BGE’s Residential Smart Energy Rewards (SER) Program at NY REV: The Role of Time-Variant Pricing Forum
Baltimore Gas and Electric

- Maryland’s largest utility
- 200 years
- 1st gas utility
- 1.2 million electric
- 650,000 gas
- 31 million MWh
- 7,200 MW
- 3,400 Employees

Exelon
Key Challenges and Opportunities for BGE

- Customers demanding better service reliability
- EmpowerMD Goals – 15% reduction in electric use / customer and in peak demand by 2015 (vs 2007 baseline)
- Growing levels of intermittent, renewable energy on the grid
- Emergence of *Smart Appliances*
- Emergence of plug-in electric vehicles
- Significant investments needed in new and replacement infrastructure
BGE’s Demand Response Programs and Smart Grid Programs

**PeakRewards™**
- Established in 2008
- DR currently available to residential customers with central A/C, electric Heat Pump and/or electric water heater. 1-way Smart t-stat or switch with 50, 75 or 100% cycling options.

**Smart Grid Deployment**
- 2010-2014
- Collecting kW, kWh, voltage, VAR and tampering alerts
- Remote connect / disconnect.
- Conservation Voltage Control

**Smart Energy Manager®**
- Launched October 2012
- Customers with Certified AMI meters can view energy consumption on web portal (BGE.com) or mobile device and learn more ways to save.

**Smart Energy Rewards®**
- Launched July 8, 2013
- Peak Time Rebate program, available to all residential customers who have a Smart Meter installed.
BGE Smart Energy Rewards®

0. Customer Education
   Prior to summer season

1. Call Event
   Based on market conditions

2. Notify Customers
   All residential customers notified via preferred channel (e-mail, phone, SMS, web) within 3 hours

3. Calculate Baselines
   Overnight calculate up to 1.1M baselines in Oracle MDM

4. Customers Take Action!

5. Calculate Rebates
   
   - kWh Reduction \times \$1.25

6. Provide Feedback
   - Savings Summaries provided via preferred channels (e-mail, phone, SMS, web) within 2 days
   - Paper versions provided to maximize engagement

7. Credit Bills

Day before event
Day of event
Day after event
Up to 30 Days after event
The Launch of BGE Smart Energy Rewards®

How it Works: 3 Simple Steps

1. WE’LL NOTIFY YOU
   The day before an Energy Savings Day you’ll receive an alert by phone, email or text.

2. REDUCE YOUR USE
   On Energy Savings Days, use less electricity than usual between 1 pm and 7 pm.

3. EARN REWARDS
   BGE Smart Energy Rewards credits will automatically appear on your next bill.

Savings Tips

TV Spot & Web Video

Segmented/Multi-Phased Customer Education
Providing Customers a Choice

Two ways to save energy and money on Energy Savings Days.

A HANDS-ON WAY
Simply use less electricity by reducing air conditioning use, delaying the use of large appliances or turning off lights to help earn $1.25 for every kilowatt-hour saved.

AN AUTOMATIC WAY
The PeakRewards device installed at your home will be cycled up to 50%, regardless of your chosen cycling participation level. You are guaranteed to receive at least your monthly PeakRewards credit. If you take additional steps to reduce your electricity usage on Energy Savings Days, you could earn additional bill credits of $1.25 for every kilowatt-hour saved.
Customer Notifications Delivered to Customer’s Preferred Channel and Customized by Customer Segment

Email Phone SMS Paper
Immediate Customer Feedback with Personalized Post Event Notifications

“This is a message from BGE. During the Wednesday, July 10th Energy Savings Day, you earned $9.75 for reducing your energy use.”
BGE Smart Energy Rewards® (SER) Results

2013:
- Four Energy Savings Days on 7/10, 7/17, 7/18 and 9/11
- 315,000 residential customers eligible
- 75% to 93% of customers earned a rebate
- Customer rebates generally about $8.00 to $11.00 / event
- LIHEAP non-PeakRewards – 6.73 kWh per event savings
- Non-LIHEAP & non-PeakRewards – 7.34 kWh per event savings

2014 (The summer that failed to show):
- Two Energy Savings Days on 7/23 & 9/5
- 867,000 residential customers eligible
- 76% average participation
- $6.55 average rebate
- LIHEAP non-PeakRewards – 4.82 kWh savings per event
- Non-LIHEAP non-PeakRewards – 5.26 kWh savings per event
Customers are motivated and see the value

Two-thirds to three-quarters of survey respondents feel motivated by and value the SER program communications.

Motivation
- Felt Motivated: 71%
- Felt efforts were effective: 65%

Value
- Important to change behavior: 71%
- Important for community: 81%
- Value communications: 72%

Q.24: Statement Agreements, 5-pt. scale
BGE Smart Energy Manager® (SEM) Behavioral Energy Efficiency Program

Interactive Online Tools
Compare past bills, track your use over time, find money-saving tips, and more.

Home Energy Reports
Better understand your use through comparisons to similar homes and savings tips tailored to your home.

Email, Voice, and Text Alerts
Receive alerts if you’re trending toward a bill that is higher than what you typically receive so you can adjust your energy usage.
What’s Next:
PeakRewards two-way thermostat Pilot

Objectives:

- Ensure the two-way thermostats chosen for the pilot can be integrated with existing BGE systems to deliver demand response capabilities for residential customers
- Determine if there are additional peak demand reductions under SER
- Determine if there are additional energy efficiency savings
- Determine if there is increased customer satisfaction with a smart thermostat

<table>
<thead>
<tr>
<th>Customer Segment</th>
<th>Customer Count/Thermostat</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Participants</td>
<td>1,000 customers w/Honeywell 9000</td>
</tr>
<tr>
<td>Upgrade Current Participants</td>
<td>500 customers w/Honeywell 9000</td>
</tr>
<tr>
<td></td>
<td>1,000 customers w/ecobee Smart Si</td>
</tr>
<tr>
<td>BYOT</td>
<td>100 customers w/ecobee Smart Si</td>
</tr>
</tbody>
</table>
2008 – 2011 SER Pilot Overview
BGE Planned Smart Energy Pricing Based on Feedback

- BGE decided to offer Peak Time Rebates as well as Dynamic Peak Pricing (DPP a.k.a. CPP) beginning in June 2008
  - 1,021 randomly selected customers from the entire BGE service territory; about 90% of customers contacted agreed to participate
  - Day ahead notification of a peak event
  - Test groups included
    - Price incentive only
    - Price incentive with in-home display (Orb)
    - Price incentive with direct load control and Orb
  - Advanced meters were provided to collect 15-minute interval data
**Smart Energy Pricing Pilot Design 2008**

<table>
<thead>
<tr>
<th>Group</th>
<th>Total</th>
<th>PTR Low Rebate</th>
<th>PTR High Rebate</th>
<th>Dynamic Peak Pricing</th>
<th>Control Group</th>
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</thead>
<tbody>
<tr>
<td>Without Enabling Technology</td>
<td>675</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>300</td>
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<tr>
<td>With Orb Technology</td>
<td>250</td>
<td>125</td>
<td>125</td>
<td>0</td>
<td>0</td>
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<tr>
<td>With Orb and AC Switch Technologies</td>
<td>375</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>0</td>
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<tr>
<td>Total</td>
<td>1300</td>
<td>375</td>
<td>375</td>
<td>250</td>
<td>300</td>
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</table>

**BGE’s SEP Pilot: 1,300 accounts, a statistically significant sample**
Dynamic Peak Pricing (DPP aka CPP) Weekdays (excluding Holidays)

Pilot Pricing
All – in Rate*

Critical Peak
$1.30425
Peak
$0.14425
Off-Peak
$0.09425

* Includes generation, transmission and delivery
Peak Time Rebate: Weekdays (excluding Holidays)

- **A Mirror Image of the DPP Rate**
  - Schedule R summer rates are $0.14 / kWh for all summer hours
  - Up to 12 critical peak days will be called by 6 p.m. the prior day
  - Customers who use less during the critical period (2 – 7 p.m.) on any critical peak day will receive a rebate. Two levels being tested:
    - $1.75/kWh (2008)
    - $1.16/kWh (2008)
Deployment: Customer Communication Is Key

To review your enrollment for the 2010 pilot, call the Smart Energy Pricing Team at 1-888-570-7470 Monday – Friday 8 a.m. to 6 p.m. or Saturday 8 a.m. to 4 p.m. or email us at smartenergypricing@bge.com. The Smart Energy Pricing Pilot has a limited number of spaces available for participants. To improve your chances for enrollment, please call or email by March 18, 2010.

We thank you for your earlier participation and look forward to helping you save money and energy during the 2010 pilot.

Sincerely,

Joseph A. Saur
Smart Energy Pricing, Project Manager

Dear BGE Customer,

The Smart Energy Pricing (SEP) Pilot Program will continue beginning June 1 and once again, you’re invited to participate. Last year, the program received praise from numerous participants who saved on their electricity bill. The average participant’s saving totaled over $100 for the four-month program. Because of the overwhelming success, we have decided to continue the program in 2010, providing additional opportunities to save money.
We Sent Customized Welcome Packages

Each treatment group received different materials describing the pricing and technologies for that group.
Dear Customer,

Thank you for participating in the BGE Smart Energy Pricing (SEP) pilot program. Your continued participation confirms that there is indeed a high interest in exploring innovative, energy and money saving programs. This welcome packet will provide you with important information, including:

- 2010 Smart Energy Pricing Pilot Program Overview
- Smart Energy Pricing Savings
- Year Round Energy Saving Tips
- BGE Smart Energy Savers Program Overview
- Smart Energy Pricing FAQs

If you have questions about the content of this package, please call our Smart Energy Pricing Team at: 1-888-670-7470, Monday – Friday from 8 a.m. to 8 p.m., or Saturday from 8 a.m. to 4 p.m.

At the end of this summer, you will be invited again to participate in a survey to evaluate your experience with the pilot program. This valuable feedback will help us measure the success of this program and provide us with information for possible future expansion.

We look forward to another summer season!

Sincerely,

Joseph A. Baer
Project Manager, Smart Energy Pricing

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We thanked our customers and provided tips for saving. We provided contact information for our Call Center and supplemented the Call Center with our Hotline.
We Provided Sample BGE Bills Showing Rebates

“This is the 2nd year that I have participated in the Smart Energy Pricing program and I really enjoy the savings!!!

Verbatim from Catherine, Sykesville
Peak Time Rebate Savings Reports Were Sent Soon after Each Event

Timely feedback on meaningful savings is essential to a successful PTR program.

Pilot customers received reports in distinctive envelopes that did not resemble a BGE bill. This reinforced the value of the program with positive feedback, and provided additional tips for saving.

### BGE

**Smart Energy Pricing**

**Savings Summary**

<table>
<thead>
<tr>
<th>Critical Peak Day</th>
<th>Electricity Use Reduction</th>
<th>Rebate Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep 23- Sep 30</td>
<td>73%</td>
<td>$30.00</td>
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</table>

**Savings History**

<table>
<thead>
<tr>
<th></th>
<th>Typical Use 2pm-7pm</th>
<th>Actual Use 2pm-7pm</th>
<th>Savings</th>
<th>Rebate Rate</th>
<th>Rebate</th>
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</thead>
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<tr>
<td></td>
<td>kilowatt hours</td>
<td>kilowatt hours</td>
<td>kilowatt hours</td>
<td></td>
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<tr>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sept 30</td>
<td>16</td>
<td>5</td>
<td>11</td>
<td>$1.25</td>
<td>$13.75</td>
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<tr>
<td>Sept 23</td>
<td>17</td>
<td>4</td>
<td>13</td>
<td>$1.25</td>
<td>$16.25</td>
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<tr>
<td>Sept 4</td>
<td>18</td>
<td>8</td>
<td>10</td>
<td>$1.25</td>
<td>$12.50</td>
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<tr>
<td>Sept 3</td>
<td>18</td>
<td>9</td>
<td>9</td>
<td>$1.25</td>
<td>$11.25</td>
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<tr>
<td>Aug 19</td>
<td>23</td>
<td>5</td>
<td>18</td>
<td>$1.25</td>
<td>$22.50</td>
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<td>July 29</td>
<td>20</td>
<td>4</td>
<td>16</td>
<td>$1.25</td>
<td>$20.00</td>
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<td>July 22</td>
<td>20</td>
<td>6</td>
<td>14</td>
<td>$1.25</td>
<td>$17.50</td>
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<tr>
<td>July 18</td>
<td>16</td>
<td>4</td>
<td>12</td>
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<td>$15.00</td>
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<td>July 17</td>
<td>16</td>
<td>3</td>
<td>13</td>
<td>$1.25</td>
<td>$16.25</td>
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<td>July 16</td>
<td>16</td>
<td>14</td>
<td>2</td>
<td>$1.25</td>
<td>$2.50</td>
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<td>June 27</td>
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<td>5</td>
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<td>June 10</td>
<td>15</td>
<td>7</td>
<td>8</td>
<td>$1.25</td>
<td>$10.00</td>
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</table>

**Total Savings**

| 137 | $171.25 |

**Tip:** Take advantage of pleasant weather

Save electricity - take advantage of the warm season and safely grill outdoors

**Tip:** Use natural light when possible

Limit the use of lights, especially during the day.

**Tip:** Be mindful of your quiet gadgets

Make sure to shut down "silent energy users" - computers, scanners, MP3 players.
How did BGE Customers Respond to Smart Energy Pricing?

Demand reductions due to price signals and technology

Actual load shapes for Smart Energy Pricing Pilot on July 17, 2008
How Did BGE Customer Respond to Smart Energy Pricing?

http://www.youtube.com/watch?v=nMiwvFzdDhc
Reasons to Participate in Smart Energy Pricing

- The potential to save money on monthly utility bills continues to be the primary motivation behind customers’ participation in the Smart Energy Pricing Pilot, with selection of this response at 78% in 2008, 84% in 2009 and 75% in 2010.

Q 1. What was the most important reason for your participation in the 2009 Smart Energy Pricing Pilot? (Select one option)
Program Satisfaction

- Satisfaction with the SEP Pilot Program remains consistently high, with over 50% of the participants claiming to be ‘Very Satisfied’ with the pilot program, and nine out of ten participants stating they are at least ‘Satisfied’. Only 1 – 3% were dissatisfied.

Q 2a). On a scale of 1 to 5, where 1 is "Very Dissatisfied" and 5 is "Very Satisfied", please rate your overall experience with the Smart Energy Pricing pilot program.

Mean Score = 4.5
Interest in Future Participation

- Participants in each year’s SEP Pilot Program were overwhelmingly interested in returning to a similar pricing structure the following summer between 97 and 99%.

Q 4. The Smart Energy Pricing Pilot program has ended and all participants who received special rebate credit opportunities have returned to the normal billing structure. Would you be interested in returning to similar billing program structure as you experienced during the 2009 summer pilot program for the summer of 2010? (Select one option)
2008 Demand Response Impact Summary

Comparison of the demand response impact across all SEP treatments (50 hours)
## Summer 2008 Pilot
### Summary of *The Brattle Group* Analysis

<table>
<thead>
<tr>
<th>Program</th>
<th>Number of Participants</th>
<th>Control Group</th>
<th>Participant Peak Reduction</th>
<th>Control Group Average Usage</th>
<th>Average Participant Reduction</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>kW</td>
<td>%</td>
<td>kWh/hour</td>
<td>%</td>
</tr>
<tr>
<td>PTR - $1.16 / kWh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Technology</td>
<td>126</td>
<td>3.19</td>
<td>22.3%</td>
<td>0.71</td>
<td>17.8%</td>
</tr>
<tr>
<td>Orb Technology</td>
<td>141</td>
<td>3.19</td>
<td>26.9%</td>
<td>0.86</td>
<td>23.0%</td>
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<tr>
<td>Orb and Switch Technologies</td>
<td>113</td>
<td>3.19</td>
<td>31.9%</td>
<td>1.02</td>
<td>28.5%</td>
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<tr>
<td>PTR - $1.75 / kWh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>No Technology</td>
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<td>3.19</td>
<td>26.0%</td>
<td>0.83</td>
<td>20.9%</td>
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<tr>
<td>Orb Technology</td>
<td>137</td>
<td>3.19</td>
<td>31.2%</td>
<td>1.00</td>
<td>26.8%</td>
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<tr>
<td>Orb and Switch Technologies</td>
<td>118</td>
<td>3.19</td>
<td>36.8%</td>
<td>1.17</td>
<td>32.9%</td>
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<tr>
<td>Dynamic Peak Pricing</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>No Technology</td>
<td>148</td>
<td>3.19</td>
<td>25.4%</td>
<td>0.81</td>
<td>20.1%</td>
</tr>
<tr>
<td>Orb and Switch Technologies</td>
<td>111</td>
<td>3.19</td>
<td>36.5%</td>
<td>1.16</td>
<td>32.5%</td>
</tr>
</tbody>
</table>

**'SEP Critical Events' are defined as the 10 hottest critical events during the 2008 summer from HE 15:00 to HE 19:00**

**'Peak Demand Savings' are defined as hour ending 17:00, for WTHI of 83.1 degrees**

\[
WTHI = \text{[current day's THI]} \times \frac{10}{14} + \text{[previous day's THI]} \times \frac{3}{14} + \text{[two day's ago THI]} \times \frac{1}{14}
\]

\[
THI_t = 17.5 + 0.55 \times \text{DryBult}_t + 0.2 \times \text{WetBult}_t
\]
## Summary of 2009-2011 Load Impacts

<table>
<thead>
<tr>
<th>Program</th>
<th>Control Group</th>
<th>Participant Peak Reduction</th>
<th>Energy Savings for SEP Critical Events**</th>
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<tr>
<td></td>
<td>kW</td>
<td>%</td>
<td>kW</td>
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<tr>
<td>2009 PTR - $1.5 / kWh</td>
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<td></td>
<td></td>
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<tr>
<td>No Technology</td>
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<td>Orb Technology</td>
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<td>Orb and Switch/T-Stat Technologies</td>
<td>3.12</td>
<td>38.4%</td>
<td>1.20</td>
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<tr>
<td>2010 PTR - $1.25 / kWh</td>
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<td></td>
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<tr>
<td>No Technology</td>
<td>2.93</td>
<td>27.0%</td>
<td>0.79</td>
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<tr>
<td>Switch/T-Stat Technologies</td>
<td>2.93</td>
<td>34.3%</td>
<td>1.00</td>
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<tr>
<td>2011 PTR - $1.25 / kWh</td>
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<td>No Technology</td>
<td>2.92</td>
<td>20.8%</td>
<td>0.61</td>
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<td>Switch/T-Stat Technologies</td>
<td>2.92</td>
<td>26.7%</td>
<td>0.78</td>
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</table>

**SEP Critical Events** are defined as the 10 hottest critical events during the 2009-2011 summer from HE 15:00 to HE 19:00

***'Peak Demand Savings' are defined as hour ending 17:00, for WTHI of 83.4 degrees

WTHI = \[current \text{day}'s \ THI \text{)*(10/14)+ } [\text{previous \ day}'s \ THI \text{)* (3/14)+ } [\text{two \ day's \ ago \ THI} \text{)* (1/14)}

THI = 17.5 + .55*DryBulb + .2*WetBulb
In Conclusion

**DYNAMIC PRICING WORKS**

**IF** IT IS IMPLEMENTED THOUGHTFULLY BY

- Understanding participants’ understanding of energy
- Developing simple program design
- Engaging and educating participants
- Providing robust pricing signals

**THEN**

- Providing timely feedback, showing value to participants
- Obtaining feedback from participants
Questions?

wayne.harbaugh@bge.com