North Carolina
and the **Smart Grid**

Advanced Metering and the Smart Grid in North Carolina

April 11, 2011

A world leader

130
global markets

6,800
employees

38
major locations

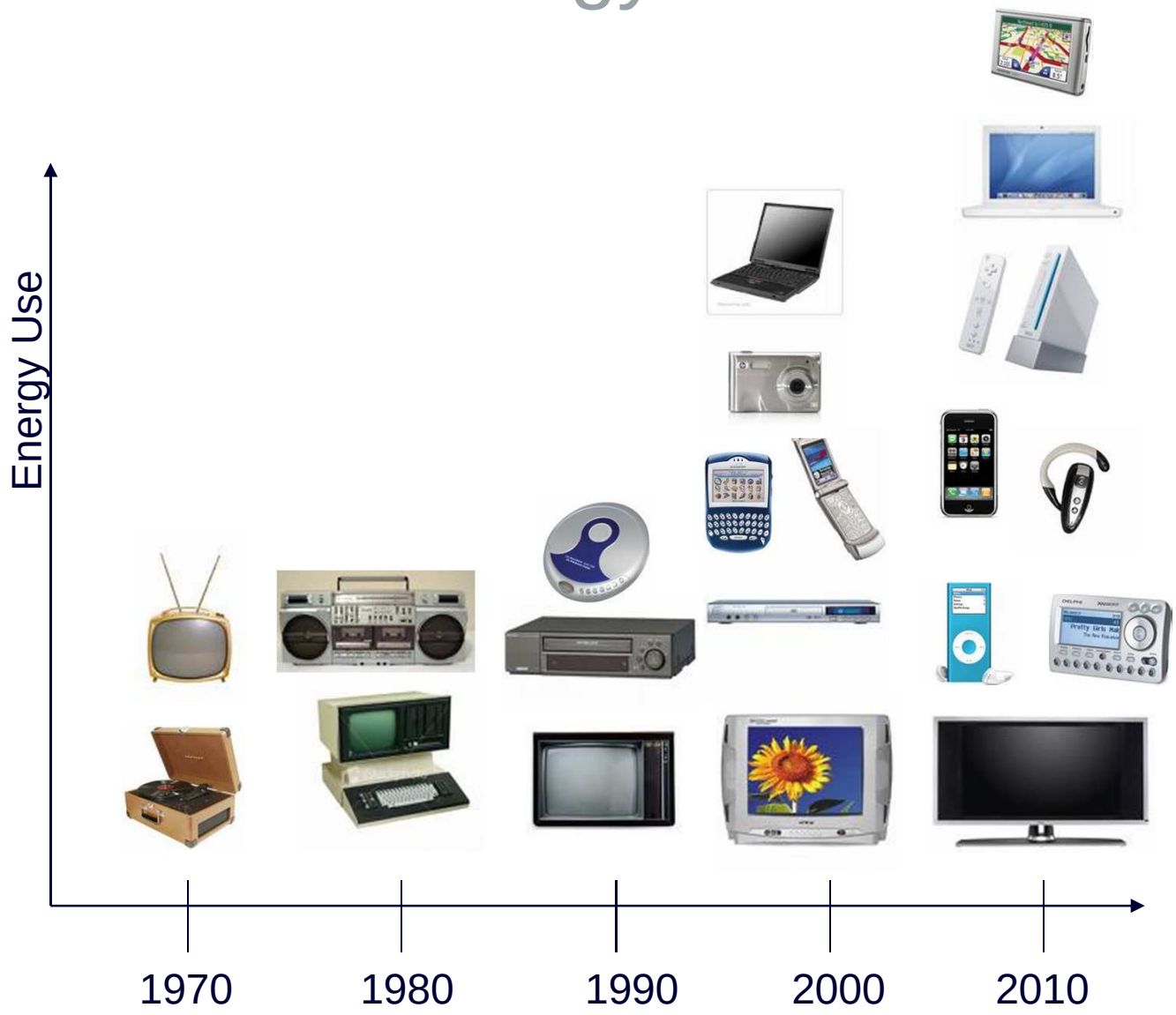
200 million
installations in the last ten years

175 Years
providing utility solutions

- Gas meter plants
- Electricity meter plants
- Water meter plants
- Industrial furnace plants

Elster/Kromschroeder/Instromet (Gas)
American Meter (NA Gas)
Westinghouse/GEC/ABB (Electricity)
Kent (Water)
Coronis (RF) / **PowerOneData** (GPRS)

Consumer Energy Demand



Who are the Customers?

- Utilities
  - Electric
  - Gas
  - Water
  - Combined
- Investor Owned Utilities (“IOUs”)
  - Shareholder-owned, for-profit
- Municipal Utilities (“Munis”)
  - City, county or tribal owned and operated, not-for-profit
- Rural Electric Cooperatives (“Coops”)
  - Member owned, not-for-profit
- Federal Utilities
  - Wholesale only to other utilities
- Joint Action Agencies (“JAAs”)
  - Collection of utilities who purchase energy from other utilities

We are the ultimate customers

Smart Grid Vision

What should a smart grid be?

1. Be able to heal itself
2. Motivate consumers to actively participate in operations of the grid
3. Resist attack
4. Provide higher quality power that will save money wasted from outages
5. Accommodate all generation and storage options
6. Enable electricity markets to flourish
7. Run more efficiently
8. Enable higher penetration of intermittent power generation sources

Source: United States Department of Energy's Modern Grid Initiative report:

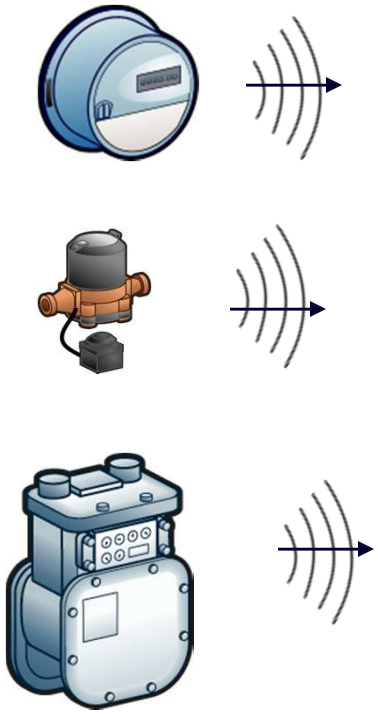
> …robust two-way communications, advanced sensors, and distributed computing technology will improve the efficiency, reliability and safety of power delivery and use. It also opens up the potential for entirely new services or improvements on existing ones
>
> *Source: Utilities Planning Committee EEI*

AMR vs. AMI

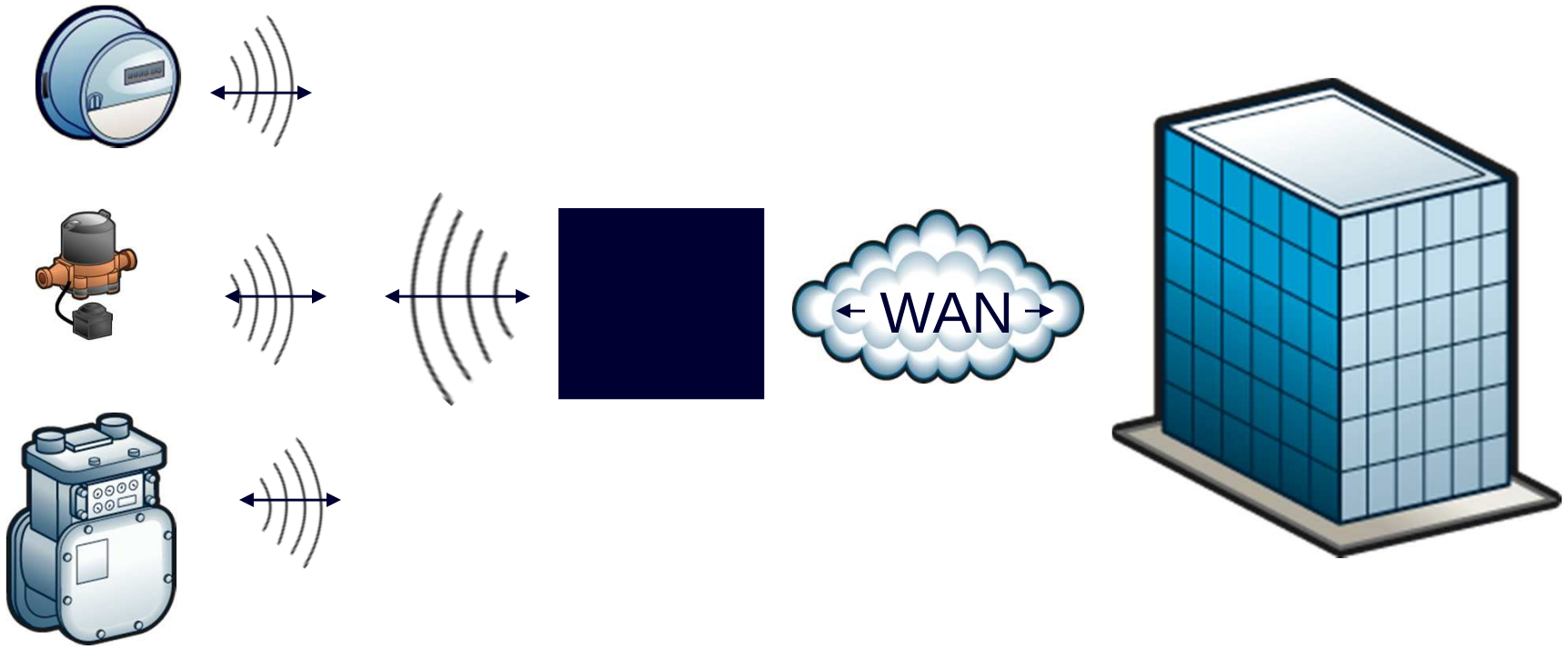
- Automated Meter Reading (AMR)
  - 1-way communication
  - Replaces manual monthly reads
  - Improved accuracy
  - Reduced labor costs
  - Eliminates hard/dangerous-to-read situations
- Advanced Metering Infrastructure (AMI)
  - 2-way comms
  - More frequent data
  - Transfer knowledge
  - Take action now

Actionable information that is useful but perishable

AMR is One Way with Dumb Endpoints



AMI is Two Way with Intelligent Endpoints



“Smart” Smart Meters vs

“Dumb” Smart Meters

Utility Customer Benefits

- Better Access and Data to Manage Energy Use
  - No more ***Sticker Shock*** budgeting
  - Your bill, any time, anywhere
- Accurate and Timely Billing
  - No estimating, no surprises
- Rate Choices and Flexibility
  - What works best for you
- Improved Outage Restoration
  - No need to wait for your call
- Power Quality Data
  - “High 9’s” power for some customers

Utility Benefits

- Reduced Meter Reading Costs
  - Reduced trips (“truck rolls”)
- Reduced Call Center Transactions
  - Empowered customers
- Reduced Theft and Write-Offs
  - Tamper detection, prepay options
  - Reduced estimated billings and billing errors
- Improved Monitoring, Operations & Maintenance
  - Transformer load management
  - Capacitor bank switching
  - Better data for critical reliability, efficiencies, losses, forecasting, and grid system design
- Gateway for Growth & New Technologies

Smart Grid - Today

Cost & societal benefits

2009 Data Example: One utility with 500k installed points to date (half their consumers)

- Eliminated: 246k field visits (in addition to billing cycle reads)
  - Saved 82k labor hours
  - Saved 443k miles
  - Saved 44k gallons of fuel
- Improved safety across the workforce
  - Reduced personal injury 39%
  - Reduced vehicular accidents 10%
- Improved response to service reconnection
  - From: 4 days after payment
  - To: 1 day, 24 hours a day, 7 days per week
- Improved collections by $103 per incident eliminating need for recovery in the general rate base.

North Carolina AMI Examples

- Town of Apex
  - 2008
  - Electric & water
  - ~1,200 commercial-industrial electric meters
  - Testing benefits of AMI over AMR
  - Potential for advanced rate structures
  - Separate Elster network for R&D
- Fayetteville Public Works Commission
  - 2008
  - ~1,000 commercial-industrial electric meters
  - Load profile analysis for new rate for churches

Can Smart Grid Change Customer Behavior?

- I am ***not*** an Expert in Behavioral Modification, but…
- Goal: Positive, Persistent Behavior Change for Energy & Water
- Critical Obstacles to Change
  - Ignorance
  - Apathy
  - Lack of pain
- Knowledge without Action: Useless
- Motivation: Different People, Different Groups, Different Drivers
- Decisions: Emotions + Logic
- What's in it for Me?
  - My family? My city? My school?
  - My country? My planet?
  - Our future?

No Single Way to Motivate Everyone

So?

- Segment the Market
  - Identify each segment's needs, drivers, motivators
  - Tailor/test the messages – and products -- to the target audiences
- Provide Rapid, Meaningful Feedback
  - In-Home Displays, web tools, online management tools, text alerts, smart phone apps, etc.
- Appeal to Emotions and Logic
- Educate, Educate, Educate!
- Empower Customers
  - Simplicity
  - Tools
  - Resources
  - Choices
- Put the Customer in the Driver's Seat
- Living Program

$$Billion Question

Thank you!

Chuck Sathrum, PEM
Director, Smart Grid Solutions
Elster Solutions, LLC
O 919/212-4757
M 919/901-9910
Chuck.sathrum@us.elster.com
www.elstersolutions.com