



SmartGridCity™
Colorado PUC Review

May 29, 2008

Smart Grid City - *Boulder, Colo.*

“An international showcase of smart grid possibilities... a comprehensive demonstration of an intelligent grid community”



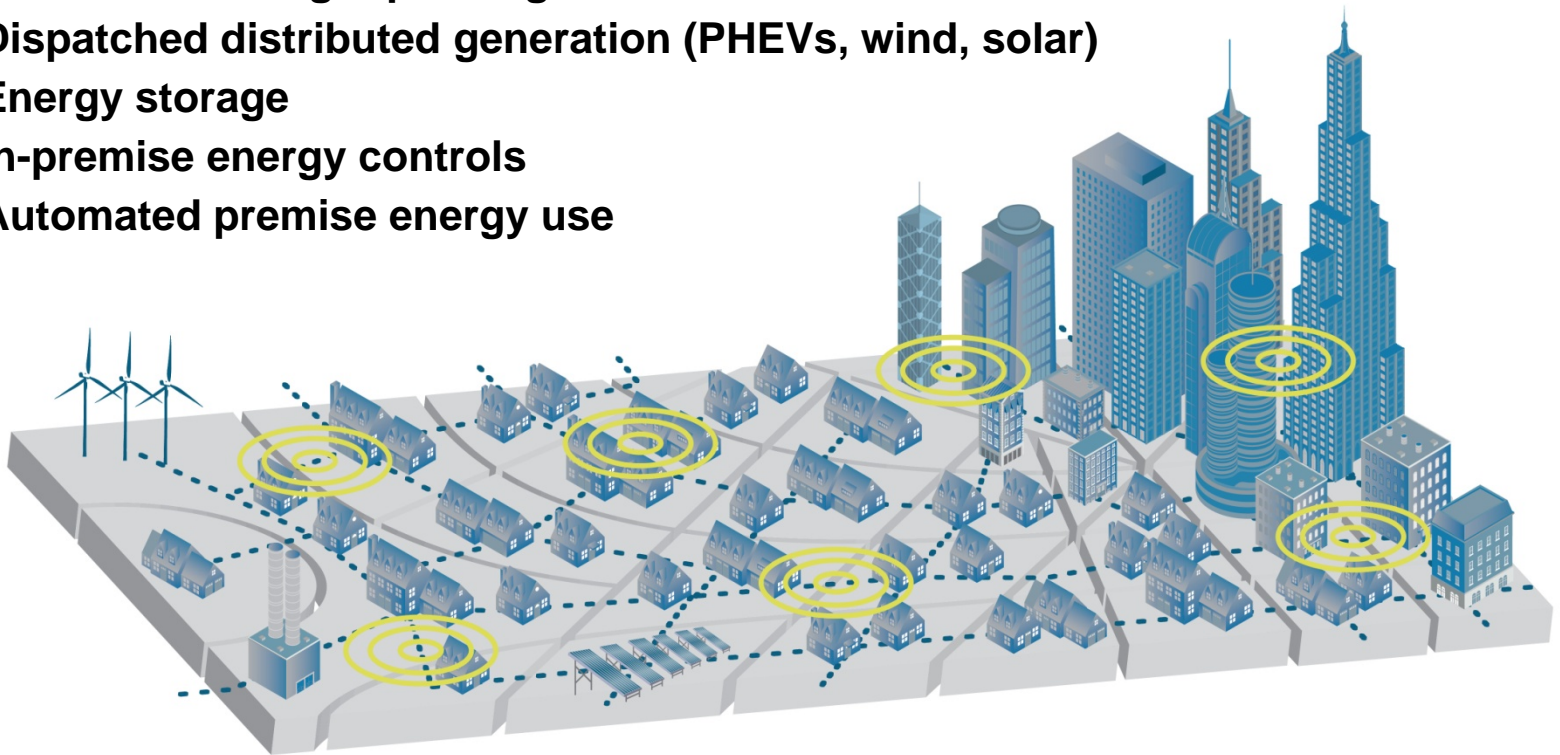
- ▶ **Test technology**
- ▶ **Integrate smart grid portfolio of projects**
- ▶ **Prove benefits**

Boulder's Key Strengths

- ▶ **Ideal size (50,000 customers/meters)**
- ▶ **Ideal geographic location (easy access to needed grid components)**
- ▶ **Ideal Smart Grid consumers:**
 - ▶ Web-savvy, early adopters
 - ▶ Environmentally aware
- ▶ **Collaborative opportunities with:**
 - ▶ University of Colorado
 - ▶ National Center for Atmospheric Research
 - ▶ National Institute of Standards and Technology
 - ▶ City leaders

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- Involves the entire energy pathway from the power source to the premise and all points in between
- Rich in IT
- High-speed, real-time, two-way communications
- Sensors enabling rapid diagnosis and corrections
- Dispatched distributed generation (PHEVs, wind, solar)
- Energy storage
- In-premise energy controls
- Automated premise energy use



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Current Planned Scope

- **Includes majority of Boulder, Colorado territory**
 - Approximately 100k residents
 - Approximately 50k premises
- **Mix of communications technologies**
 - 90% Broadband over Power Line (BPL) enabled (new)
 - Wireless (new)
 - Existing (manual read and drive by)
- **Mix of metering technologies**
 - 25k Smart Meters (15k Phase 1 + 10k opt in)
 - 25k existing Itron or new wireless meter solutions
 - No change to gas meter technology planned

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Current Scope (cont.)

- **Premise Automation**
 - Designed for 10K – 15K of premise automation
 - Minimal real-time utilization & pricing
 - Maximum of generation dispatch and full load control
 - All premises have access to enhanced web portal
 - Bidirectional interval data for all premises
 - Bidirectional demand management and sub-metering for initial automated premises
- **Substation/Feeder Automation**
 - Four substations in initial scope
 - 25 feeders in initial scope
 - Improved switching and asset mgmt

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Current Scope (cont.)

- **Distribution Control Automation**
 - Demand Management (New)
 - Enhancements and integration to existing operational systems (OMS, GIS, MRAS, WMS, MDMS, GIS, Mobile, CRS, Call Center, Web, etc.)
- **Dispatch Enhancement**
 - Real-time power status monitoring and inquiry
 - Work management/dispatch integration
- **Markets**
 - Virtual Power Plant (generation & supply balancing)
 - Signaling to customers
 - Simulation of existing environment

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Anticipated Benefits

- **Business efficiency gains**

- Meter reading
- Outage management
- Asset Management/Life Extension
- Increased Dispatch/Mobile Efficiencies
- Engineering & Planning

- **Reliability gains**

- Accurate Transformer and feeder loading
- Immediate outage notification and improved fault isolation
- Improved Demand Management
- Condition Based Preventative Maintenance

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Anticipated Benefits (cont.)

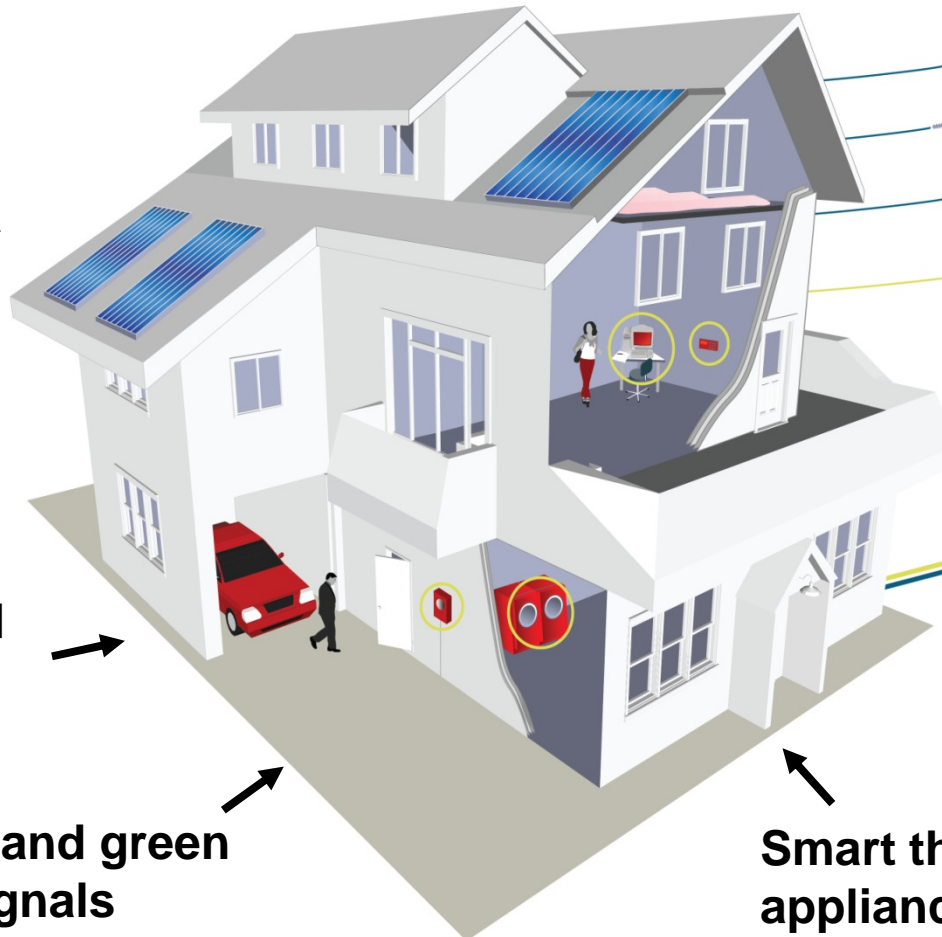
- **Energy Supply**
 - Megawatts (Distributed Generation, load profile control and reduced spinning reserves)
 - Demand Management that controls demand to available supply
- **Asset Earnings**
 - Allows greater variety of tariff models
 - Avoided Asset Investment (ex. Generation/Transmission)
 - Asset life extension and/or TCO reduction
- **Improved Customer Satisfaction**
 - Better positioning for rate cases
 - Enhanced information flow to customers
 - Customers provided with expanded choice model

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Anticipated Benefits (cont.)

- **Environmental**
 - Carbon management capabilities
 - Other emissions that can be valued
- **Other Strategic**
 - Position for future acquisitions through enhanced business model
 - Protection of business position
 - Competitive advantage of first mover
 - Unplanned investment avoidance
 - Industry/standards leadership
 - Influence on rate and regulatory structures

Added green power sources



Plug-in hybrid electric cars

Real-time and green pricing Signals

High-speed, networked connections

Customer interaction with utility

Smart thermostats, appliances and in-home control devices

Smart Premise

Consumer Benefits

- ▶ **Ability to use energy more wisely**
- ▶ **Increased energy efficiency/conservation options**
- ▶ **Lowered carbon footprint**
- ▶ **More reliable service**
- ▶ **Heightened satisfaction**
- ▶ **Save money**

Environmental Benefits

- ▶ **Better use of technology to address climate concerns**
- ▶ **Lowered overall emissions**
- ▶ **Reduce need for peaking plants**
- ▶ **Optimize existing assets**
- ▶ **Easier integration of renewable energy into standard operations**
- ▶ **Speed acceptance of alternative transportation**

Timeline

- ▶ **Partner alignment** completed
- ▶ **City selection** March 2008
- ▶ **Scope and design** End of Q1 2008
- ▶ **Build out** April 2008 - March 2009
- ▶ **Benefit assessment** Q4 2008 – Q4 2009

Conclusion

- ▶ **Xcel Energy believes a horizontal integration for Smart Grid is much more productive and efficient than pursuing independent vertical solutions.**
- ▶ **A horizontal Smart Solution is good for customers and the environment and positions us to expand technology opportunities for the grid.**

For Additional Information

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