</li> <li>• Use of this information will alert PPL to customer voltage problems, thereby increasing customer satisfaction by correcting voltage issues on a proactive basis</li> <li>• Measurement, collection and analysis of voltage information will enable improved voltage control</li> <li>• Applications of voltage, current and relational phase angles information will proactively aid identification of defective metering equipment to avoid revenue loss</li> <li>• Will provide pertinent information to a smart grid strategy that will enable PPL Electric to reduce voltage when needed to maintain distribution system reliability</li> <li>• Will provide a framework for an accurate operational model, which will provide faster customer restoration, and more efficient system utilization.</li> </ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"> <li>• If the PLC based pilot is successful, it is expected that implementation will occur in 2012 at an estimated cost of \$125,000.</li> </ul>

**PPL Electric Utilities Smart Meter Plan Pilot/Evaluation**

**6C(7)**

**Ability to remotely reprogram the meter**

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• PPL Electric will be evaluating ways to continue refining the power line smart meter infrastructure's remote programming capabilities. These evaluations are associated with the work described in Section 6C(5).</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• The costs to complete these evaluations are included in Section 6C(5).</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• Demonstrate enhanced ability to reprogram meters</li><li>• Upgrade the system's equipment firmware to improve performance</li><li>• Consider potential equipment hardware upgrades to accommodate enhanced functionality.</li><li>• Reporting results and implementation plans to the Commission.</li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>• Benefits are similar to that described in Section 6C(5).</li></ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"><li>• Embedded in that described in Section 6C(5).</li></ul>

## PPL Electric Utilities Smart Meter Plan Pilot/Evaluation

### 6C(8)

#### Ability to communicate outages and restorations

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• PPL Electric will define roadmaps and conduct a pilot to further enhance use of the existing AMI's capabilities in 2010.</li><li>• 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.</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• \$100,000</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• Establish pilot objectives</li><li>• Demonstrate improvement in the accuracy of existing pings through the investigation and mediation of performance issues</li><li>• Modify the Company outage management system to proactively "ping" customers' meters for service health</li><li>• Optimize ping services to more actively assess outage conditions and dispatch personnel where required</li><li>• Reporting results and implementation plan to the Commission.</li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>• Implements 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</li><li>• Ability to know outage types and locations will more quickly allow PPL Electric to report that information to customers who do call in</li><li>• Will provide a framework for more quickly performing proactive outage notification feature in the future for customers to elect that option.</li></ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"><li>• If the pilot is successful, it is expected that implementation will occur in 2011 at an estimated cost of \$115,000.</li></ul>

## PPL Electric Utilities Smart Meter Plan Pilot/Evaluation

### 6C(9)

#### Ability to support net metering of customer generators

<b>Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• PPL Electric will pilot, in 2010, the functionality and performance of the new bidirectional meters in our 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 Electric grid.</li></ul>
<b>Estimated Cost of Pilot/Evaluation</b>	<ul style="list-style-type: none"><li>• \$234,000</li></ul>
<b>Pilot/Evaluation Plan</b>	<ul style="list-style-type: none"><li>• Selection of 100 customer locations in existing and new net metering situations</li><li>• Meter hardware and installation</li><li>• Develop/implement required software and IT programming changes</li><li>• Evaluate pilot results</li><li>• Establish an implementation plan</li><li>• Report results and implementation plan to the Commission.</li></ul>
<b>High Level Benefits</b>	<ul style="list-style-type: none"><li>• Supports the functional operation and performance capabilities of the power line smart meter infrastructure and bi-directional meters</li><li>• Meets the intent of the Commission's Net Metering tariffs</li><li>• Provides a feasible and economical meter solution to monitor AEPS renewable energy requirements through measurement of the generation output of applicable generation sources.</li></ul>
<b>Potential Implementation</b>	<ul style="list-style-type: none"><li>• If the pilot is successful, implementation of an estimated 500 meters annually will result in an estimated cost of \$125,000 per year.</li></ul>