

# ***KCP&L Journey to Quality Through Automation Evolution***

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# *The Roadway to Quality Improvement*

- ❑ Classic Quality Improvement –  
Process and Data Driven
  - ↳ Does NOT happen overnight
  - ↳ Feedback & Continuous Improvement are key
  - ↳ Culture plays major role
- ❑ Asset Management Strategies
  - ↳ Automation is one vessel
- ❑ Distribution Automation Strategies
- ❑ SmartGrid Pilot and Strategies



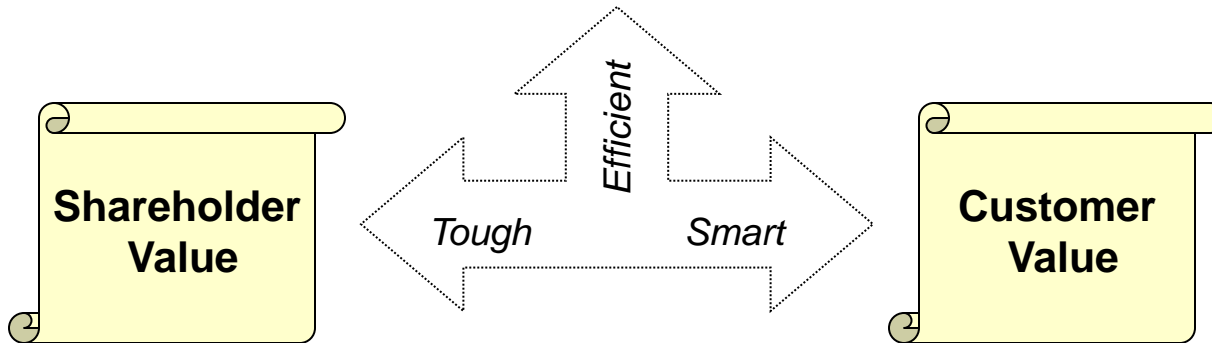
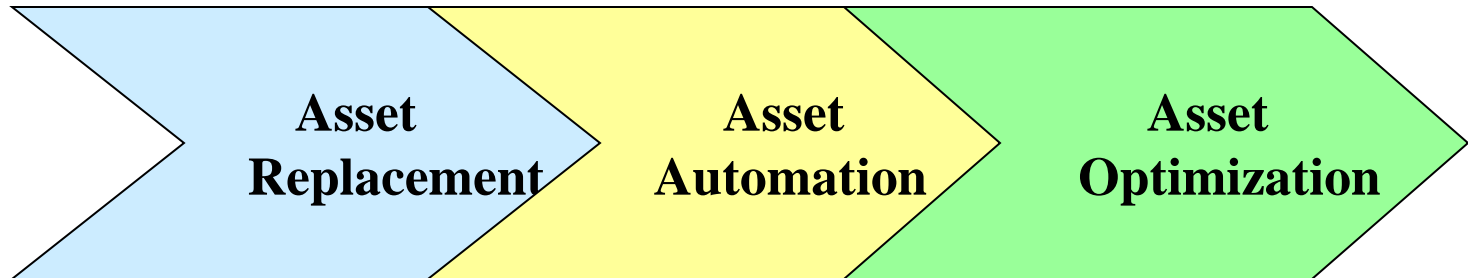
# ***Aging Distribution Infrastructure – One Major Quality “Problem”***

- ❑ Need to use equipment beyond intended life
- ❑ Increasing Electric Demands
- ❑ Increasing Customer Expectations
- ❑ Need to fully utilize assets – Sweat ‘Em’
- ❑ Need to Reduce Maintenance Costs
  - ↳ more Preventive & Condition Based Maintenance
- ❑ Increasing Regulatory Oversight on Reliability
- ❑ **All drive the need for an Integrated, Comprehensive and Dynamic Asset Management Plan**



# Key Areas of our Asset Management Strategy

*Optimize life-cycle cost for utility assets while satisfying budget, performance, and risk constraints.*



- **Long Term Asset Planning**
- **Performance / Risk Modeling**
- **Pro-Active Renewal Programs**
- **Reliability / Restoration Gains**
- **Utilized for cost effectiveness**

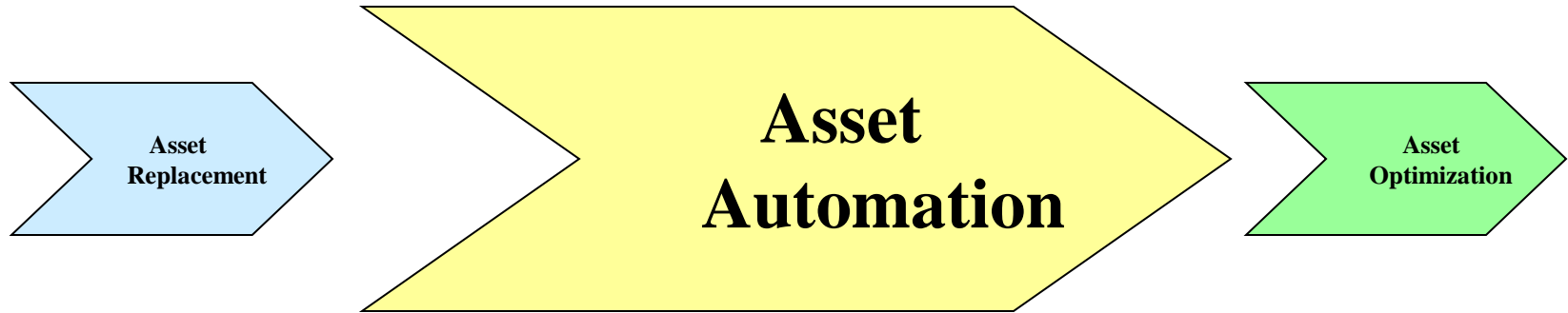
- **Communication / Technology**
- **Managed Peak / Off Peak Loads**
- **Energy Efficiency Gains**
- **Distributed Utility Partnering**
- **Service Voltage Regulation**

# One Solution – Distribution Automation

- Engineering & quality improvement processes are similar
  - ↪ Problem Identification
  - ↪ Data Gathering
  - ↪ Solution Proposals & Selection
  - ↪ Solution Implementation
  - ↪ Measure and Monitor Outcomes
  - ↪ Apply Feedback for Continuous Improvement
  
- Automation is Good Match
  - ↪ Gathers and Stores Information
  - ↪ Monitors and Reports Outcomes
  - ↪ Software/Firmware allows Upgrades for Improvement
  - ↪ Same or Better Functionality for Less Overall Cost



# Distribution Automation



## Active Initiatives

## Long Term Strategy

**Circuit of the Future**

Smart Grid Initiatives

**Network Automation**

Self Healing

Capacitor Automation

Interoperability

**50 CO Relay Automation**

Enhanced Design Standards

**34kV Recloser/Fault Ind**

EMS/DMS

**Rural Power Quality**

Communication Infrastructure



# Goals of Distribution Automation

- ❑ Improve Safety
- ❑ Improve Customer Satisfaction by
  - ↪ Improving reliability
  - ↪ Reducing response time to system problems
  - ↪ Reducing momentary power outages
  - ↪ Reducing customer voltage concerns
  - ↪ Better customer communications by enhancing knowledge of system operating status
- ❑ Move from Reactive to Proactive and Condition-Based Maintenance
- ❑ Reduce O&M Expenses
- ❑ Improves Asset Utilization
  - ↪ Condition-based decision making
  - ↪ Real Time Data
  - ↪ New Solutions Build on Existing





# UG Network Automation – Major Early Success

## ❑ Automation Project of the Year 2005

## ❑ Monitoring Reduces Impacts

- ↪ Defective current transformer found
- ↪ Water inside protectors & Flooded Vaults
- ↪ Thermally overloaded transformers – Cust Added Load
- ↪ Spot network transformers on wrong primary tap
- ↪ Identified causes of excessive operations/chatter
- ↪ Closing motor failure found
- ↪ Found failed arcing contacts
- ↪ Blocked vault ventilation

## ❑ Safety

- ↪ Crews check status before entry
- ↪ Crews remotely operate – Open, Block, Auto
- ↪ Remote monitoring reduces exposure

## ❑ Crew trust and confidence

## ❑ Condition-based maintenance vs. simple periodic

- ↪ Monitors # of Operations
- ↪ Monitors Temperatures & Water Levels

## ❑ Front Line Embrace & Ownership

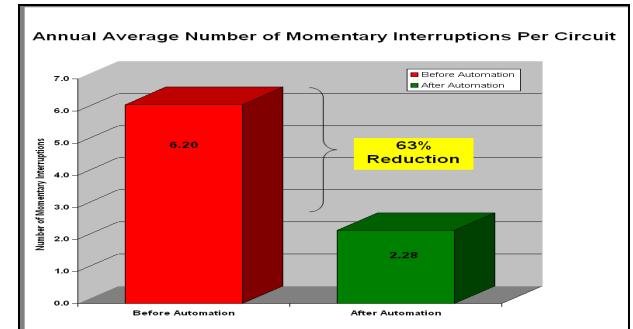




# Other Real Examples – Quality Improved

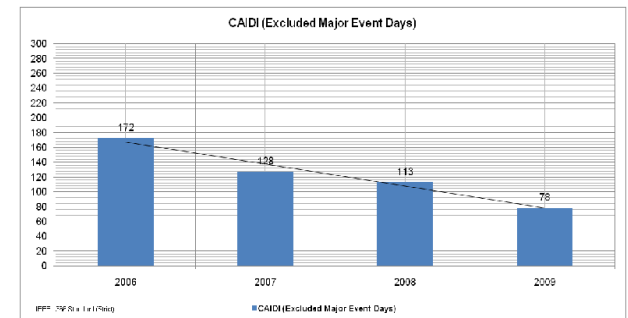
## ❑ Fast Trip Automation Reduces Momentary Outages 60%

- ↪ Match to Current Weather Conditions
- ↪ Turned On/Off Remotely by Dispatchers
- ↪ Better Power Quality for Customers



## ❑ 34kV Communicating Reclosers Reduce 34kV CAIDI by over 50%

- ↪ Automated Outage Detection/Restoration
- ↪ Remote Operation to Rural Areas – no need to roll a truck for switching. Crews focus on repairs.
- ↪ Less crew exposure.
- ↪ Considerably less maintenance than old switches



## ❑ Dynamic Voltage Control Contributes 50 MW Demand Response

- ↪ Leveraged Capacitor Automation – No Customer Impacts when reducing voltage 2.5%
- ↪ Turned On/Off Remotely by Dispatchers
- ↪ Distribution System Efficiency Optimized - near Unity Power Factor year round

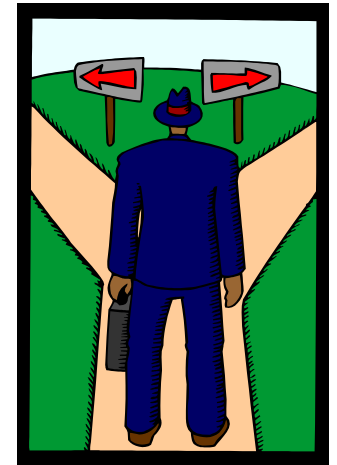


# SmartGrid – Logical Evolution for KCP&L

- ❑ SmartGrid is the logical next step for KCP&L
- ❑ Natural Outgrowth of Circuit of the Future “Incubator”
- ❑ Automation on “Steroids”
- ❑ KCP&L Culture is Already on this Path

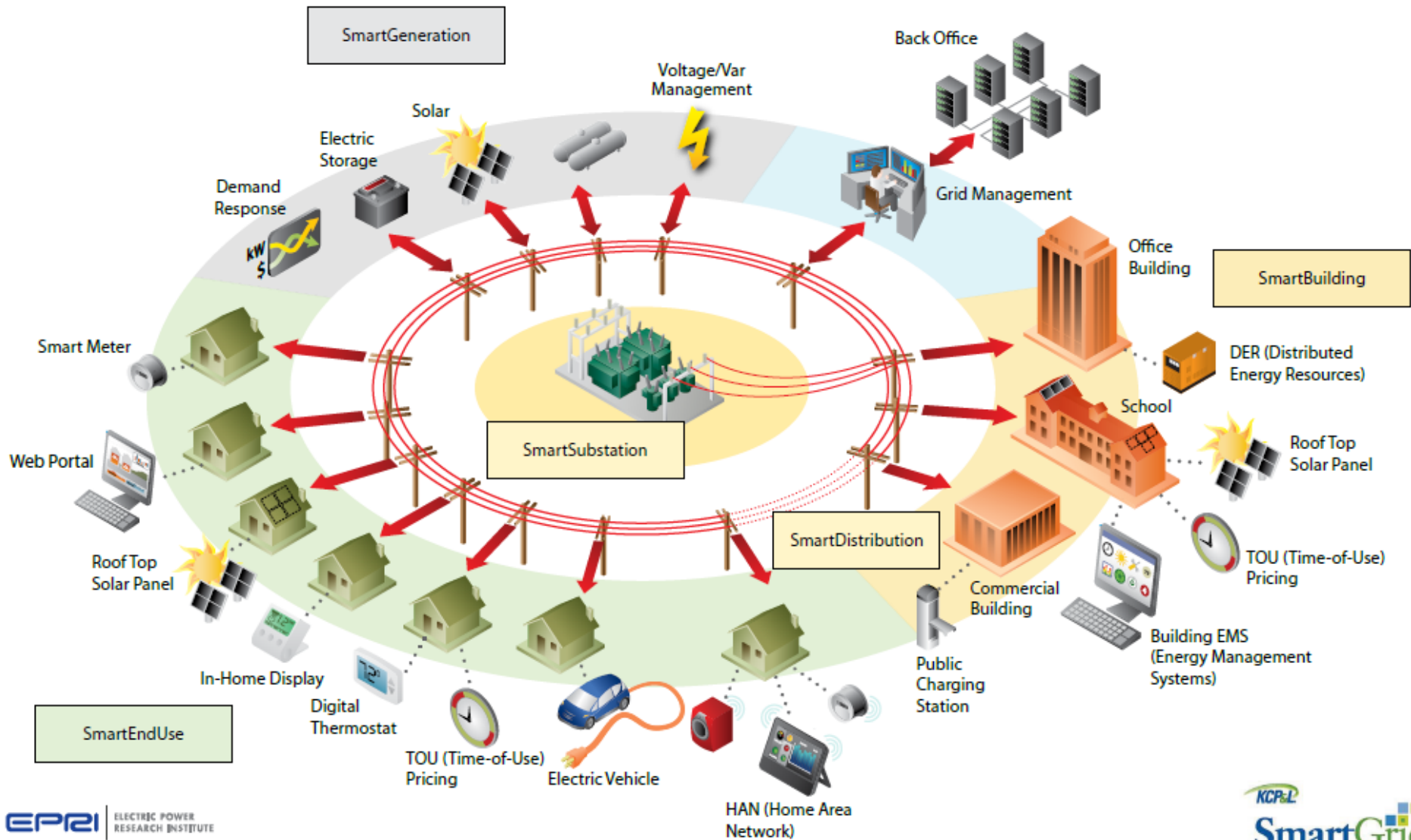
## SmartGrid Quality Contribution

- ❑ Increases Remote Monitoring Dramatically
- ❑ Increases Data Collection Dramatically
  - ↪ Real Time Data into Automated Systems
- ❑ Integrates Systems like never before
- ❑ Interoperable – Plug & Play
- ❑ Better Services & Information for Customers
- ❑ Improved Power Quality and Reliability
- ❑ Efficiency Improvements - Manpower & Energy
- ❑ Better Asset Utilization



*We stand at the beginning of the “energy internet”*

# KCP&L Demonstration – True End-to-End Smart Grid



# *Questions?*