Distribution Roadmap Initiative in Manitoba Hydro

Distribution Strategic Development Engineer
Background

• 24 utilities (including MH) in CEATI DALCM Interest Group sponsored a study by Capgemini to look at the utility environment in the future and how utilities can prepare for it.
• Study looks at the near future, the medium future and long term future (2010, 2015, & 2025).
• 4 reports are produced.
• Many utilities are already doing something.
• Manitoba Hydro has initiated several projects that have long term significance.
What other utilities are doing

A number of utilities are:

• Developing road map plans
• Developing & Implementing DA
• Developing & Implementing AMI
• Developing & Upgrading IT solutions
  • Customer databases
  • Outage Management Systems
  • Work Management Systems
  • others
Manitoba Hydro’s Strategy

What Manitoba Hydro needs is

- Determine our issues
- Develop a Coordinated Approach
• Government owned
• Monopoly of energy supply
• Mostly hydro generation – relatively cheap
• Population growth not too fast
• Population spreadout – large service area
What are Manitoba Hydro’s issues

1. Technology
2. Customers
3. Workforce
4. Regulatory
5. Assets
New Technology

- Information Technology
- Communication Technology
- Distribution Automation
- Automated Metering Infrastructure
- Alternative Energy - Wind Turbines, Solar Panels
- Electric/Hybrid Vehicles
- Modular Substations
- ...

Customer Issues

- Service Reliability
- Power Quality (sags, harmonics)
- In-service Dates (unexpected demands)
- Energy Management Programs
- Customer Information - bills, outages, energy usage profile, etc)
- Distributed Generation
- Health Concerns
- Aesthetics
- Rates – TOD, residential demand billing
Workforce

- Loss of experience and expertise
- Attraction and retention
- Motivation/ priorities of the younger generation
- Different skill sets, generally more hi-tech
- Workforce Management
- Contracting in/Contracting out
- Industrial Relations
- Succession Planning
- Training
Regulatory Requirements

- Compliance with many agencies – Federal, Provincial, American
- More stringent environmental regulations
- Land use - right of way, station siting
- Reliability requirements from NERC and FERC
- DER connection and tariffs
- EMF and other health issues
Asset Issues

- Aging infrastructure, e.g. equipment over 40 years old, some facilities not properly maintained
- Demand on capacity & equipment to handle fast load growth
- Reaching maximum capacity (urban renewal) – feeder ties, fault level
- Loss of gas supply, loss of key electric stations
- Safety
- Shorter lifecycle for new technology
Possible Scenarios

- Changing regulatory environment
- Difficulty in obtaining land
- Sharp increases in energy costs
- Drastic change in energy market
- Shift towards electric (hybrid) vehicles
- Different load profile due to DER, energy management, life style
- Increased power quality expectations
- Changing knowledge & skill set requirements
- Proliferation of Distributed Energy Resources and Co-Generation
1. The development of a Distribution Roadmap is established as a goal in the Business Unit Strategic Plan.

2. Held 2 symposiums with Capgemini & staff from stakeholders.


5. Conduct research projects on
   - Distribution Automation
   - Automated Metering Infrastructure
   - Distributed Generation
   - New equipment /material

6. Develop IT projects on
   - Data management
   - GIS
   - Customer service
   - Workforce management
   - Outage Management
• **Manitoba Hydro Distribution Roadmap**

• **Champion/Sponsor:** E.H. Wiebe

• **Overall Purpose:** Identify and prioritize technical and organizational initiatives required to effectively prepare for the changes expected in customer needs, as well as technical, business, and regulatory environment of the Distribution system in Manitoba.

• **Objectives:** Develop a Distribution Roadmap for Manitoba Hydro that describes the vision of the Distribution utility for 2020, the changes required and the implementation strategy for technologies and practices that support it.
Terms of Reference

• **Scope:** The distribution system of Manitoba Hydro and its impact on others.

• **Deliverables:**

  • 1. Report describing the distribution utility of the future in Manitoba, recommendations for implementing the vision, and next steps to achieve this vision.

  • 2. Communications to all staff impacted to bring them to a common understanding.
Action Plan

• Ensure IT developments are coordinated and compatible with Distribution Roadmap vision
• Continue with existing pilot projects on DA, AMI, DG and other areas. If trial is successful, develop large scale implementation
• New initiatives on
  - telecommunication, e.g. optical network
  - human resources, e.g. partnership with schools
  - energy delivery, e.g. substation technology…
• Convey message to Upper Management and staff
Some New Initiatives

• Communication
  - optical network
• Human resources
  - partnership with schools
  - recruitment & retention strategy
  - workforce management
  - training
• Asset Management
  - asset management system
• Energy Delivery
  - substation technology
  - HV PMT
• Energy Management
  - Utility controlled DSM programs (commercial, industrial, residential)
  - residential demand billing
  - wholesale conversion to alternate lighting, e.g. CFL, LED
Implementation

• Draft Distribution Roadmap Report issued for comments
• Final Report issued
  - Identify and prioritize initiatives
  - Develop costs and benefits
  - Establish processes and schedules
• Submit to Executives for approval
• Future corporate projects (e.g. outage management system) reviewed and signed on by Distribution Roadmap Task Force
EXAMPLE
## ASSETS

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<tr>
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<tbody>
<tr>
<td>eGIS enhancements</td>
<td>Linkage of eGIS to CIS, SAP, RMS, CDM, OMS</td>
<td>Maintenance staff in the field have access to database</td>
<td>Integrated OMS and dist. mgmt</td>
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<td>Development of dist. common data model</td>
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<tr>
<td>Trial of PMT Substation (DSC)</td>
<td>Regular Use of DSC as Supply Option</td>
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<td>Flexibility in meeting load</td>
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<td>Integrate functions of CS Operations, SIR, Call Centre</td>
<td>Deployment of OMS</td>
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<tr>
<td>Pilot on AMI</td>
<td>Limited deployment of AMI</td>
<td>Remote monitoring &amp; control of dist. system</td>
<td>Smart Grid</td>
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<td>Pilot project on dist automation</td>
<td>Feeder automation</td>
<td>Distribution SCADA</td>
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<tr>
<td>Pilot on sensors</td>
<td>Condition monitoring of major equipment</td>
<td>Real time data on equipment</td>
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<tr>
<td>Dist. Mtce Planning linked to reliability data</td>
<td>Condition-based mtce</td>
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<tr>
<td>Establish asset management program</td>
<td>Asset Management policy in place</td>
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Manitoba Hydro Initiatives

Distribution Automation

- Report from KEMA consultants
- Staged Implementation
- Incorporate DA into Design Philosophy

Goal – Increase Reliability & Efficiency
Manitoba Hydro Initiatives

Automated Metering Infrastructure

- $1.5 M Pilot Project
  - Radio Frequency (Urban)
  - Power Line Carrier (Rural)
- $170 M full project cost

Benefits

- Improved Service Interruption Reporting
- Improved Service Restoration Time (CAIDI)
- Better Customer Load Profiling
- Better Load Estimates
- Improved Billing & Collections
- Improved Planning & Design
- More accurate Customer Information
Conceptual Data Model

- Central data repository
- Standardize data format
- Linkage between databases

Benefits

- Easy access to data
- Avoid duplication, confusion
- Improves data integrity
- Facilitates data exchange
Distributed Generation/Resources Research

• How to connect safely

• Anti-Islanding Technology
  \(\text{(Transfer Tripping – zero crossing technology)}\)

• Dispatchable Power Programs

• Prevent System Problems

Benefits

• Accommodate Alternative Energy Sources

• Export DG resources

• Delay new construction
Manitoba Hydro Initiatives

Distribution Supply Centers

- Match supply with load
- Minimal Maintenance
- Short Lead Time (6-8 months)
- Small foot print
- Increased reliability
- Reduced stranded assets
Manitoba Hydro’s DSC

Conventional station

- 5 - 10 MVA units
- 66 Kv
- Developing 115 kv
Barriers

- Lack of Long Term Vision
- Corporate Culture
- Perception
- Political Climate
- Communication to decision makers
- Costs
- Lead Time for Equipment & Material
What Works?

- Visionary Leader
- Commitment
- Buy-in by T&D Management
- Stakeholders Involvement
- Spirit of Cooperation
- Available Resources – CEA, other utilities, consultants
Questions?