



SmartGridCity[™] and Xcel Energy's Vision for a Clean Energy Future

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Overview

- **A Closer Look at SmartGridCity**
 - **Where We Are**
 - **Where We're Heading**
- **Smart Grid's Role in a Clean Energy Future**

What is SmartGridCity?

**A technology pilot to explore smart grid tools
in a real-world setting.**

Operational Efficiency

Reliability

Conservation

Renewable Energy

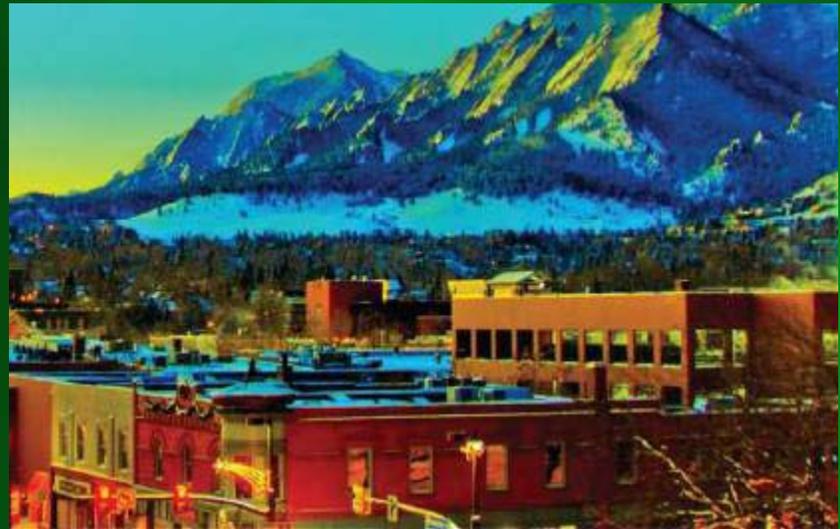
Goals

- Create a test bed
- Build skills and experience
- Prove (or disprove) hypotheses
- Evaluate benefits
- Leverage talent



Site Selection

- Location, location, location!
- Customer base
- Partnerships with national leaders

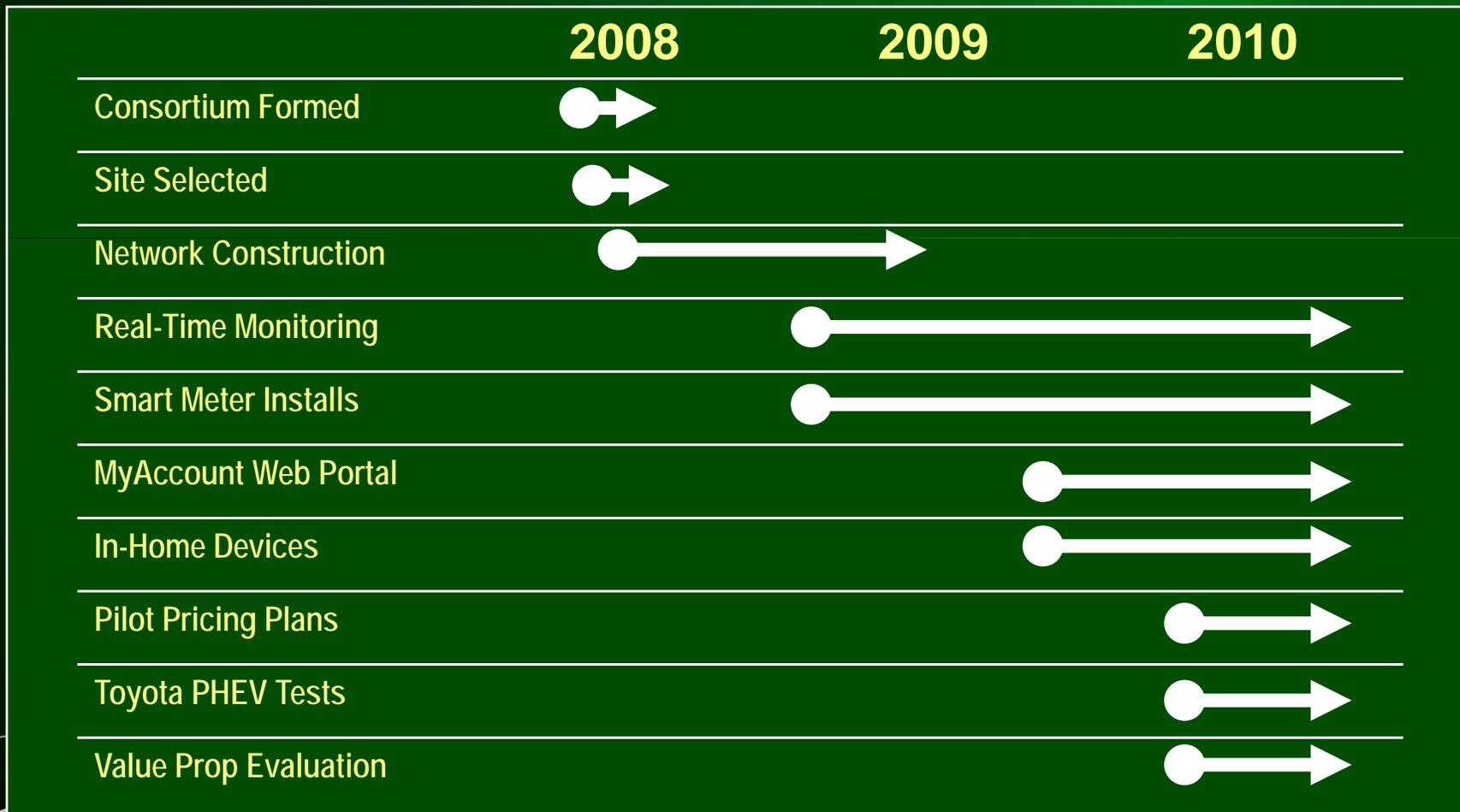


Boulder, Colorado

SmartGridCity Network “Backbone”

- **IT Infrastructure**
 - 20+ applications developed and integrated
 - 95 interfaces to new and legacy systems over two new bus architectures
 - Multiple new security technologies
- **Communication Network**
 - Over 200 miles of fiber optic cable
 - 46,700 premises enabled with broad band over power line (BPL)
- **Automated Substations and Feeders**
 - Four substations automated
 - Four feeders automated and 23 monitored
- **Current and Voltage Sensors**
 - 4,721 transformers monitored
- **Two-way Smart Meters**
 - More than 23,000 installed

Project Development



Real-life Scenario

Transformer Overload

Traditional Process

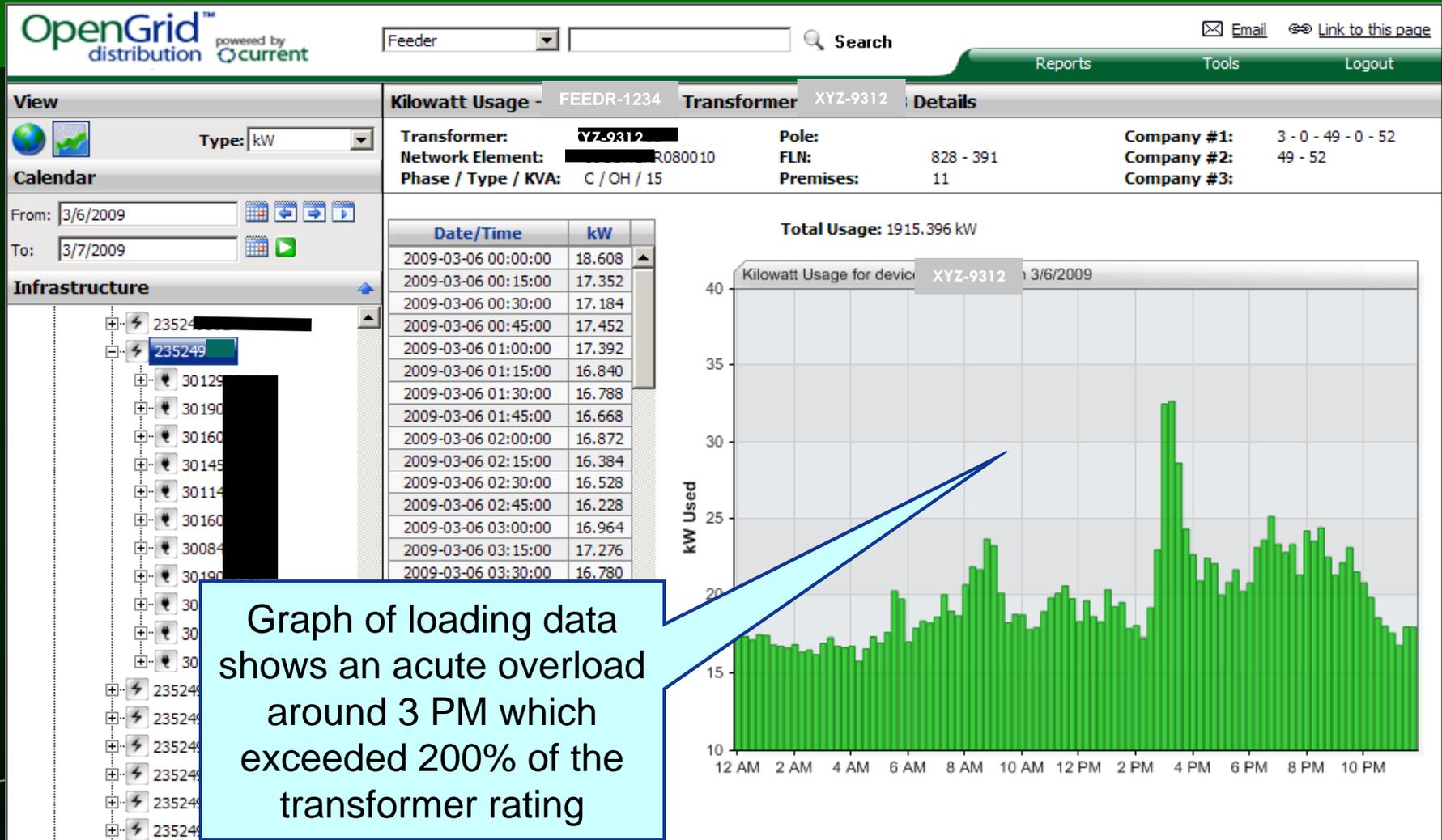
- Trigger → Customer complains about low voltage or flicker during high load conditions
- Area Engineer reviews feeder prints, planning Power Flow
- Area Engineer investigates in field
- Field Crew takes field measurements if necessary
- Field Crew resolves issue
- Customer is called to verify resolution and close complaint

SmartGridCity Process

- Trigger → *OpenGrid*-Distribution notifies Area Engineer of overload
- Area Engineer investigates from office using *OpenGrid* reports
- Field Crew resolves issue

Overload Event – March 12, 2009

Overload



Customer/Utility Benefits

- **Issue resolved before any customer complaints were received**
- **Transformer failure avoided**
- **Unplanned outage avoided**
- **Investigation required fewer personnel and labor hours**
- **Problem corrected during normal business day**

Benefits in Boulder

- Overall improved customer experience
- Heightened operational efficiency
- Avoided outages, reduced outage duration

SMART METERING

- ✓ Provides 15-minute updates on energy use
- ✓ Can be read remotely
- ✓ Finds nested outages
- ✓ Reduces “OK on Arrival” calls
- ✓ Fewer truck rolls

MONITORING

- ✓ Outage avoidance and early detection
- ✓ Shorter and fewer outages Improved maintenance
- ✓ Unpredicted transformer overloads have decreased by more than 90%

POWER VOLTAGE

- ✓ Enhanced power quality
- ✓ Better grid efficiency
- ✓ Customer satisfaction
- ✓ Voltage complaints have been reduced by up to 90%

2010 Plans

- **Maximize customer value and choice**
 - **Additional portal functionality**
 - **In-home energy management**
 - **Advanced Pricing Pilot**
 - **Plug-in Hybrid Electric Vehicles**
- **Data collection and evaluation**

MyAccount Portal



RESPONSIBLE BY NATURE™

> Xcel Energy Home

Welcome,

[Contact Us](#) - [Privacy Policy](#) - [Terms and Conditions](#)

< Choose your account or premises

Settings

Logout

Help

Conservation

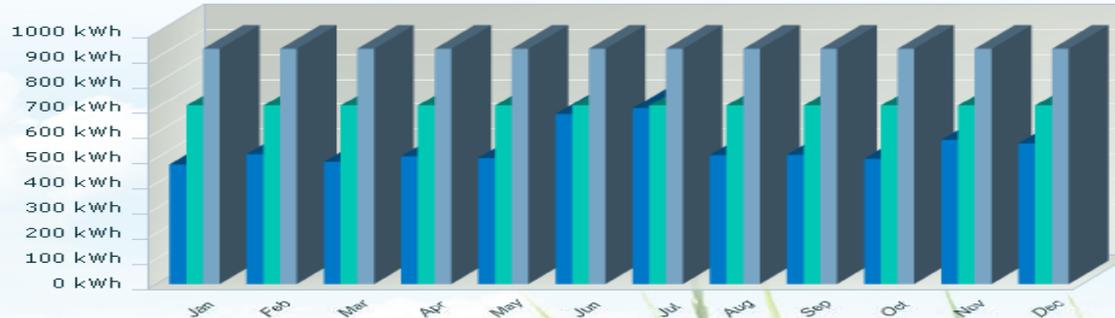
Change Display

How am I Doing?

Conservation Tips

Your Estimated Energy Comparison Chart

The information presented here is an **estimated usage** based on your Home Profile, and is **not using actual usage** information that is available on the Premises Overview page. The comparison is against the Colorado state average and the national average. This functionality is currently available **only to residential customers**.



Your Energy Breakdown (approx.)



N/A Consumption Grade
coming soon

Carbon
3238 lbs

Energy Tips
Learn tips and tricks to save energy

Conservation

Change Display

- Winter Energy Saving Tips
- Energy Saving Tips for Business
- Heating Tips
- Your Life, Our Energy

Programs

Change Display

Program Name	Effective Date

In Home Energy Management

- **1,100 Customers targeted with smart meters**
- **400 Customers outside of SGC**
- **Equipment:**
 - **Two-way programmable thermostat**
 - **Two smart appliance plug-ins**
- **Customers can:**
 - **Control through MyAccount**
 - **Agree to participate in Energy Savings Events**

Proposed Advanced Pricing Pilot

- **Three Custom Pricing Plans:**
 - **Time of Use**
 - **Critical Peak**
 - **Peak Time Rebate**
- **In October 2010, 2,000 customers with smart meters**
 - **Sampling for participants and non-participants in the In-Home Smart Device Pilot**
- **Expanded to 5,000 in March 2011**

Plug-in Hybrid Electric Vehicles

- **Collaboration with Toyota, CU Boulder, NREL**
- **Objectives:**
 - **Consumer behavior and system impacts**
 - **Communications systems and protocols**
 - **Vehicle and battery performance**

Strategy For a Clean Energy Future

Innovation in energy and information technology to deliver environmental benefits and customer value.



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