• 14,000 MW electric peak (2007)
• 3800+ miles electric transmission
• 400 substations
• Members of PJM and NERC/ReliabilityFirst (RFC)
• Registered as a Transmission Owner, Distribution Provider, Load Serving Entity, and Purchasing-Selling Entity

*PHI Competitive Energy Businesses include Conectiv Energy and Pepco Energy Services
PHI Business Overview…

### Power Delivery

#### Customers
- **pepco**: 767,000
- **Delmarva Power**: 498,000
- **Atlantic City Electric**: 547,000

#### GWh
- **pepco**: 26,863
- **Delmarva Power**: 13,015
- **Atlantic City Electric**: 10,089

#### Mcf (000's)
- **pepco**: N/A
- **Delmarva Power**: N/A
- **Atlantic City Electric**: 20,300

#### Service Area (square miles) & Geography
- **pepco**: District of Columbia, major portions of Prince George’s and Montgomery Counties
- **Delmarva Power**: Major portions of Delmarva Peninsula
- **Atlantic City Electric**: Northern Delaware, Southern New Jersey

#### Population
- **pepco**: 2.1 million
- **Delmarva Power**: 1.3 million
- **Atlantic City Electric**: 1.1 million

*Note: Based on 2008 annual data*
PHI’s Smart Grid Vision...

“Through the ‘Smart Grid’, customers will be empowered to make choices regarding their use and cost of energy.

It will create opportunities for innovation for the customer and PHI.

It will provide the ability for PHI and its customers to take advantage of energy alternatives and efficiencies. It will allow the industry and customers to take advantage of green alternatives.

PHI’s Smart Grid strategy will improve reliability, while ensuring data security.

PHI will enhance our Asset Management and Infrastructure strategies enabling us to upgrade, operate and maintain the grid assets in a more cost effective manner.

It is incumbent on PHI and the industry to ensure the achievement of this vision through complete engagement with the industry and commitment to share our joint learnings....
PHI believes there are 5 evolutionary steps to achieving the Smart Grid…

Adapted from IBM
PHI’s Smart Grid activities will provide numerous benefits for customers, the economy, the environment and society...

<table>
<thead>
<tr>
<th>Customer Benefits</th>
<th>Economic Growth Benefits</th>
<th>Environmental and Societal Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowers Energy Bills</td>
<td>Create US Jobs</td>
<td>Reduces Energy Usage</td>
</tr>
<tr>
<td>Improves Reliability</td>
<td>Promote US Energy Independ.</td>
<td>Increases Green Energy</td>
</tr>
<tr>
<td>Improves Restoration</td>
<td>Enables New Markets</td>
<td>Combats Global Warming</td>
</tr>
<tr>
<td>Better Billing</td>
<td>High Inter-operability</td>
<td>Better Planning &amp; Forecasting</td>
</tr>
<tr>
<td>Better Energy Info &amp; Control</td>
<td></td>
<td>Resists Attack</td>
</tr>
<tr>
<td>Greener Options</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PHI’s Smart Grid Activities**

- Advanced Metering Infrastructure
- Distribution Automation
- Demand Response Dynamic Rates
- Direct Load Control
- Transmission Automation
- Smart Home Automation
- Distributed Generation
- Energy Efficiency

**Full Smart Grid Deployment**

**Smart Grid Benefits**

**Key:**
- Increasing degree of benefits
PHI’s Smart Grid Domains and Integrated Communications Infrastructure

**Home Intelligence**
- Solar (or Wind)
- Smart Thermostat
- Smart Meter
- House
- Electric Vehicles

**Feeder Automation**
- AMI Collector
- SF6 Line Switch With Radio Transceiver
- Distribution Poles

**Substation Automation**
- Communications Tower
- Smart Substations (Transmission & Distribution)
- Smart Relays
- Smart Monitors
- Legacy RTU
- Smart Meters

**Transmission Automation**
- PHI Central Operations
- PJM

Customer → Meter → Collector → Substation → PJM

- Home Area Network
- Wireless Mesh Network
- Broadband Wireless Network
- Fiber-Optic Network

Growing volume of data...
Transition to Smart Substations

Analog Substations
- Separate relays for each event
- Limited situational awareness
- Visual confirmation of failure event
- Limited station communication to Control Center

Digital Substations
- Multiple events managed by Smart Relays
- Increased situational awareness and analysis of events
- Increased status communication to Control Center
Feeder Automation – Automatic Sectionalizing and Restoration Scheme

- Protects customers from sustained outages caused by feeder lock-outs
- Segments feeders into 2, 3, or 4 sections using remote controlled switches or Automatic Circuit Reclosers (ACR’s) in the field
- For a fault in any one section:
  - ASR opens closed switches to isolate the section
  - ASR restores the other sections by reclosing the feeder breaker and/or closing open tie switches to other feeders
- Generally ASR operates in less than a minute
- 1 year Field Test yielded 7 operations and over 50% improvement in feeder performance
AMI Progress to Date

Vendor Selection

- Comverge – Direct Load Control
- Silver Spring Networks – AMI communication network
- IBM – system integrator
- GE and Landis + Gyr – meter manufacturers
- Scope Services – Meter Installation Contractor

Delaware Deployment

- Field Acceptance Test Completed
- System development and integration in progress
- 4Q 2009 - Commenced AMI full deployment in Delaware
- 1Q 2010 - Initial customer functionality
Initially focused on enabling the following operational and customer functionality which are necessary to meet customer expectations as defined by the Blueprint & AMI Business Case filings

- **Automated Deployment** – Includes the integration of PHI’s legacy systems with Scope Services and Silver Spring Networks’ (SSN) communication Head End System to support the procurement, receipt, installation and provisioning of LAN equipment and AMI devices

- **Meter to Bill** – Includes the integration of Silver Spring Networks’ Head End System, Itron’s Enterprise Edition, Meter Data Management System and PHI’s Customer Billing System (C3) to support the transfer of and billing based on meter reads collected “over the air” in addition to remote turn-on and turn-off of a customer’s electricity via a switch in the electric AMI meter

- **Outage** – Includes the integration between SSN Head End, PHI’s Outage Management System, PHI’s Customer Notification Engine and C3 to transfer and process outage messages received from AMI meters for use in both proactive customer outage and restoration of service notifications sent via the customer’s mechanism of choice (e.g., email, text or voice)

- **Web Presentation** – Includes the implementation, configuration and integration of Aclara’s Load Analysis Module to support presentation of electric and gas consumption profiles to customers in addition to the presentation of daily usage on the customer’s bill

- **AMI Portal** – Includes the creation of a PHI AMI Portal which allows Call Center Representatives and other designated departments to request and receive on-demand information stored by AMI electric meters, verify AMI electric meter status, obtain outage information and view customer’s interval usage data
Direct Load Control / Demand Response

- Smart Thermostats and Outdoor switches
- Program Currently Underway
- 222,000 by Devices by 2013
- Compatible with AMI

**MD DLC**

**Direct Load Control**

Minimum devices required to meet energy reduction goals (Cumulative)

<table>
<thead>
<tr>
<th>Year</th>
<th>Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>End 2008</td>
<td>0</td>
</tr>
<tr>
<td>End 2009</td>
<td>25,250</td>
</tr>
<tr>
<td>End 2010</td>
<td>75,750</td>
</tr>
<tr>
<td>End 2011</td>
<td>126,250</td>
</tr>
<tr>
<td>End 2012</td>
<td>167,660</td>
</tr>
<tr>
<td>End 2013</td>
<td>167,660</td>
</tr>
</tbody>
</table>

**PowerCents DC**

- 780 Participants
- Pilot Designed to Test Market Receptivity to Three Pricing Alternatives (Supply Portion Only)
  1. Hourly Pricing
  2. Critical Peak Pricing
  3. Critical Peak Rebate
PHI HAN Strategy

- PHI’s near-term focus is for utilizing the HAN to control a Programmable Controllable Thermostat (PCT) and In-Home Display.
- Future evolution will lead to the integration and control of on-site renewable generation and Plug-in vehicles.
- PHI recognizes that Smart Appliances will be available by 2015 and is tracking their development and considering their benefit to customers, likely penetration and level of utility involvement.
- Critical to this success is the ability to upgrade devices and operating firmware remotely to accommodate future capabilities.
- Customers will ultimately decide what functionality will be included in the HAN and when.
- All of these potential uses will require a secure and interoperable communications architecture within the HAN.

Near-Term
(SEP 1.0)

To-Be
(SEP 2.x)
Privacy-related efforts/resolutions

- There is a delicate balance between Customer privacy and the Utility’s need for Operational Data.
- Concerns are complicated by the Customer’s desire to make data available to third parties.
- Customers need to be made equally aware of both opportunities and threats.
- Successful resolution is a key driver for Smart Grid maturity.

Currently NARUC, NIST and EEI have all launched efforts to address privacy-related issues.
**Blueprint initiatives are accelerated through DOE funding...**

<table>
<thead>
<tr>
<th>Total Cost DOE Funded</th>
<th>Pepco-DC</th>
<th>Pepco-MD</th>
<th>ACE-NJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>$89.2M</td>
<td>-280,000 smart meters</td>
<td>-570,000 smart meters</td>
<td>-25,000 DLC devices</td>
</tr>
<tr>
<td>$44.6M</td>
<td>-20,000 DLC devices</td>
<td>-168,000 DLC devices</td>
<td>-20 ASR schemes</td>
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<tr>
<td></td>
<td>-17 ASR schemes</td>
<td>-62 ASR schemes</td>
<td>-158 Capacitor banks</td>
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<tr>
<td></td>
<td>-Dynamic pricing</td>
<td>-Dynamic pricing</td>
<td>-Enabling comms</td>
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<tr>
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<tr>
<td></td>
<td>$209.6M</td>
<td>$104.8M</td>
<td>$37.4M</td>
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<td>$18.7M</td>
<td>$44.6M</td>
<td>$104.8M</td>
<td>$18.7M</td>
</tr>
</tbody>
</table>

- Acceleration of installation of meter and thermostats
- Acceleration of benefit for customer to manage their energy use
- Modernization of the electric system to reduce outages, better manage the operation of the system and reduce losses
Looking forward to the future

• PHI wants to:
  – encourage innovation and customer engagement
  – be engaged with the industry and a contributor to the evolution of *Smart Grid*
  – create a more efficient grid
  – partner with customers, regulators and fellow utilities to achieve the obvious benefits of Smart Grid
Key Takeaways

“The smart grid will only work to the extent that customers win,”
Joseph Rigby, CEO of Pepco Holdings

• Customer Adoption and Participation is a key enabler

• Smart Grid will move at the *Speed of Value*
  – Utilities will still need Regulatory approval for large projects related to Smart Grid
  – Standards and Interoperability are key to preventing stranded assets

• Interoperability and Standardization are not spectator activities.
  – Utilities need to get involved and make their voices heard and be engaged as individual companies and as an industry

• Through the Smart Grid, Utilities will become “Technology” Companies
  – No longer the “best solutions” but rather iterations of “Better Solutions”
  – Similar to Electric System Operations, Communication Network Operations and enhanced Cyber Security will become part of our future DNA

• Legislation should be applied judiciously
  – Standards are hard to change, laws are nearly impossible.
Questions?