Smart Grid – What's in it for me? Customer Benefits and Engineering Career Opportunities

UMBC SWE Sept. 23, 2015

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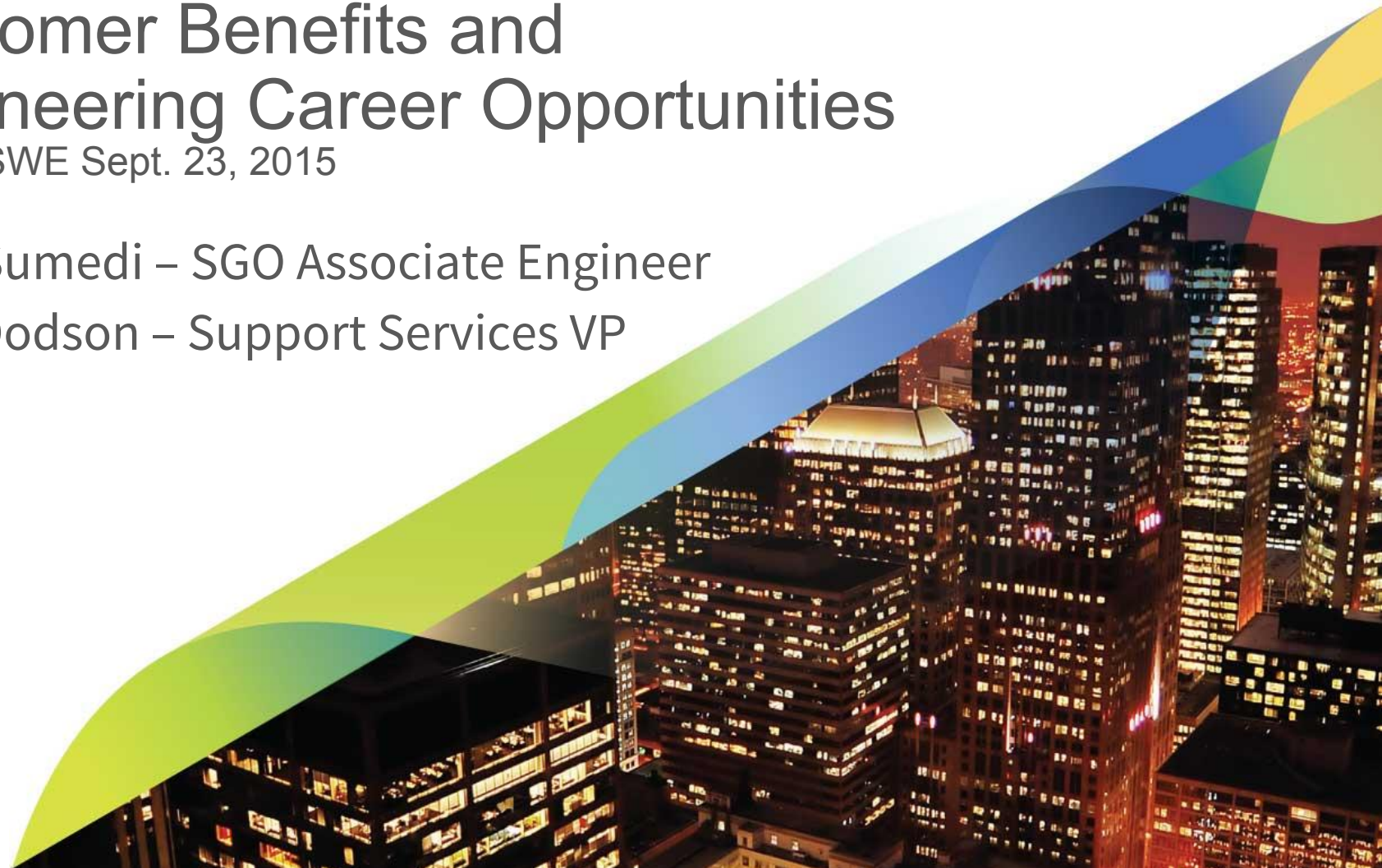

Get to Know the Exelon Family of Companies

Exelon.

Exelon By The Numbers

#1 COMPETITIVE ENERGY PROVIDER IN THE U.S.

1.1 MILLION CONSTELLATION CUSTOMERS

6.6 MILLION UTILITY CUSTOMERS

$79 BILLION IN ASSETS

47 STATES WHERE EXELON OPERATES

ALMOST 35,000 MEGAWATTS OF OWNED POWER GENERATION

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BGE Overview

BGE
An Exelon Company

- BGE and its nearly **3,200 employees** are responsible for maintaining more than **26,000 miles of power lines** that make up the electric transmission/distribution systems and more than **7,100 miles of gas main** .

- BGE provides customer operations for more than **1.9 million customers** across the region. The service territory covers **2,300 mi^2** (approx. 6,000 km^2) in central Maryland.

- BGE is committed to improving electric and gas service reliability for its customers. For nearly **200 years,** BGE has been an innovator in meeting the energy needs of central Maryland residents and businesses.

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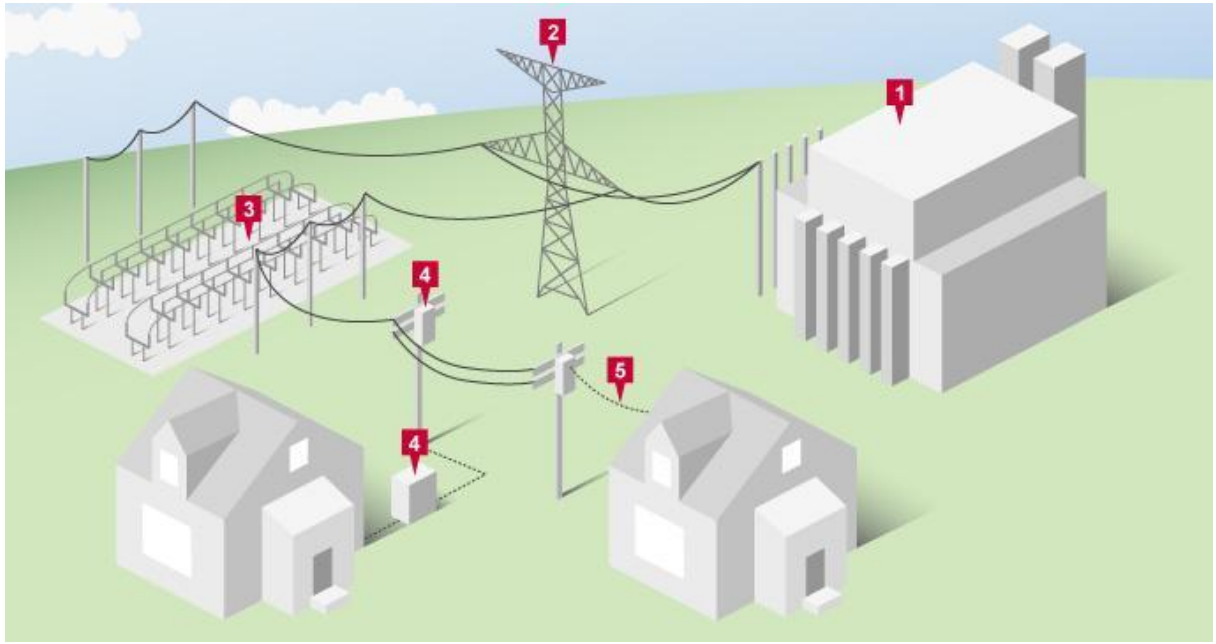
What is Smart Grid?

Electric Power System (Electric Grid)

1. Electricity is generated at one of the many different power plants
2. Electricity travels from the power plant over high-voltage transmission lines to substation
3. At a substation, the electricity voltage is lowered so that it can travel over the distribution system
4. Transformers reduce the electricity voltage even further to an acceptable level for the home or business
5. Service lines carry electricity to the home or business



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What is a Smart Grid?

A **smart grid** is a modernized electrical grid that adds two-way communication to improve the efficiency, reliability, economics, and sustainability of the production and distribution of energy.

What does a Smart Grid do?

Smart Home/Business

- In-premise network composed of smart devices and equipment that respond to the price of energy
- Distributed energy devices to offset usage or sell back into grid

Smart Meters (AMI)

- Time of usage and bi-directional measuring
- Two-way data flow into/out of the premise
- Power on/off status, tamper status and other meter events

Smart Distribution System

- Real-time reporting of status and outages
- Automated controls of relays and reclosers. Efficient field force management
- Effective interconnection of

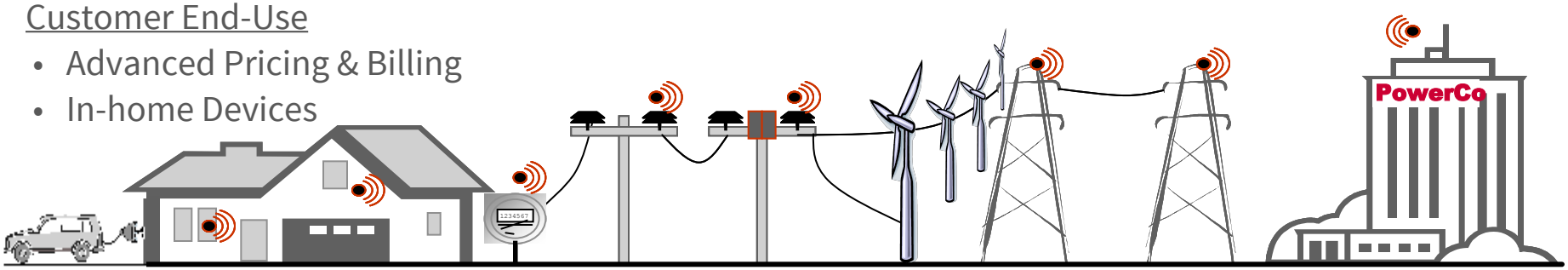
Smart Utility

- More efficient data collection, processing and back office functions
- Asset utilization strategies (PM, CM, run-to-failure)

Leveraging **integrated** communication systems and information processing is critical

<u>Customer End-Use</u>

- Advanced Pricing & Billing
- In-home Devices



<u>Distributed Energy</u>

- Plug-in Hybrid Electric Vehicles
- Self-generation

<u>Customer Gateway</u>

- Advanced Metering Infrastructure (AMI)

<u>Grid Modernization</u>

- Distribution Automation
- Smart Substations
- Renewable Interconnection

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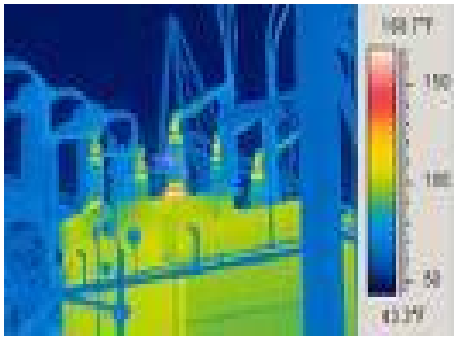
Upgraded Technology

Smart Grid Electric System Upgrades include the following programs:

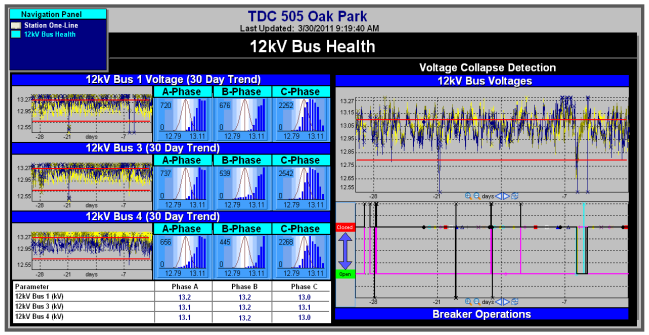
- Substation micro-processor relay upgrades
- Distribution automation
- Smart meters
- Associated cyber secure data communications network

Smart Substation Upgrades

Microprocessor Relaying



Asset Health Monitoring



Smart Substations include:

- Modern micro-processor based devices
- Two-way communications between utility control centers and substations
- Technology to remotely monitor substation transformers including temperature, liquid levels, fan and oil pump operation, and combustible gas content

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Distribution Automation (DA)

A DA network is comprised of:

- Smart "sectionalizing" devices that detect and isolate faults as part of a system that will automatically re-route around faulted sections to restore customers
- A system to remotely send control signals and retrieve status of various system parameters (SCADA)
- Computer systems that control, operate, monitor and store the data for the DA system

Conservation Voltage Reduction

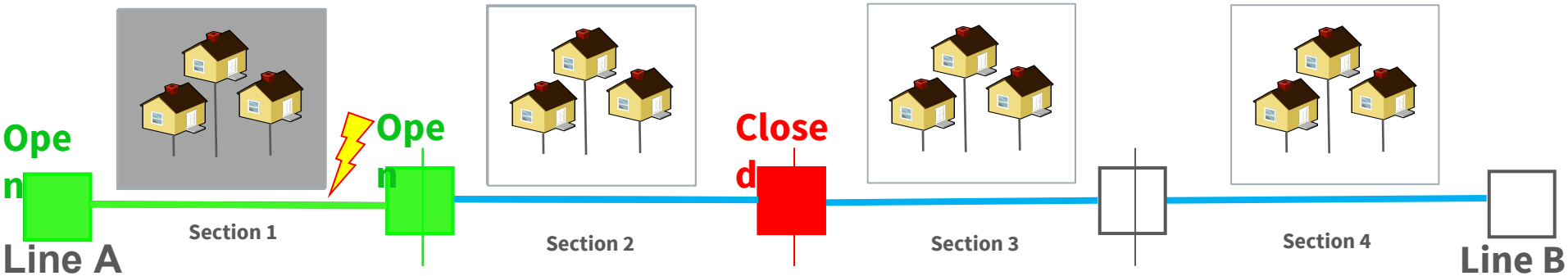
Radio Systems

Circuit Reclosers

Pulse Closing Switches

DA Equipment Basic Operations

Self Healing System – Section 1 Fault:



Normally Closed

Normally Open

Normally Closed

Car Hits Pole

Station Breaker Opens

Customers on Line A are out of Power

Normal Closed Device opens

Normal Open Device Closes

Customers in Section 2 Have Power

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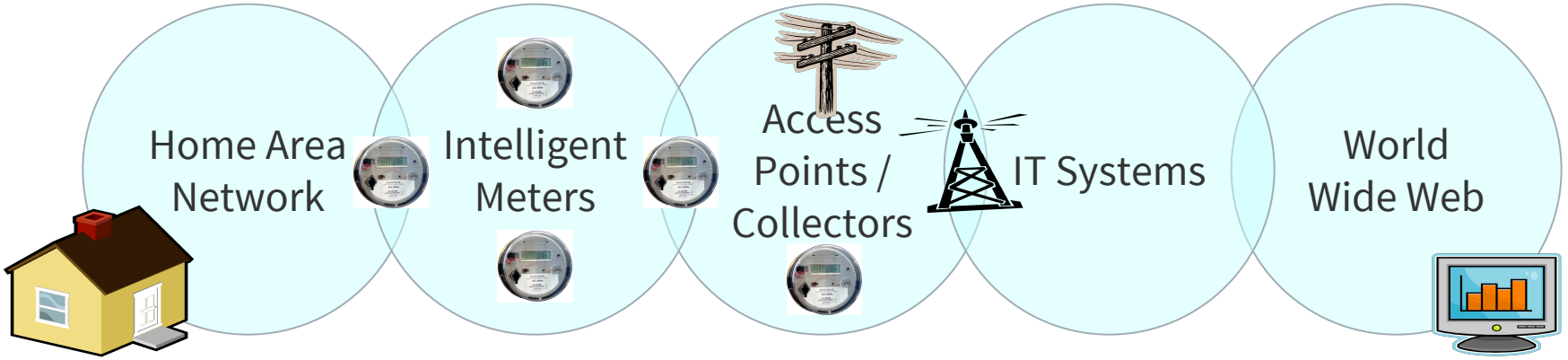
Smart Meter Deployment



The Smart Meter system, including the wireless communication network, provides an infrastructure to support customer services and smart grid applications such as:

- Outage management
- Voltage regulation
- Demand response
- Distributed generation
- Customer applications, such as in-home devices and electric vehicles
- Competitive markets

Benefits

Fewer and shorter outages

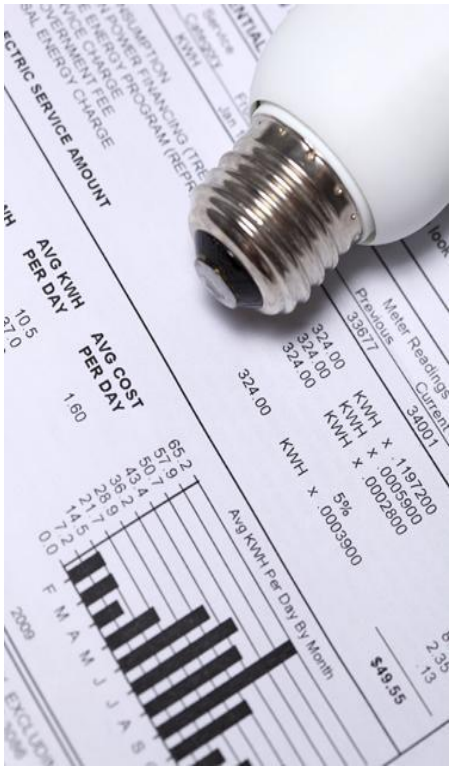
- For example: an estimated 700,000 avoided customer outages per year could save customers $100M annually

Consumer savings, choice and control – customer sat

- With advanced meters, consumers could save on energy costs by:
  - Better managing energy use
  - Using new energy management technologies, such as smart appliances or home area network devices

Peak Time Rebate

- With a Smart Meter customers may opt in to a Peak Time Rebate program



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Engineering Career Opportunities

- Innovative designers –utilities, manufacturers, etc.
- Communications network – security, data storage and usage
- Consumer applications and products

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Stacy Sumedi – Engineering Intern to Associate Engineer

UMBC Alumni – Mechanical Engineering ’15

Vice President UMBC SWE 2014-2015

- **Eng. Intern - Gas Distribution and Planning**
  - Support engineers with…
    - Data analysis
    - Corrosion Protection
    - Construction of visual displays
      - Communication is important!
  - Explore all realms of BGE
    - Met with various managers
    - Tours of BGE plants
    - See action in the field first hand!
- **Associate Engineer – Smart Grid Operations**
  - AMI No Read DB Analysis
  - MDM Outage WQ Analysis
  - Engineering Rotational Program

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Carol Dodson – VP Support Services

Come see Exelon at the 2015 Fall Career and Internship Fair!

Wednesday, October 14
11:30 am – 3:30 pm @ RAC

We are seeking 2016 Summer interns from majors including:

- Mechanical Engineering
- Computer Engineering
- Electrical Engineering