



National Rural Utilities  
Cooperative Finance Corporation

CFC Forum | DENVER

# Essential Analysis in a Changing Industry

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40  
years

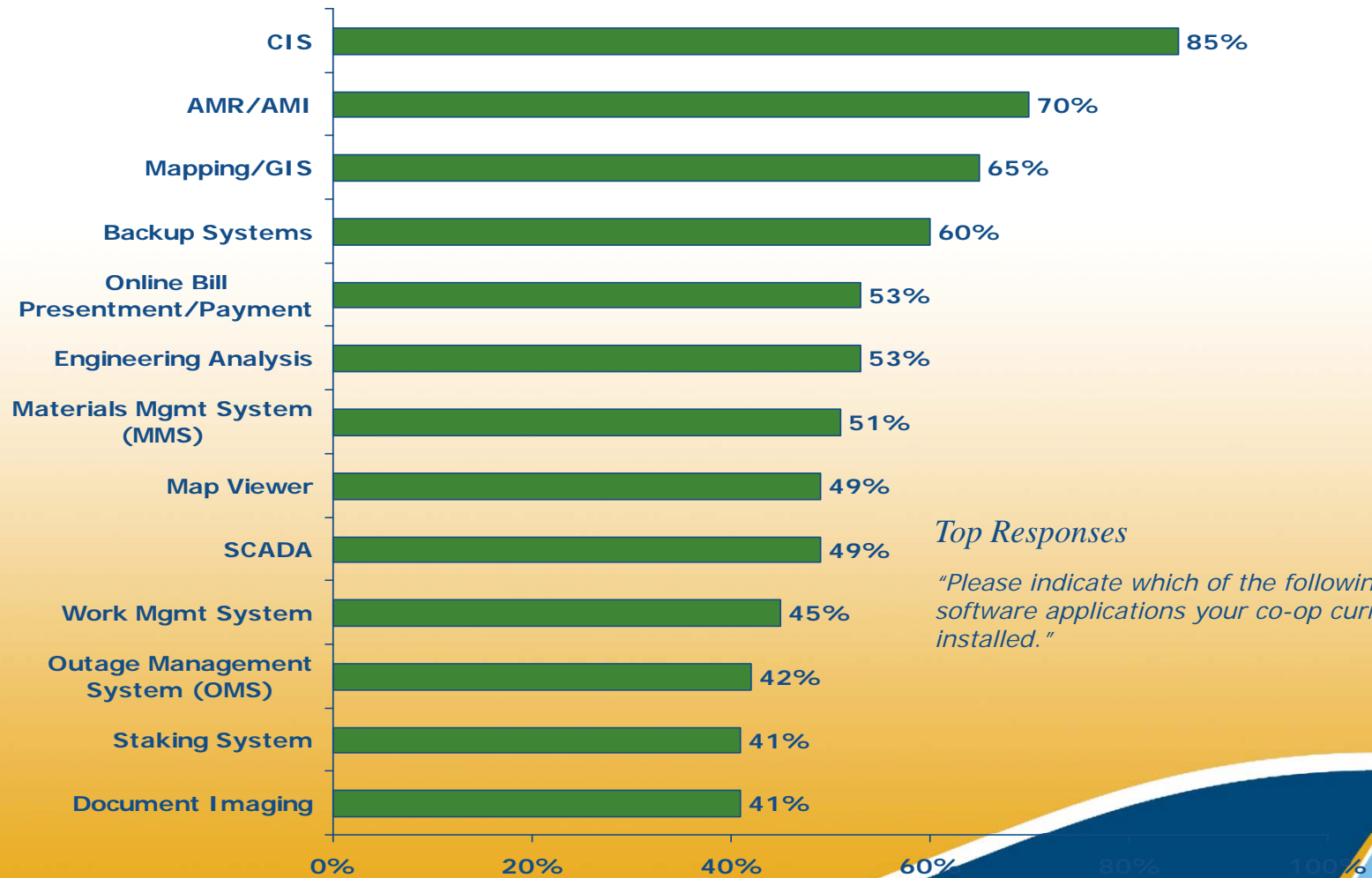
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# A Few Notes

(Disclaimer)

- EnerVision is an Independent Consulting Services Provider
- Not affiliated with any Vendors
- Not “Pushing” a Particular Technology or Methodology
  - What works for one co-op, May not work for another, and Vice-Versa
  - References are for Example Purposes Only

# Software Applications Currently Installed at Co-ops



## Top Responses

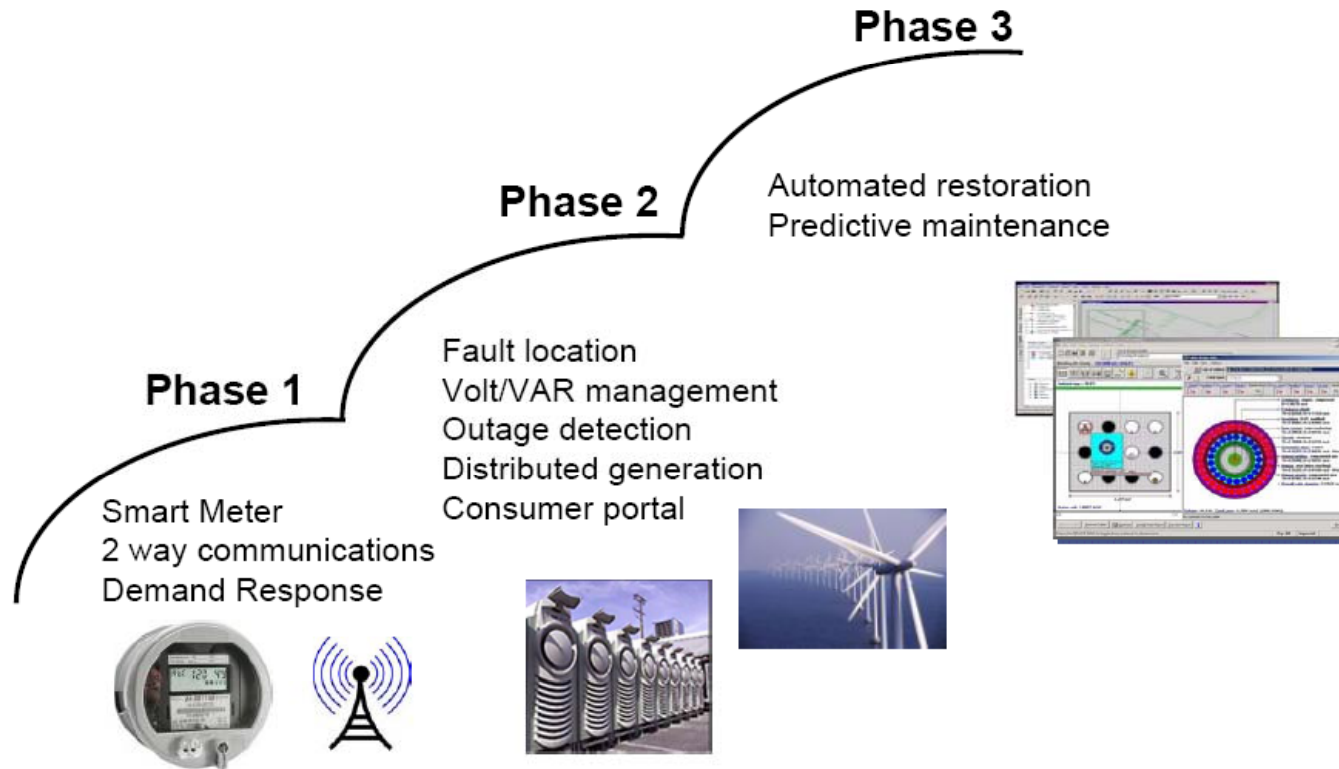
*"Please indicate which of the following types of software applications your co-op currently has installed."*

# AMI Can Do a Lot

- **Billing and Member Service**
  - Remote Disconnect, Service Limiting
  - Theft and Meter Tampering
  - Rates and Financial Planning
  - Demand Limiting
  - Outage Detection and Restoration
  - Prepay
- **Engineering and Operations**
  - Distribution Transformer Loading Assessment
  - System Planning and Work Plan Evaluation
  - Voltage Monitoring and Evaluation
  - Blink Count Evaluation
  - Peak Loss Evaluation
- **Energy Management and Demand Response**
  - Customer Notices, Usage & Pricing Information
  - Time of Use (TOU)
  - Critical Peak Pricing (CPP)
  - Real Time Pricing

# One Path for Smart Grid Investment

## Representative Intelligent Grid Road Map



**COOPER** Power Systems

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# Technology Drivers

- Regulatory Requirements
- Customer Requirements
- Board Policy Decisions
- Step Change in Technical Capability
- Step Change in Technology Pricing
- Reduced Operating Costs - Efficiency
- Wholesale Contract Terms/Rates

# Working Examples

- How Wholesale Rates Can Drive Technology Decisions
- Will Examine 4 Situations
- Will Focus on:
  - AMR
  - AMI
  - Load Control
  - Demand Response

# Definitions

- **AMR (Automatic Meter Reading)**
  - Only Reads/Reports Usage
  - One-way communication from the meter
  - Typically drive-by or power-line carrier
  
- **AMI (Advanced Metering Infrastructure)**
  - Two-way communications to and from the meter
  - Typically power-line carrier or radio based
  - Multiple Functions

# Definitions

- **Direct Load Control**

- Changes In Electric Usage Through Utility Control of Customer Appliances (HVAC Compressors, Water Heaters, Irrigation Pumps, Pool Pumps, Etc)

- **Demand Response**

- Changes in electric usage by customers in response to changes in the price of electricity
  - Response can be automated (Smart Thermostat)

# Case A

## Rate Type and Incentives

- Power Supply Capacity Based on 12 CP
- Power Supply Energy is a Flat Rate
- No Incentive for Load Control
- No Incentive for Demand Response

# Case A

## Technology

- **Driven by Internal Requirements**
  - Efficiency (AMR, WFM...)
  - Reliability (SCADA, OMS...)
  - Customer Service (CIS, Billing...)
- **AMR Would Only Require One-Way Communications** - Customer Meter to Co-op
- **No Present Need for AMI or 2-Way Communications**
- **System Integration Consideration**
  - Setting Stage for the Future

# Case B

## Rate Type and Incentives

- **Power Supply Capacity Seasonal Rate**
- **Energy is Tiered with Ascending Rates**
- **Incentive for Direct Load Control**
  - Reduce Capacity Charges
- **Possible Incentive for Demand Response**
  - Depends on Structure of Tiers and Load Shapes

# Case B

## Technology

- **Additional (External) Requirements**
  - Direct Load Control
    - Communications From Co-op to Customer Switch
    - If also AMR, then 2-Way Communications Needed
- **AMI Requirements Emerging**
- **System Integration Provides Real Benefits**
  - Customer Records

# Case C

## Rate Type and Incentives

- **Seasonal Capacity Rate**
- **Hourly Energy Cost Pass-Through**
- **Incentive for Direct Load Control**
  - Reduce Capacity Costs
- **Incentive for Demand Response**
  - Reduce Capacity Costs
  - Reduce Energy Costs
    - (Critical) Peak Period Pricing
    - Time of Use

# Case C

## Technology

- **More (External) Requirements**

- Demand Response

- Pricing Signals to Customer (Hourly)
    - Customer Response/Hourly Meter Readings to Co-op
    - 2-Way Communications Needed

- AMI a Good Idea

- Data Volume
    - Records

- Integration Becomes Critical

- Many Systems Requiring the Same Data
    - Don't Re-enter Data!

# Case D

## Rate Type and Incentives

- **Energy Market**
  - Marginal Pricing
- **Demand Response**
  - Real Time Pricing
- **Direct Load Control**
  - Control Ancillary Service Costs
  - Generate Revenues

# Case D

## Technology

- **Even More (External) Requirements**
  - Direct Load Control
    - “Tighter” Operational Requirements
    - Forecasting, Bidding, Records Requirements
  - Demand Response
    - Real Time Pricing Signals to Customer (5-10 Minute Intervals)
    - Customer Response/Meter Readings to Co-op
  - AMI and System Integration Critical
    - Lots of Data
    - Exposure to Increased Costs
    - Exposure to Lost Revenues

# So You Have a Technology Project....

- Useful Questions and Considerations

# Technology

## Questions and Considerations

- **Faster Write-Down – 5-10 Years**
- **Need to Balance “Bleeding Edge” Technology Against Cheap (Obsolete)**
  - Technical & Dollar\$
- **Is this the Vendor’s Standard Product?**
  - How Custom is Your Specification?
- **Will it Integrate?**
  - How Much Customization Is Required?
  - MultiSpeak Compliant?

# Technology

## Questions and Considerations

- **Hidden Cost Considerations**

- Internal Support
- Redundancy
- Annual Licenses
- Mission Critical?
- Vendor Support
- Back Up
- Software, Radio
- Disaster Recovery

- **Flexibility?**

- Updates
- Future Plan Fit?
- Upgrades

- **Training**

- Stranded Resources?

# Useful Resources

- **CRN website:**

- <https://crn.cooperative.com/>

- **MultiSpeak website:**

- [www.multispeak.org](http://www.multispeak.org)

- **Technology Interoperability Case Study**

- [http://www.techadvantage.org/2009ConferenceHandouts/4D\\_Wolven.pdf](http://www.techadvantage.org/2009ConferenceHandouts/4D_Wolven.pdf)

- **Cooperative.com List Servers –**

- E&O

- IT

# Thank You!