More Effective Energy Use In Our Region

MARAMA
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Energy Market Prices Are Again Accelerating Change in US Energy Use

Price per million BTU of energy

- Gas Commodity Cost, per dt
- #2 Oil Price, per MMBTU
- Propane Price, per MMBTU
- DP&L GCR Price, per dt
- Gas Delivered to City Gate, per dt

California Energy Crisis
Warmest Winter in 112 Yrs
5% Colder than Average Winter
Katrina & Rita

Equivalent Average DP&L Residential Electric Space Heat Rate, July ’08 = $44.72 per million BTU
The Smart Grid will:

- Enable active participation by consumers
  - *think eBay and 2-way electricity flow*
- Accommodate all generation and storage options
  - *plug & play, standards and interoperability needed*
- Enable new products, services and markets
  - *all stakeholders – residential, commercial, industrial, aggregators, etc.*
- Provide cleaner power quality for a digital economy
  - *finds problems, dispatches solutions*
- Optimize distribution equipment utilization and operations
  - *less conservative operation, extended life of components*
- Anticipate and respond to system disturbances
  - *enhanced sensing, disturbance avoidance, automated prevention, containment, and restoration*
- Operate resiliently against attack and natural disaster
  - *including cyber attack*
Combined Service Territory

2007 Key Metrics

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$5,244.2M</td>
</tr>
<tr>
<td>Earnings</td>
<td>$231.8M</td>
</tr>
<tr>
<td>O&amp; M</td>
<td>$655M</td>
</tr>
<tr>
<td>Capital Exp.</td>
<td>$545M</td>
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</table>
Why Would PHI Promote More Effective Use of Energy?

- This country uses more energy than we are willing to produce, making us dependent upon markets where:
  - The national government or major sectors of the local population are hostile to the US
  - Other nations or economic groups are willing to outbid us for the energy we seek
  - We have a pressing need to maintain a high-cost military presence to protect our interests
- Recent research indicates that fossil fuel use at current levels may contribute to global warming in multiple ways
- The economic cost of our present mix of energy is greater than we as a nation, and our service areas, can competitively support
Annual Heating Degree Day History
Wilmington, Delaware  1895-2007
PHI-Wide *Blueprint* Initiative

- “Blueprint” embraces the Smart Grid concept, and will make it a reality in our operating region
- Creates conditions that support not only traditional energy efficiency programs, but also advanced demand response programs and renewable energy
- Creates the ability of customers (any who desire it) to better manage their energy use interactively in real-time
- Improves both electric service reliability and security of the distribution system
DSM is part of the **Blueprint Approach**

**Reality:**
Today, our Local Distribution Companies

- Don’t generate power – only distribute it
- Focus on better management of the
  - distribution system, as well as the
  - energy coursing through it
- Are working to implement new technology to transform how the system serves customers
  - better reliability
  - better system security
- Are looking to provide tools customers can use to manage their own energy
- Are building on what we have, to make it an integrated system, make it better
Demand Side Management Focuses on Changing Actual Energy Needs

Simple Examples
Decoupling

• Traditional electric & gas utility ratemaking is geared towards encouraging growth of sales
  – Rates are set presuming a mix of operating efficiency improvements will be achieved
  – The industry matured decades ago – sales growth is now primarily driven by
    ✓ population growth
    ✓ usage per customer in response to price
  – A large portion of fixed costs are usually recovered in a volumetric rate
  – Fixed costs are growing, and may grow faster than sales
  – Under this approach, it is difficult for a utility to meet its costs of capital with average weather

• Decoupling is rate restructuring, not a rate increase
  – Fixed costs are covered by fixed revenue
  – Variable costs are covered by sales / variable revenue
Decoupling

Under the historical rate structure approach
• High usage customers tend to be charged more than their cost of service
• Low usage customers are often not charged enough to recover the costs to serve them

Significance
• Absent Decoupling, conservation & energy efficiency actions by customers typically cause earnings losses for a utility
• Losses are only ended if the next rate case increases rates to offset losses
• High usage customers will tend to overinvest to capture false savings

Solution
• Restructure rates to eliminate the benefit of the utility doing nothing, allowing recovery of operating costs consistent with the way they are incurred

*Elaboration: Eliminates existing fiduciary conflict of interest in helping customers to cost-effectively achieve greater energy efficiency*
Blueprint DSM Proposals in PHI Service Areas

- Energy Awareness / Public Education Program (DE, MD, DC)
- Solar Program
  - Financing Assistance (NJ, MD)
  - Company Facility Installations
- Renewable Energy Demonstration Program (DC)
- Smart Thermostat / Residential DLC (DE, MD, DC, NJ)
- Comprehensive Residential Energy Savings Pilot (NJ)
- Home Performance / Energy Star (DE, MD, DC)
- Residential HVAC Efficiency (DE, MD, DC)
- Residential Lighting [CFLs at reduced prices] (DE, MD, DC)
- Building commissioning & O&M program (DE, MD, DC, NJ)
- C&I HVAC efficiency (DE, MD, DC)
- Electric motors & lighting program (DE, MD, DC)
- Custom incentives program (DE, MD, DC)
- C&I smart thermostat / DLC (DE, MD, NJ)
- Internet-based PJM market response program (DE, MD, DC, NJ)
- Dynamic pricing of energy with AMI support (DE, MD, DC, NJ)
- Smart Metering / Dynamic Pricing pilot program (DC)
Just Getting Started

Maryland

Decoupling approved May 2008

Compact Fluorescent Light program Nov 2007 – Sep 9, 2008
- interim stage to LED lighting transition
- CFLs -> ~75% less energy vs. incandescent lighting
- LEDs -> ~90% less energy vs. incandescent
- 1,060,000 CFL bulbs sold thru TrueValue, Ace, Home Depot & others
- Using EPA factors => 25 million tons of CO₂ & 80 GWh displaced over bulbs’ lifetime

Direct Load Control Program approved May 2008
- First step to Smart Grid in MD – 2008 to 2012 buildout
- RFP for system development & support going out this week

District of Columbia

Demand Response demo program – real-time / peak pricing & smart meters

Delaware

Decoupling, AMI & Demand Response approved September 16th

New Jersey

Deliberations continue
PHI Blueprint – AMI Technology Overview

AMI System

- Thermostat
- Refrigerator
- Smart Stat / Appliances
- Meter / Gas Module
- Repeater
- Collector
- Public/Private Network
- RF
- Fiber

Central Operations

- Electric / Gas Operations
- MDM
- CIS
- AMI Head End
- Customer Operations

AMI LAN

- HAN
- B (Meter)
- C (Collector)

PHI WAN – Backhaul

PHI HQ
Many of these key components focus on energy efficiency and conservation while improving customer service.
Impact of Making a High SEER Affordable to the Consumer

Residential air conditioning unit replacement impact

- Existing is an 8 SEER unit operating at 5 SEER due to normal performance degradation over unit’s lifetime
- 13 SEER minimum = 13 / 5 improvement
- 21 SEER upgrade = 21 / 5 improvement
- Factor in 30-40% fuel efficiency at power plant and 93% transmission efficiency (generating plant-to-meter)
- Difference? => 13 / (5 x .65 x .93) vs. 21 / (5 x .65 x .93)
  
  overall improvement factor 4.3 vs. 7.0

What is the impact on fuel use? .. emissions? .. heat to atmosphere? .. bill?
US DOE Energy Information Agency
2008 Forecast of Future Energy Use


Accelerated adoption of technology (not shown above) is projected to reduce energy use per person by 7% by 2030.
How Can We Accelerate Results?

• Normal replacement rates on appliances reflect their long lives – new purchases should be as efficient as the customer can afford

• Normal replacement rates on housing reflect very long lives – renovations & upgrades could improve efficiency if cost justified & affordable

• Show customers how to use the tools available to them to be more energy efficient and save $$
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