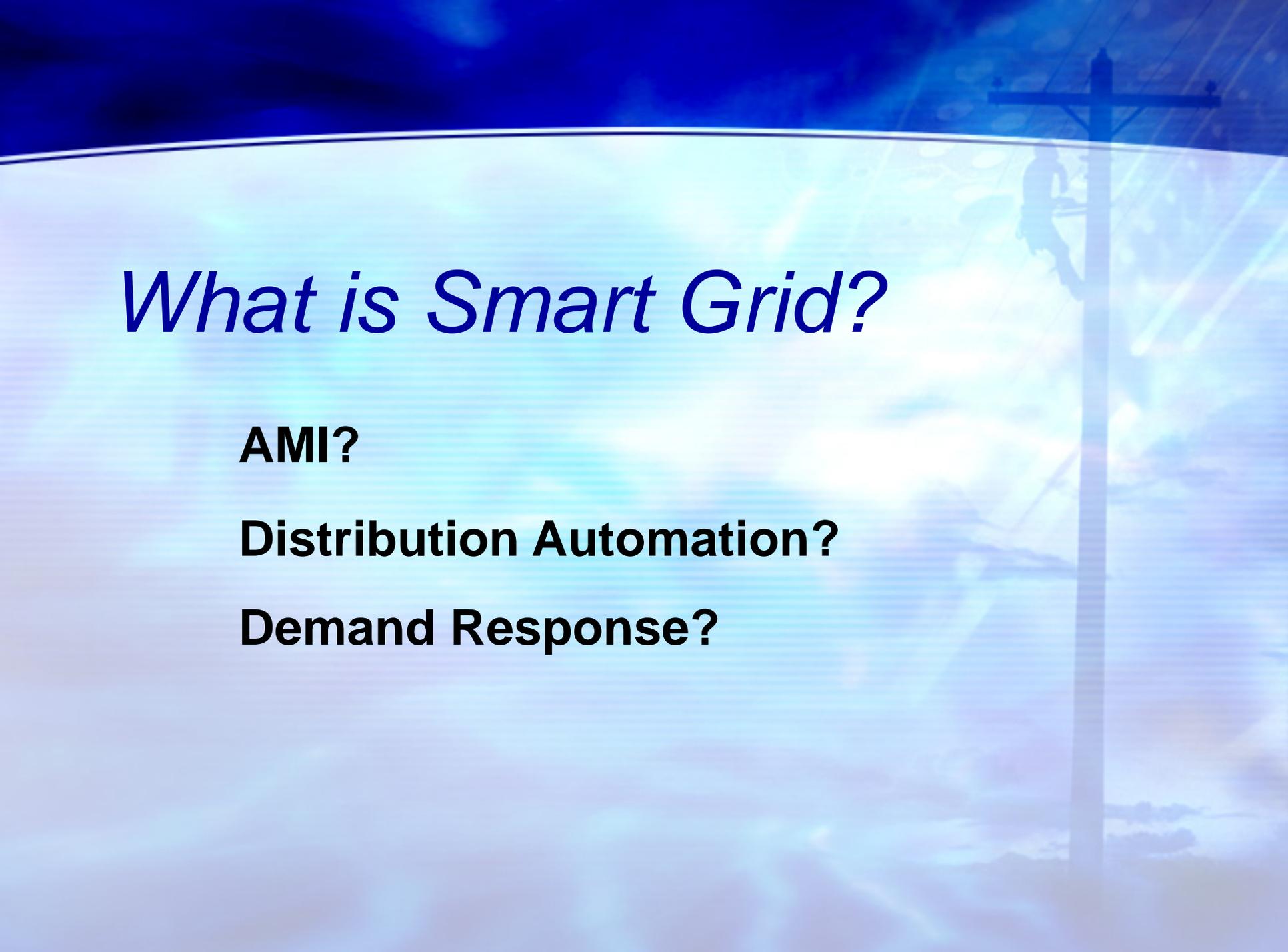


# Xcel Energy's SmartGridCity™



**Minnesota Public Utilities Commission  
March 25<sup>th</sup> 2009**



# *What is Smart Grid?*

**AMI?**

**Distribution Automation?**

**Demand Response?**

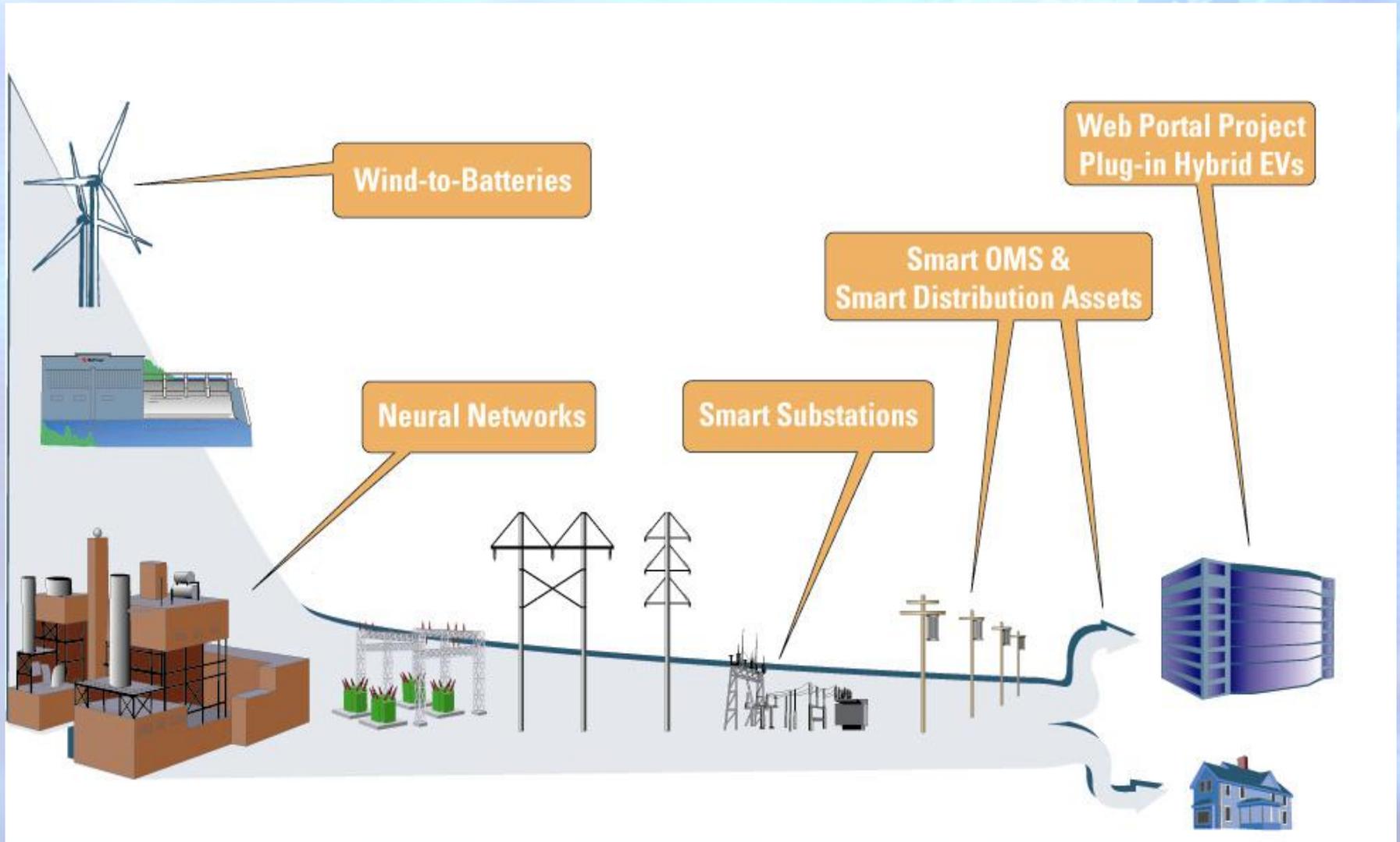


# Vision of Smart Grid City

- **Create a catalytic event: test much more than just smart meters.**
- **Leverage private sector partnerships/ R&D.**
- **Not choose a technology winner in advance. Deploy multiple technologies, rate structures, in-home devices, etc.**
- **Test multiple benefit hypotheses ... not try and predetermine outcomes.**



# SmartGridCity™ – Key Concepts



# Project Status

- **Groundbreaking April, 2008**
- **More than a dozen partners**
- **Scope: City of Boulder 45,000 accounts (38,000 residential)**
- **Substation and Distribution system automation: 45% complete**
- **More than 100 miles of Fiber installed**
- **Hundreds of transformers & switches & re-closers automated**
- **More than 13,000 of 25,000 two-way meters now installed**
- **In-home installations commencing, total scope still expanding**
- **Web-portal Q2 2009**
- **Benchmarking throughout 2009**
- **New Pilot tariffs in 2010?**

# Product Bundles Summary

To achieve the goals of SmartGridCity, varying levels of in-home control are required. Those levels vary from providing information/education to a customer of their energy use and it's impacts on reliability and the environment to providing a customer and Xcel Energy complete control of a customer's energy use.

Product Solution	Product Features	Benefits
<i>Home Energy Manager Basic</i>	Customer Portal (GCP)	Provides secure and private access to dynamic customer website to view energy usage
<i>Home Energy Manager Expanded</i>	Customer Portal (GCP)	Provides secure and private access to dynamic customer website to view energy usage
	2-way Programmable Thermostat	Includes advanced programmable thermostat to regulate heating and cooling in a more efficient way
<i>Home Energy Manager Premium</i>	Options may vary: Load Control Switch/Outlet/Light Switch	Includes options for outlet, light, complete circuit or load control to monitor and manage select circuits
	Customer Portal (GCP)	Provides secure and private access to dynamic customer website to view energy usage
	2-way Programmable Thermostat	Includes advanced programmable thermostat to regulate heating and cooling in a more efficient way
	Options may vary: Load Control Switch/Outlet/Light Switch	Includes options for outlet, light, complete circuit or load control to monitor and manage select circuits
<i>Home Energy Manager Premium</i>	Secure Load Manager	Provides safety mechanism for managing chosen appliances and outlets protection in case of outage.
	Battery Backup	
	Renewable Integration	Provides monitoring of additional alternative energy sources with overall household energy plan

# Sample Benefits to Test

## Immediate

Operations efficiencies

Asset management

Reliability

Improved Data

Customer options

## Probable

Demand response

Energy conservation

Pricing options

Remote connect

Customer control

Confirmation of benefit

Voltage optimization

## Possible

Reduce line loss

V2G – PHEV

Batteries/storage

Reduce reserve

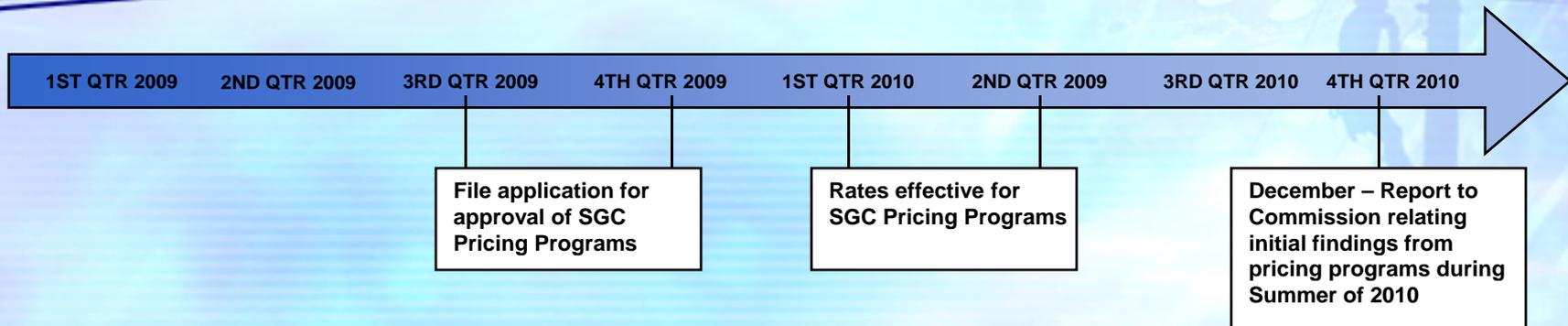
CO2 reduction

Integration of DG

Greater renewables

Green price signals

# Pricing Programs - Timeline



TYPE OF PROGRAM	PROGRAM DESCRIPTION
<b>Time-of-Use with Critical Peak</b>	Similar to our residential pricing pilot program; would be in effect year-round.
<b>Peak Time Rebate</b>	Customers remain on standard tariff except during critical peak periods. They receive a bill credit for reduced consumption.
<b>Variable Peak Pricing</b>	Peak pricing periods consistent with CPP periods. Length of period and price can vary depending on system conditions.
<b>Real-Time Pricing</b>	Customers receive continuously variable prices in “real-time”. (May require bill guarantee for customers.)

# Pricing Programs – Issues/challenges

- **Need to have a significant sample size for the “treatment groups”. Will a voluntary process provide a sufficient sample for all programs?**
- **Goal is peak load shaving. How much fixed cost loss is due to customer reaction to peak prices?**
- **Will need clear communication to customers on the impact of their consumption decisions.**
- **Billing and data analysis.**
- **Designing a carbon intensity measure... and potentially integrating that into a pricing regime.**



<http://smartgridcity.xcelenergy.com/>