The Center for Neighborhood Technology and its work with the Illinois Smart Grid Initiative

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Remember This From The Super Bowl?
Today’s Dumb Grid
The Smart Grid Tomorrow?

SMART GRID
A vision for the future — a network of integrated microgrids that can monitor and heal itself.

Smart appliances
Can shut off in response to frequency fluctuations.

Demand management
Use can be shifted to off-peak times to save money.

Solar panels

Processors
Execute special protection schemes in microseconds.

Sensors
Detect fluctuations and disturbances, and can signal for areas to be isolated.

Storage
Energy generated at off-peak times could be stored in batteries for later use.

Generators
Energy from small generators and solar panels can reduce overall demand on the grid.

Offices

Wind farm

Houses

Central power plant

Isolated microgrid

Disturbance in the grid

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### How The Electric System Would Change

#### TODAY’s GRID. AND TOMORROW’s.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Today’s Grid</th>
<th>Smart Grid</th>
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<tbody>
<tr>
<td>Enables active participation by consumers</td>
<td>Consumers are uninformed and non-participative with power system</td>
<td>Informed, involved, and active consumers - demand response and distributed energy resources.</td>
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<tr>
<td>Accommodates all generation and storage options</td>
<td>Dominated by central generation - many obstacles exist for distributed energy resources interconnection</td>
<td>Many distributed energy resources with plug-and-play convenience focus on renewables.</td>
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<tr>
<td>Enables new products, services and markets</td>
<td>Limited wholesale markets, not well integrated - limited opportunities for consumers</td>
<td>Mature, well-integrated wholesale markets, growth of new electricity markets for consumers.</td>
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<td>Provides power quality for the digital economy</td>
<td>Focus on outages - slow response to power quality issues</td>
<td>Power quality is a priority with a variety of quality/price options - rapid resolution of issues.</td>
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<tr>
<td>Optimizes assets &amp; operates efficiently</td>
<td>Little integration of operational data with asset management - business process silos</td>
<td>Greatly expanded data acquisition of grid parameters - focus on prevention, minimizing impact to consumers</td>
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<tr>
<td>Anticipates and responds to system disturbances (self-heals)</td>
<td>Responds to prevent further damage - focus is on protecting assets following fault</td>
<td>Automatically detects and responds to problems - focus on prevention, minimizing impact to consumer</td>
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<tr>
<td>Operates resiliently against attack and natural disaster</td>
<td>Vulnerable to malicious acts of terror and natural disasters</td>
<td>Resilient to attack and natural disasters with rapid restoration capabilities.</td>
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http://www.oe.energy.gov/1165.htm
The Meter Has Been One Barrier

- Since before 1900, the best measuring device available...

...Inexpensive, long lasting, but limited
Smart Meters Could Create Consumer Opportunities

- A meter just provides measured information
- The challenge is what do you do with that information?

- Smart Meters + Dumb Rates = A wasted opportunity
- Smart Meters + Smart Rates + Smart Technologies = Value to Consumers, The Electric Grid and the Environment
What Innovations Could Come Next?

Changing people’s behavior and awareness opens them up to interest in

- Innovative information communications systems
- New homes with enabling technology built in
- Grid friendly appliances

PriceLight: Engages Consumers

The home as a generator: Participate in the market

New Technology: Automates efficiency
Early Generations of Technology Often Needs Transformation
Will Google Be The Answer?

![Home Electricity Use Graph]

Note: labels in this graph are demonstrative, and are not part of PowerMeter's current design.

**Analyze:**
Get better information about how you use energy and what you can do to be more efficient.

**Save:**
Reduce your energy bills and carbon footprint by making smart decisions about your energy use.

**Share:**
Strike up a little friendly competition to see how your energy consumption compares to your friends and neighbors.
Community Microgrid
Some Of The Open Issues

• Security
• Standards/Interoperability
• Vaporware
• Who pays
• The role of plug-in hybrid electric vehicles
What’s Happening in Illinois?

Illinois Smart Grid Collaborative

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Illinois Statewide Smart Grid Collaborative
The Reality of Regulatory Timelines

• **2007** ComEd and Ameren file distribution rate cases
• **Summer, 2008** Illinois Smart Grid Initiative workshops
• **Fall, 2008** Illinois Commerce Commission orders ComEd to conduct smart meter pilot and both utilities to undertake two year planning collaborative
• **Winter, 2009** ComEd workshops on pilots; First statewide collaborative meeting
• **Spring, 2009** ComEd soon to file smart meter pilot proposal; Federal stimulus guidelines released
• **Fall, 2009** ComEd starts installation of pilot smart meters
• **Summer, 2010** ComEd smart meter pilot
• **Fall/Winter, 2010** Evaluation of ComEd smart meter pilot; Statewide Collaborative report
• **2011** Regulatory and legislative decisions on larger smart grid deployment?
• Held a series of workshops in 2008 to introduce Illinois stakeholders to the Smart Grid and the regulatory and policy issues surrounding it
• Informal process, not part of any regulatory proceeding
• Final Report recently released, see:
  – www.ilsmartgrid.org
• Current ComEd Smart Meter Pilot and Statewide Collaborative are the result of ICC orders
ISGI Key Findings

• A smart grid can
  – Fundamentally improve reliability and efficiency
  – Can integrate renewable energy on the local level
  – Can empower consumers to take charge of and reduce their electricity bills

• While saving energy and reducing carbon emissions
ISGI Key Findings, cont.

• In order to open the door to new ‘green power’, high-tech business opportunities in communities throughout the state, we need to
  – Increase consumer choice by pairing real-time electricity rates with smart technology
  – Advocate for regulatory rule changes that encourage public and private investment in energy efficient smart grids
ISGI Key Findings, cont.

- A stakeholder-driven definition of the smart grid is necessary. The ISGI Report offers the following working definition:

  “The smart grid combines new digital information technologies with the traditional electric power infrastructure to improve utility operations and to extend greater control to customers. The smart grid includes smart electricity meters that automatically transmit time-of-use prices to consumers and their appliances; electronic sensors and controls that reduce or even eliminate outages; local or “distributed” power generation such as solar powered buildings; and infrastructure improvements that allow consumers to take advantage of plug-in hybrid electric vehicles.”
Key Areas of Ongoing Examination

- Smart grid metrics, planning, monitoring, and evaluation
- Evaluation of smart grid investments from a societal perspective
- Alternative methods of ratemaking for smart grid investment
- Non-utility investment in the electric grid
- Modification of default service pricing
- Effect of statutory renewable resources, demand response and energy efficiency
ISGI Recommendations

• Redefine "procurement" so that investments in increased efficiency, whether through public investment or private action and behavior change - be considered on an equal footing with the purchase of additional kilowatt hours or kilowatts

• Give customers real choice

• Educate consumers
What’s Next

• In 2010 ComEd will install 100 – 200,000 smart meters to test
  – communications system/meters
  – new rates structures
  – in-home/business technologies
  – consumer education/engagement

• Likely partnership with Chicago to apply for stimulus funds

• If the pilot is successful will seek full deployment

• Meanwhile statewide collaborative will review the many aspects of smart grid planning and deployment to develop the business case for the full smart grid
What You Can Do Today
Residential Real-Time Pricing

- 2003-2006 pilot program with ComEd; since 2007 more widely available to ComEd and Ameren customers
- Good demand response (15 to 20% cuts in peak demand)
- Increased energy efficiency
- Bill savings (~10%) and strong customer interest/satisfaction
- Value to a range of customer types
- The next step is to understand how widespread RTP can transform markets
- In Illinois we are exploring if residential RTP will
  - Lower prices for everyone
  - Create meaningful customer choice
  - Develop a platform for technological innovation to encourage conservation and efficiency
For More Information

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