

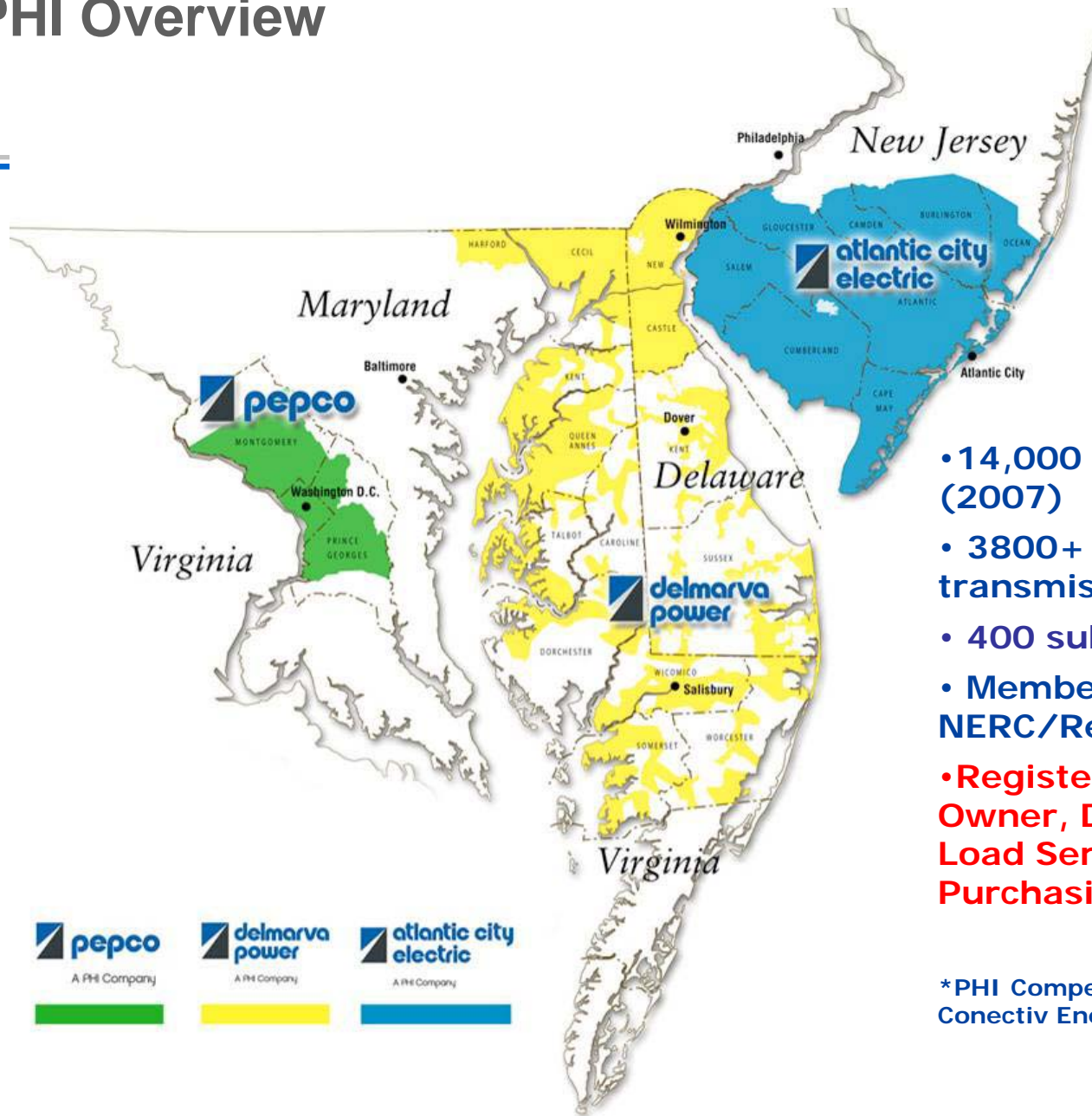
PHI's Plans for Smart Grid



IEEE PES Conference on Innovative
Smart Grid Technologies
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David Velazquez
Executive Vice President
PHI Power Delivery

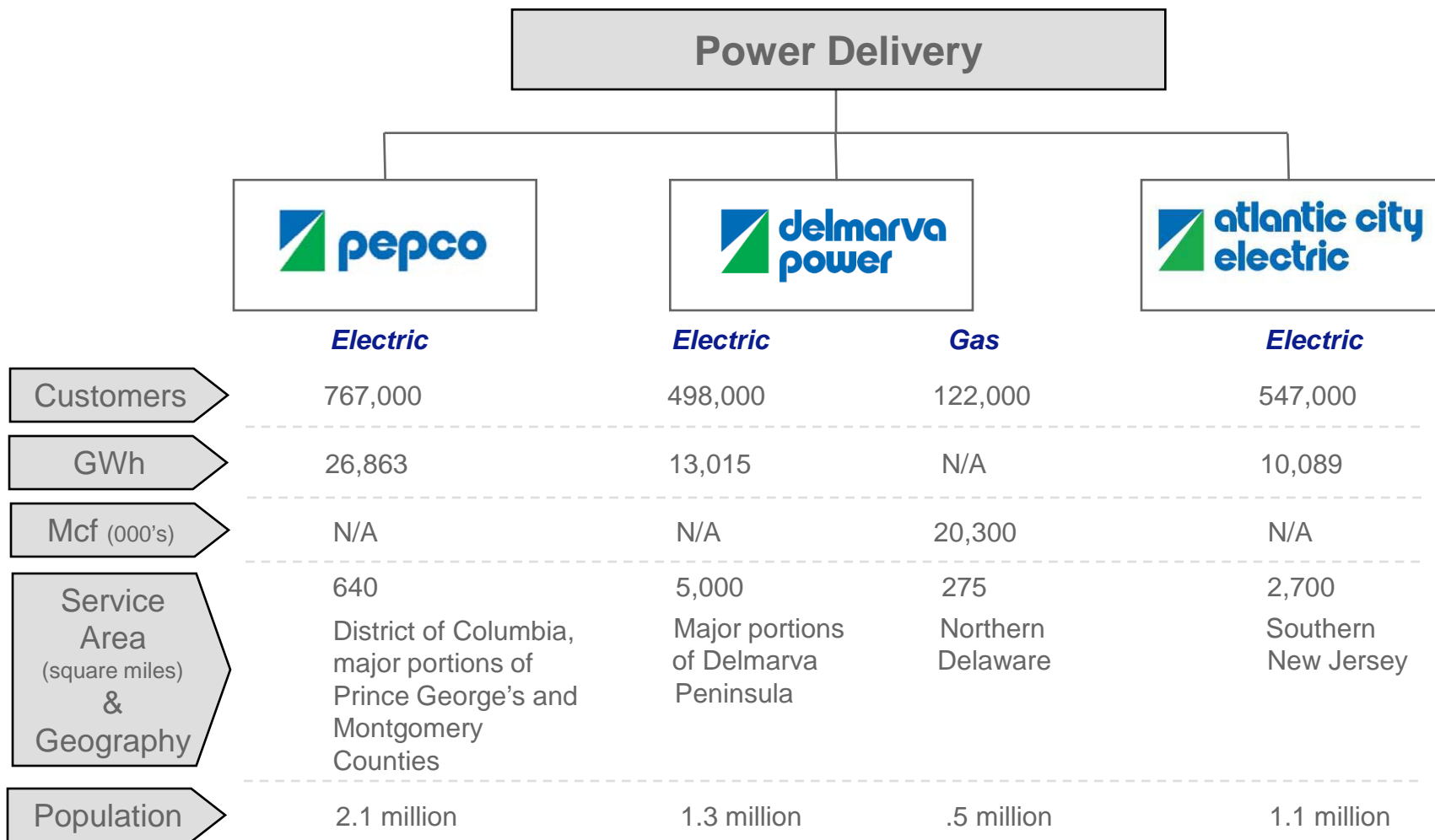
PHI Overview



- 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



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.*

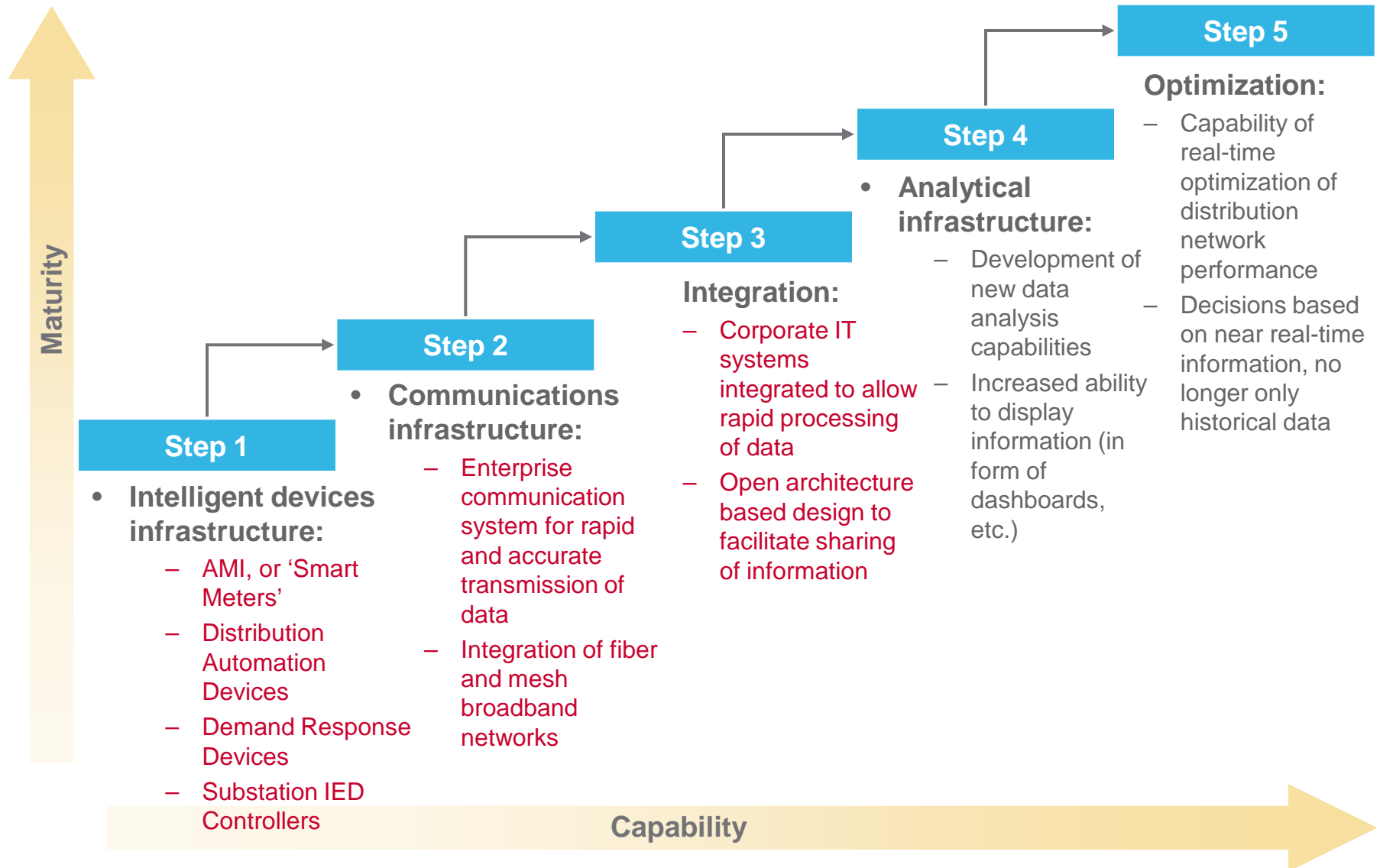
*It will provide the ability for PHI and its customers to take advantage of energy alternatives and **efficiencies**. It will allow the industry and customers to take advantage of **green alternatives**.*

*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...

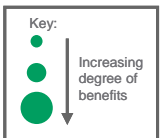
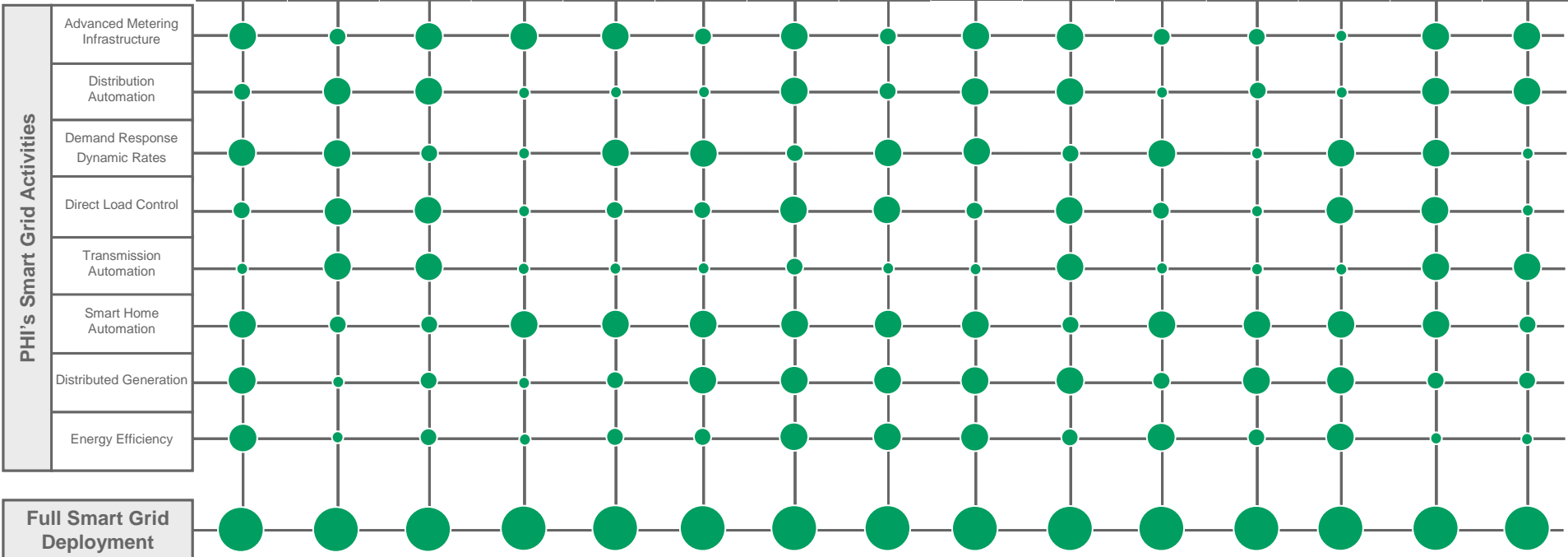


PHI's Smart Grid activities will provide numerous benefits for customers, the economy, the environment and society...

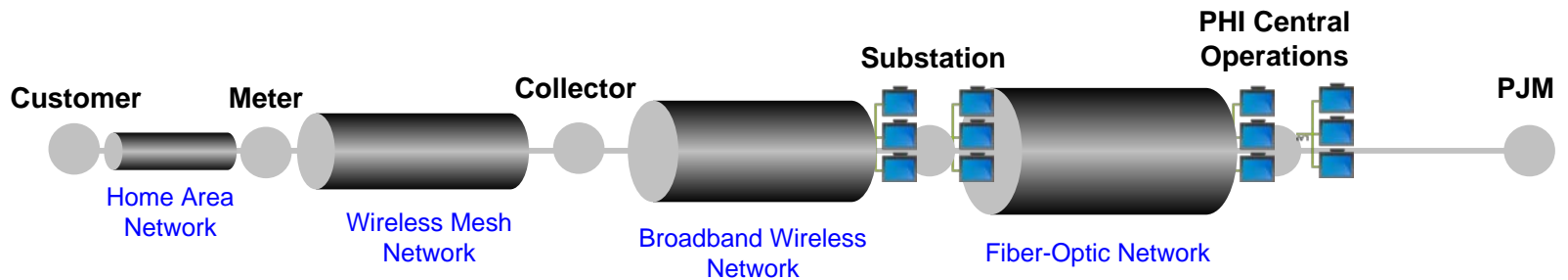
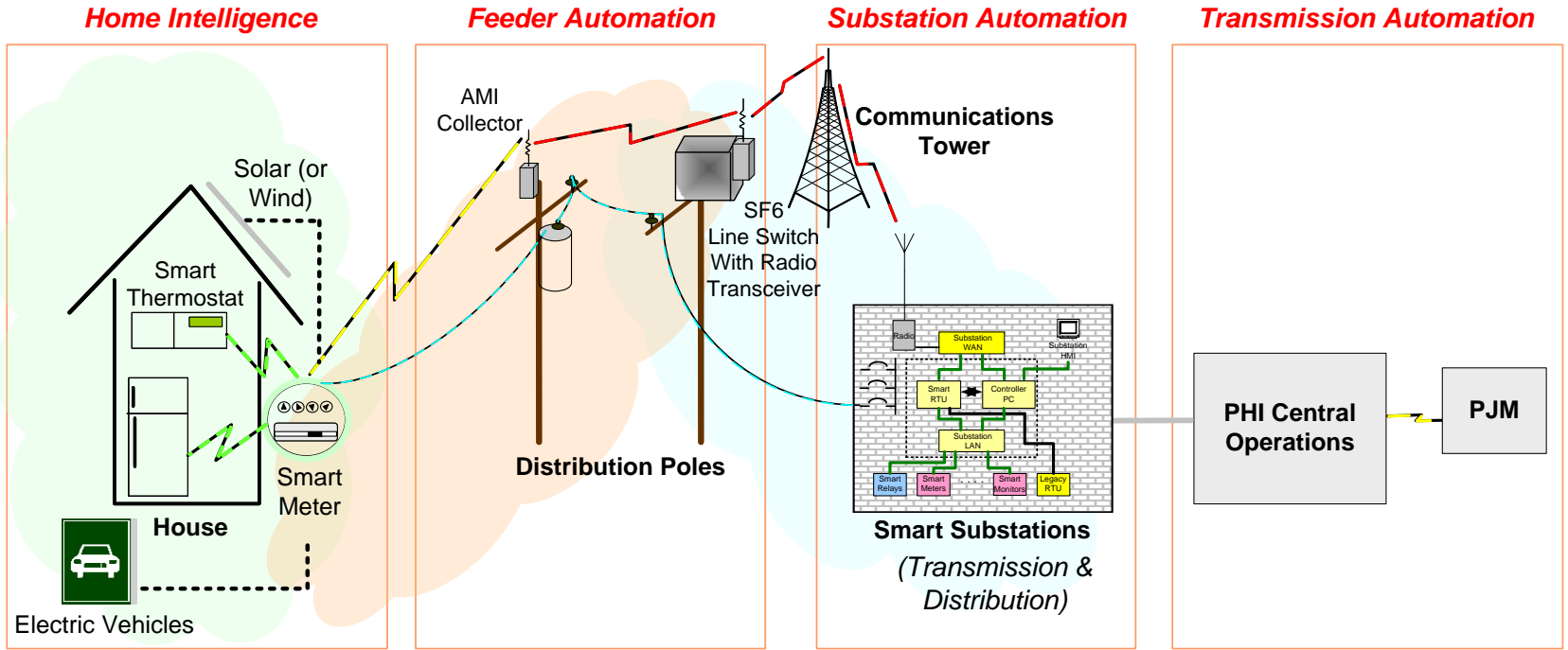


Smart Grid Benefits

Customer Benefits						Economic Growth Benefits				Environmental and Societal Benefits				
Lowers Energy Bills	Improves Reliability	Improves Restoration	Better Billing	Better Energy Info & Control	Greener Options	Create US Jobs	Promote US Energy Independ.	Enables New Markets	High Interoperability	Reduces Energy Usage	Increases Green Energy	Combats Global Warming	Better Planning & Forecasting	Resists Attack



PHI's Smart Grid Domains and Integrated Communications Infrastructure



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



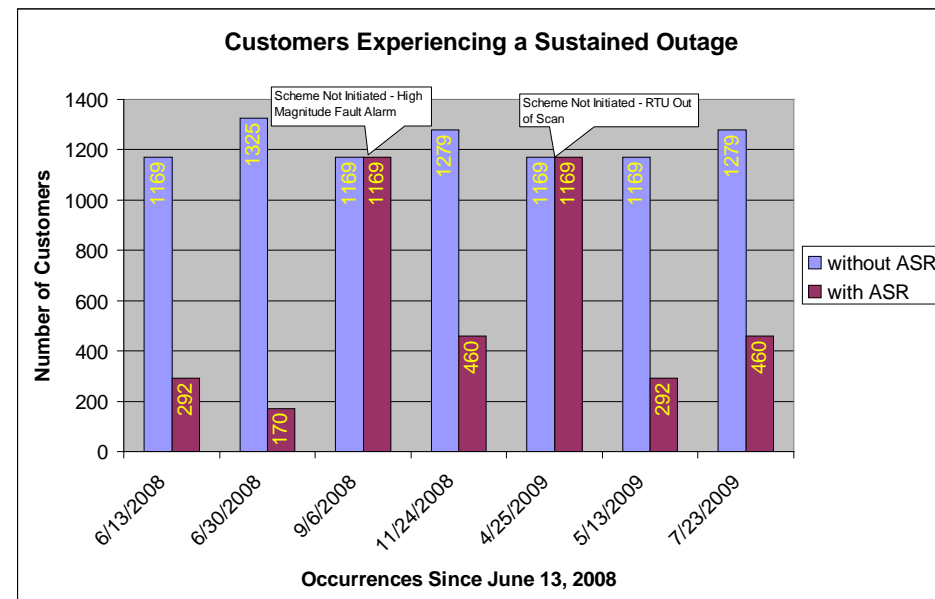
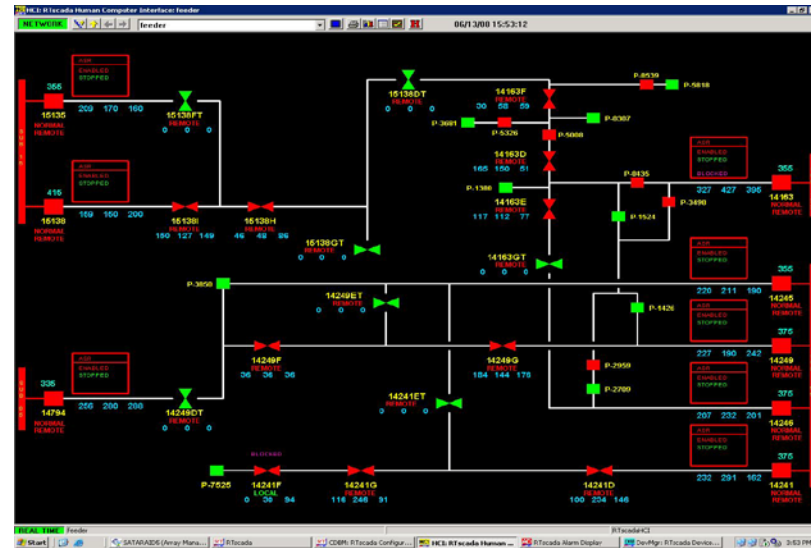
Digital Substations

- 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



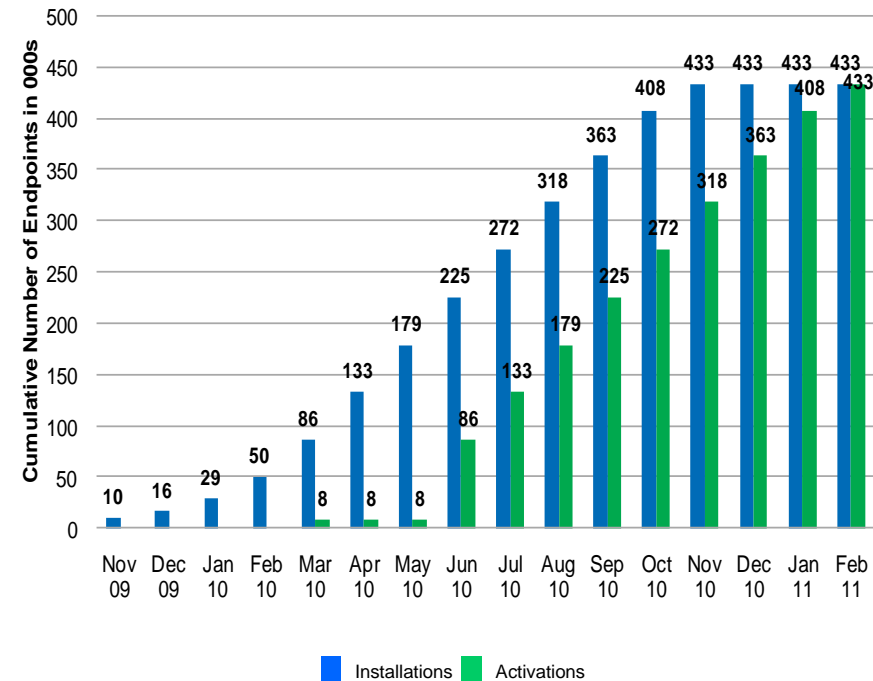
Vendor Selection

- 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



Delaware Deployment – Initial Functionality

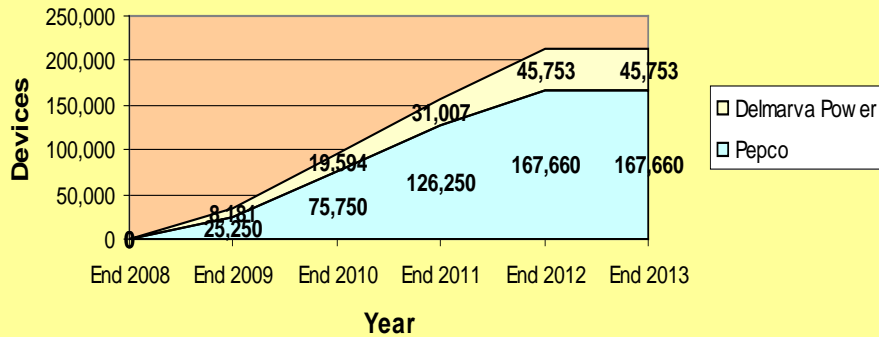
Initially focused on enabling the following operational and customer functionality which are necessary to meet customer expectations as defined by the Blueprint & AMI Business Case filings

- **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

MD DLC

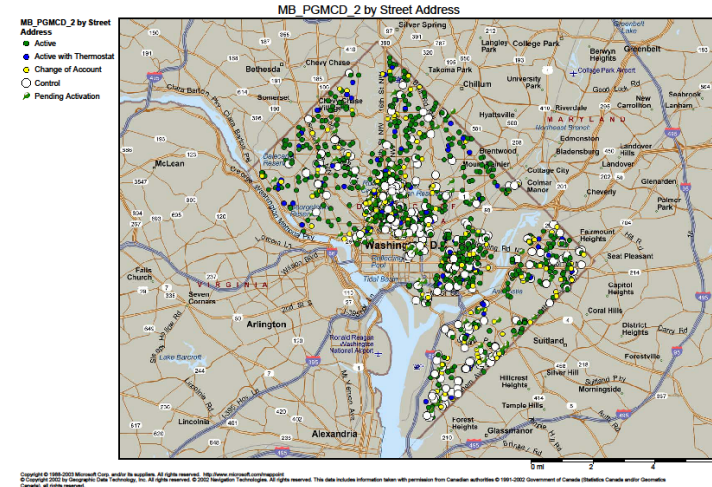
Direct Load Control

Minimum devices required to meet energy reduction goals
(Cumulative)



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

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

Privacy-related efforts/resolutions

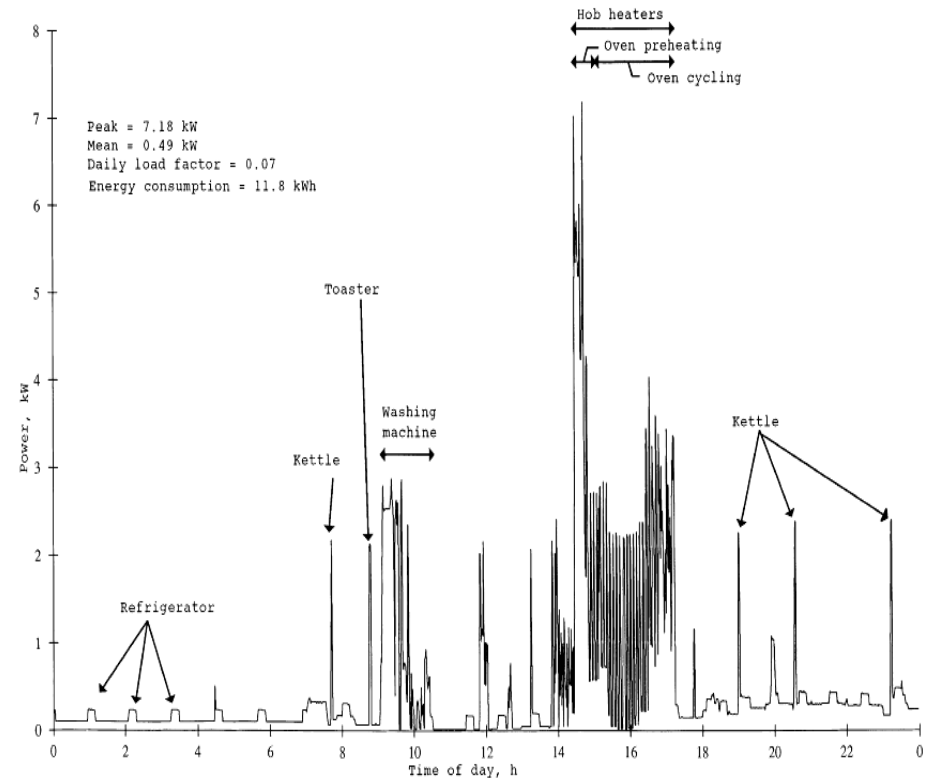
- *There is a delicate balance between Customer privacy and the Utility's need for Operational Data.*
- *Concerns are complicated by the Customer's desire to make data available to third parties.*
- *Customers need to be made equally aware of both opportunities and threats.*
- *Successful resolution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

Identified Smart Grid Privacy Concerns²

1. Identity Theft
2. Determine Personal Behavior Patterns
3. Determine Specific Appliances Used
4. Perform Real-Time Surveillance
5. Reveal Activities Through Residual Data
6. Target Home Invasions
7. Provide Accidental Invasions
8. Activity Censorship
9. Decisions and Actions Based Upon Inaccurate Data
10. Reveal Activities When Used With Data From Other Utilities
11. Profiling
12. Stalking and Domestic Abuse
13. Unwanted Publicity and Embarrassment
14. Tracking Behavior Of Renters/Leasers
15. Behavior Tracking
16. Public Aggregated Searches Revealing Individual Behaviors

² NIST Smart Grid Privacy Subgroup Update for Grid Interop, November 19, 2009

How power use can reveal personal activities¹



¹Elias Leake Quinn, *A Report for the Colorado Public Utilities Commission, Spring 2009*, pg. 3. (citing M. Newborough & P. 3Augood, *Demand-side Management Opportunities for the UK Domestic Sector*, IEEE Proceedings of Generation Transmission and Distribution 146 (3) (1999) 283–293).

Currently NARUC, NIST and EEI have all launched efforts to address privacy-related issues.

Blueprint initiatives are accelerated through DOE funding...

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

Impacts on PHI

- 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

- 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

***“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?

