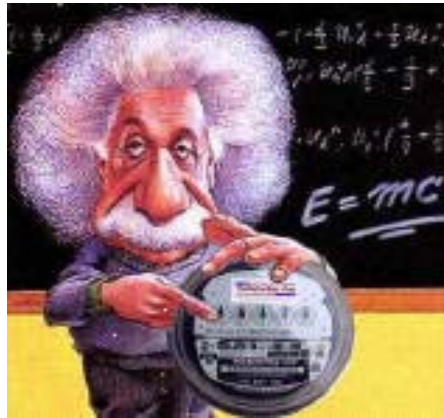


AMR, AMI, Smart Meters & Smart Grid

“Understanding the Challenges and the Deliverables”



Tony Parsons, AMR/AMI Supervisor

Introduction

AMR at ATCO Electric

Water & Gas AMR Services by ATCO

AMR, AMI, Smart Meter and Smart Grid

Alberta Government's AMI & Smart Grid initiative

AMR/AMI - Alberta Utilities & around the World

Challenges to Transition to AMI & Smart Grid

AMR at Yukon Electrical

Drivers For AMR in 1994

Business objectives

- Improve customer service
- Reduce cost of meter reading
- Provide value-added services

Minimize energy purchase risks to achieve more “accurate” energy settlement

- Frequent rate changes, time-sensitive pricing
- Shorter reading intervals

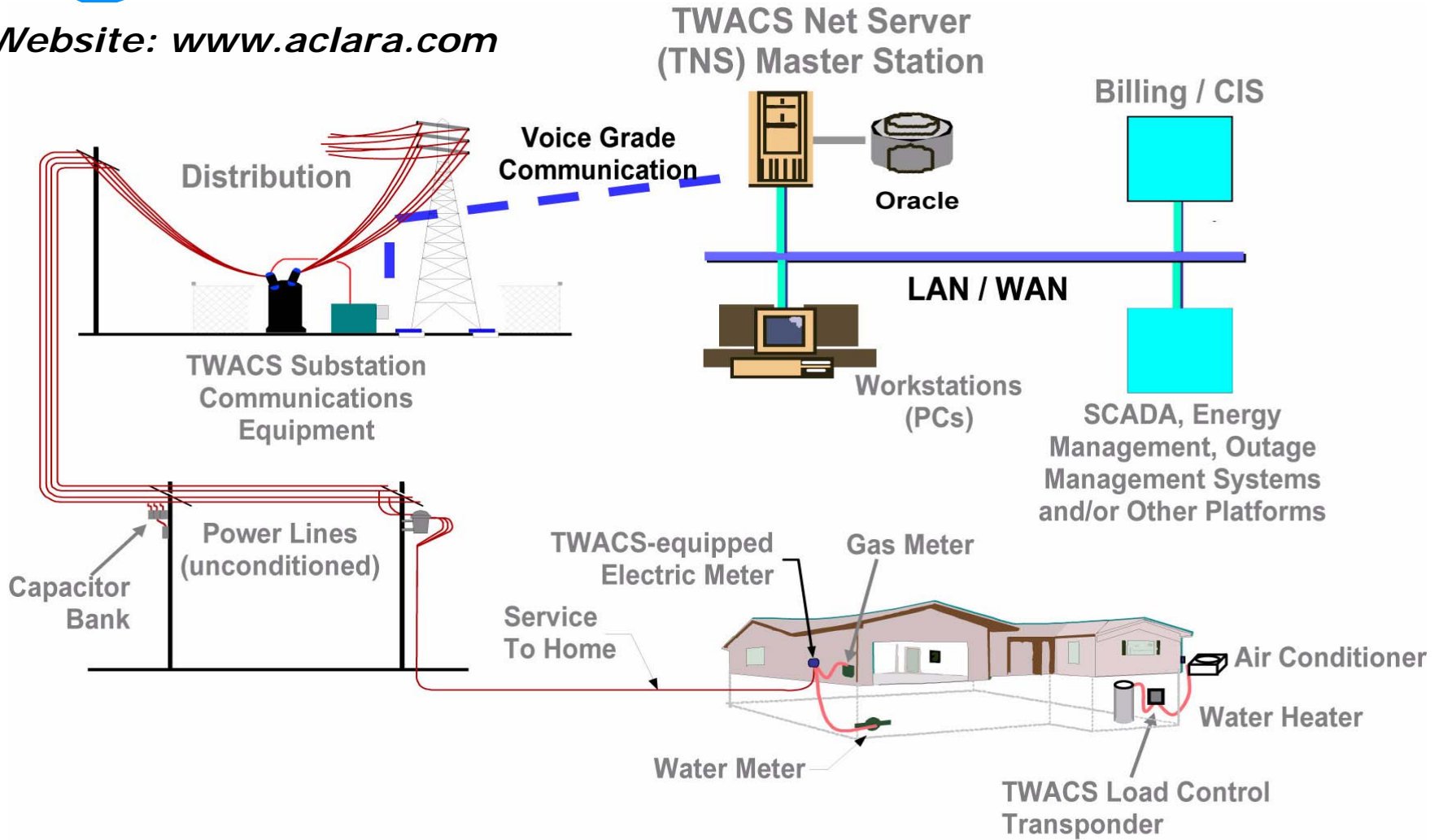
Cost reduction

- Efficiency through technology and operational improvement
- Increased productivity
- Synergy with other businesses

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AMR Technology – TWACS

Website: www.aclara.com



Lighting up the North

How TWACS Works

Residential/Apartment



Commercial - Demand

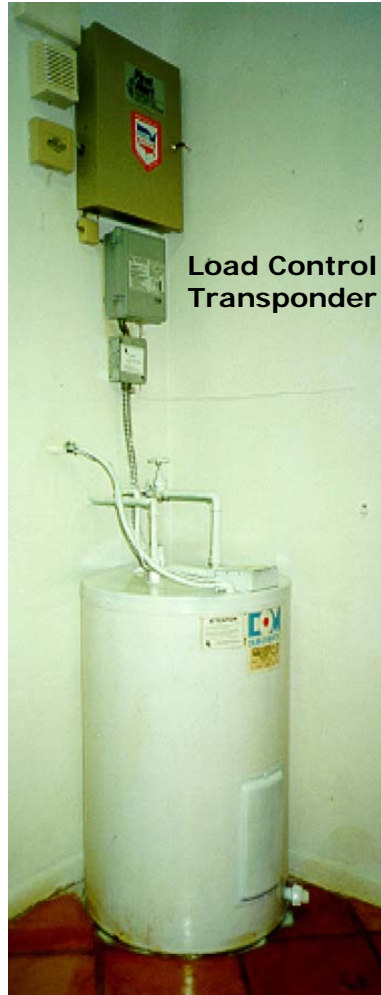


Universal Transponder

Optional TWACS Devices



Disconnect-Reconnect
Switch



Load Control
Transponder



Demand Response Unit



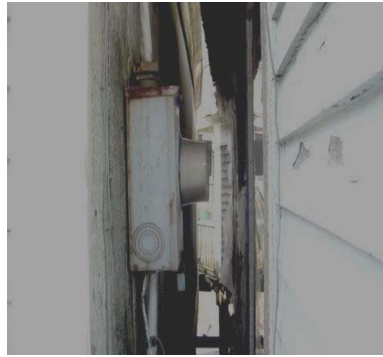
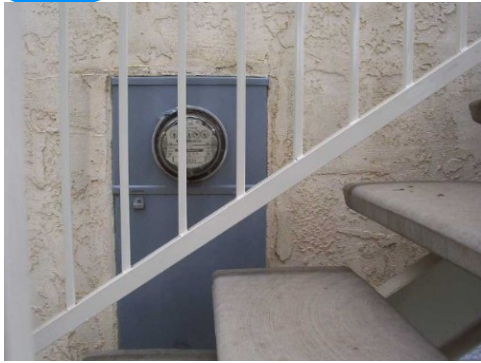
Capacitor Switch



In-Home Display

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Installation Challenges



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Meter Readings – Then & Now

	<u>1993</u>	<u>Now</u>
Reads for Cycle Billing	Monthly, Bi-monthly, Annually	Monthly
# of Meter Reads	1 million/year	2.4 million/year
Reads for Load Survey-(Hourly)	Retrieved Monthly	Every 8 Hours
# of Meters	170	750
# of Meter Reads	1.5 million/year	6.5 million/year
# of staff	23 Meter Readers + Servicemen	4 - Operators

Benefits of (TWACS) AMR

Readings available at any time

Expandable at a very low cost

Smart TWACS Meters – (approx. 100,000)

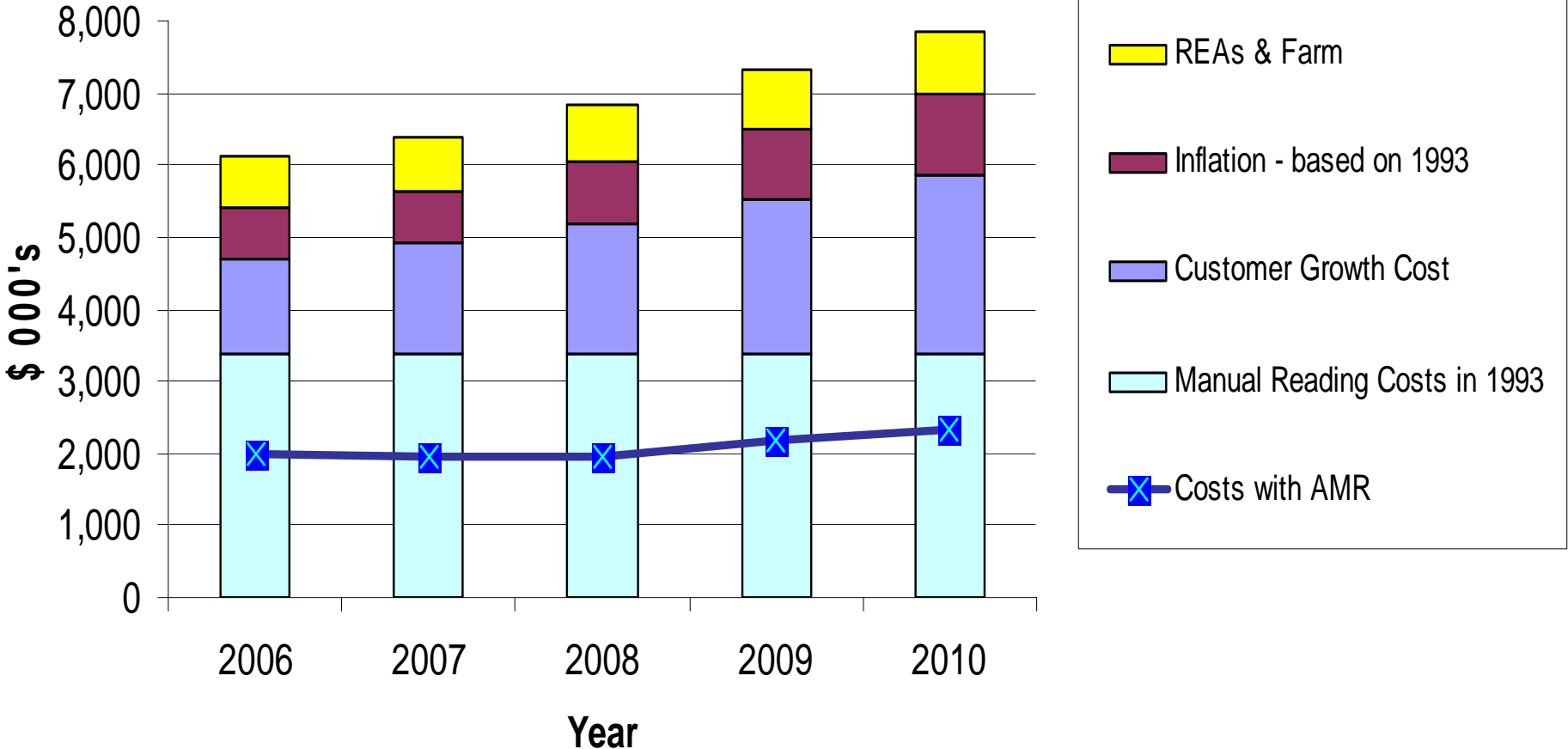
- Hourly readings
- Momentary interruptions
- Voltage monitoring

Outage Detection/management

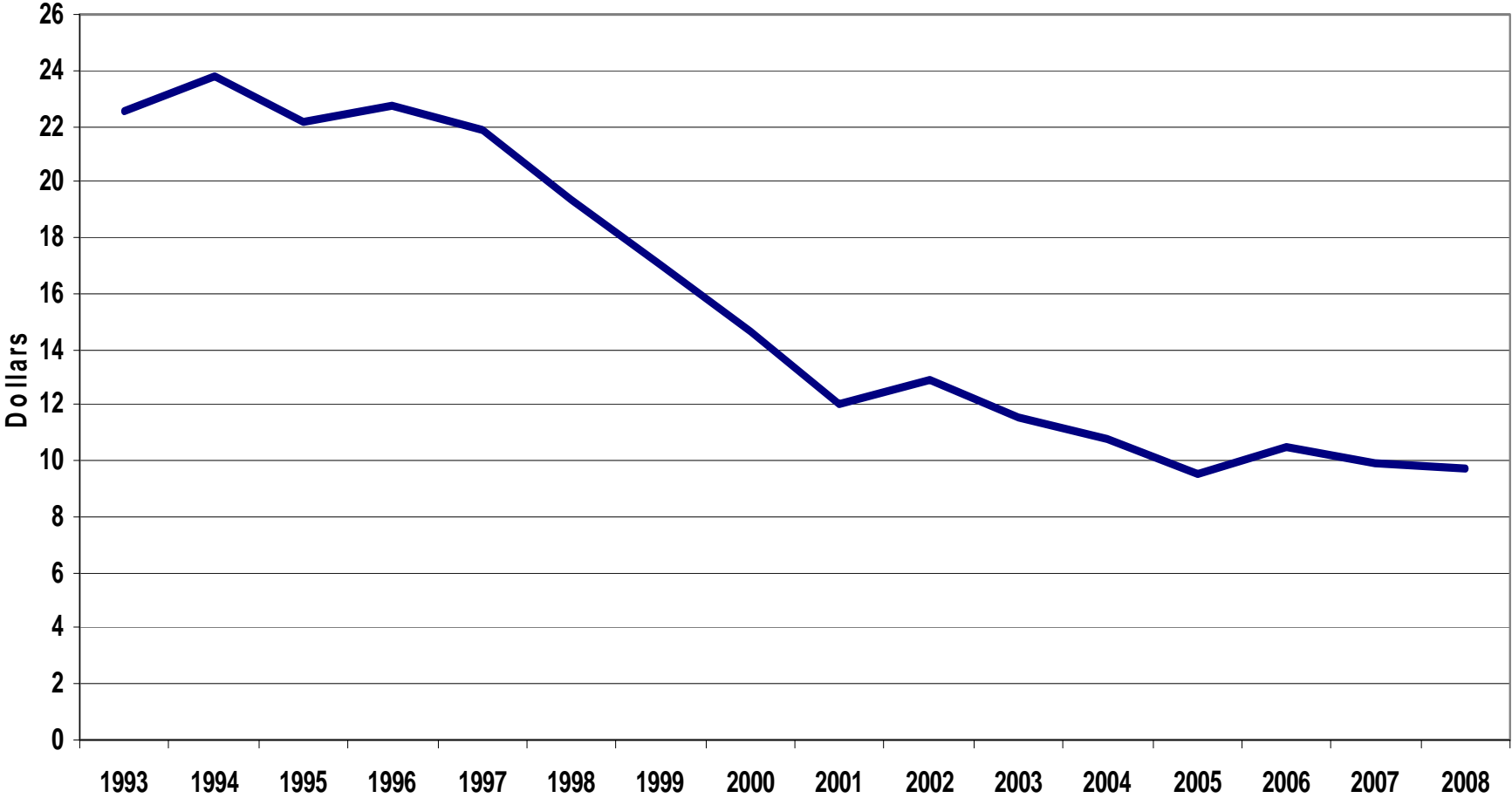
Additional TWACS features

- Customer load control
- Remote disconnect/reconnect
- Distribution automation

AMR versus Manual Cost



Meter Reading Cost per Customer



Lessons Learned

Implementation - Complete Saturation is key

- High-cost – travel, access
- Frequent special read activity/areas

Synergies between utilities

- Shared infrastructure impacts choice of technology
- Opportunity to build on relationships with communities

Technology application - One size doesn't fit all

- PLC/ Telephone-Cell/Fixed Network Radio/ Drive-by
- Pros & Cons in all technologies
- Consider hybrid solutions

Process Transition

- Don't under-estimate # of processes affected by AMR/AMI

Lessons Learned

Managing vendors

- Key questions for vendors during technology selection
 - “Real” products versus “Vaporware”
 - Warranties
- Users group involvement
- Technical support

Managing employee transition

- Discussions with employee Unions/Associations prior
 - Installers
 - Troubleshoot/repairs
 - Meter readers

Water & Gas AMR using TWACS



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Water & Gas Existing - Costs

Regular Reading

- **Labour** - benefits, compensation, supervision
- **Vehicles** – operation, maintenance, insurance
- **Tools used to read**
- **Posting reads to accounts**

Special Read - Usually performed by other staff

- **First & last reads** - Connects & disconnects
 - 20-30% of customers (annual average)
- **Special visits** - by appointment
 - inside meters, after hours, rescheduled, missed/estimated

Indirect Costs

- **Customer calls** - bill disputes; meter readings & functionality
- **Accounting** - inaccuracy & processing of adjustments
- **Theft**

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Water & Gas AMR - Costs

Water meter compatibility

Transmitter & installations

Computer hardware & software

- Interface with billing system - file transfer/receipt
- Billing system capabilities - posting readings to accounts

AMR reading cycle

- Frequency of Readings
- Off-cycle (special) readings

Verification reads

Water & Gas AMR - Benefits

Lower meter reading operational cost

Support & training included

10 year agreement - price guarantee

Non-Quantified Benefits

- Better customer relations
- Fewer safety issues

More information to manage utility

- Time-of-use
- Profiling, monitoring, leak detection
- Feeder/system monitoring

Water & Gas AMR using TWACS

Town of High Level

Town of Rainbow Lake

MD of MacKenzie

Town of Grimshaw

Town of Peace River

Town of Slave Lake

Northern Sunrise County

MD of Lesser Slave River

RM of Wood Buffalo

Town of Bonnyville

Valley South Water Co-op

Town of Vegreville

Town of Drumheller

Village of Vilna

AMR, AMI, Smart Meter, Smart Grid

AMR (Automated Meter Reading)

- Meter can be read remotely using
 - fixed network
 - hand-held / walk-by
 - drive-by

AMI (Advanced Metering Infrastructure)

- Smart Meters
- Advanced communication system
- Sophisticated Meter Data Management (“MDM”)

AMR, AMI , Smart Meter, Smart Grid

Smart Meter

- Consumption and power quality data
- Communicates to a central system
- Provides outage notification
- Acts as a control device
- Interfaces with in-home display & home area networks
- Smart Meter may be a part of Smart Grid

Smart Grid

- Intelligent
- Efficient
- Accommodating
- Resilient
- Standards

Government of AB - AMI initiative

AMI Discussion paper – June 2008

Energy Strategy report – Dec 2008

AMI Straw Model (Dept of Energy) – Jan 2010

- Hourly consumption information
- Remote disconnect/reconnect
- In-Home Display (IHD)

Smart Grid inquiry (AB Utilities Comm.) – March 2010

Timelines

- AUC Rule – Sept 2011
- Regulation – Late 2011
- Deployment – 2016 thru 2018

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AMR & AMI Initiatives in Alberta

ATCO Electric

- Has an operating AMR system
- Significant upgrade needed for AMI

Fortis Alberta

- AMR/AMI deployment underway

EPCOR

- Filed business case in Dec. 2009 with AUC

Enmax

- selected, then dropped a vendor, wait and see

Initiatives of Other Utilities

– from Metering International

Editorial & Viewpoints – customer influence

European Smart Metering Alliance

Smart Metering Learnings - in the Dutch Market

Smart Grid & Smart Metering - in Poland

Will great Britain be ready for Smart Metering?

Smart Metering - in Santiago, Chile

Smart Water Metering - near Melbourne, Australia

Energy Efficiency Through Informed Users - L&G

In-Home Display Study & Consumer Feedback

Initiatives of Other Utilities

– from Metering International

Home Energy “Apps” – the new Trend

Microsoft Hohm – Beta Testing in Seattle

Reliance Energy & Google Power Meter Trial

Residential (Electric) Water Heating Demand

Smart Grid Information Clearing House – Virginia

Smart Grid is a Green Grid

– Demand Response & Smart Grid Coalition

Transition to AMI / Smart Grid

Challenges

- **Customer participation & long-term behaviors**
- **Business case for large capital investment**
- **Rate Design & Application**
 - Critical Peak Pricing
 - Time-of-Use/Time-of-day
- **24-hour system monitoring**
- **Development of common standards**
- **Keeping up with fast-changing technology**

Transition to AMI / Smart Grid

Challenges

- **Technology evaluation & vendor selection**
 - Meter upgrades
 - Communication upgrades
 - Achieve and maintain hourly read success rate
 - MDM infrastructure upgrades
 - In-home displays
 - Remote Disconnect/Reconnect
 - Programmable Current Limiting

AMR at Yukon Electrical

Our parent company has 17 yrs experience TWACS

- supported by a reputable vendor

TWACS technology meets YECL's needs

- proven to work in our operating environment

TWACS technology has other benefits:

- Time-of-Use applications
- Bi-directional reading - used in net metering applications
- Compatibility with an in-home display
- ZigBee compatible
- Can read water and or gas meters to gain further efficiencies

YECL is proposing to install TWACS AMR

- to address the rising costs of manual meter reading.

YECL will be updating its WAF grid AMR business case

- The AMR project will be in the next GRA; or
- through a part 3 application.

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AMR at Yukon Electrical

Yukon Electrical would like to thank everyone for attending

- hope the information provided was helpful
- better understanding the concept of our AMR initiative
- better understand AMI, Smart Meters & Smart Grid
 - options they may present now and in the future.

Please provide your comments and feedback to us via

- e-mail; or
- through our website www.yukonelectrical.com
- Plus – if you would like an emailed copy of this presentation



AMR, AMI, Smart Meters & Smart Grid

Understanding the Challenges and the Deliverables

QUESTIONS?