

Preparing for the Meter Data Deluge

An *Intelligent Utility* Reality Webcast

June 2, 2011

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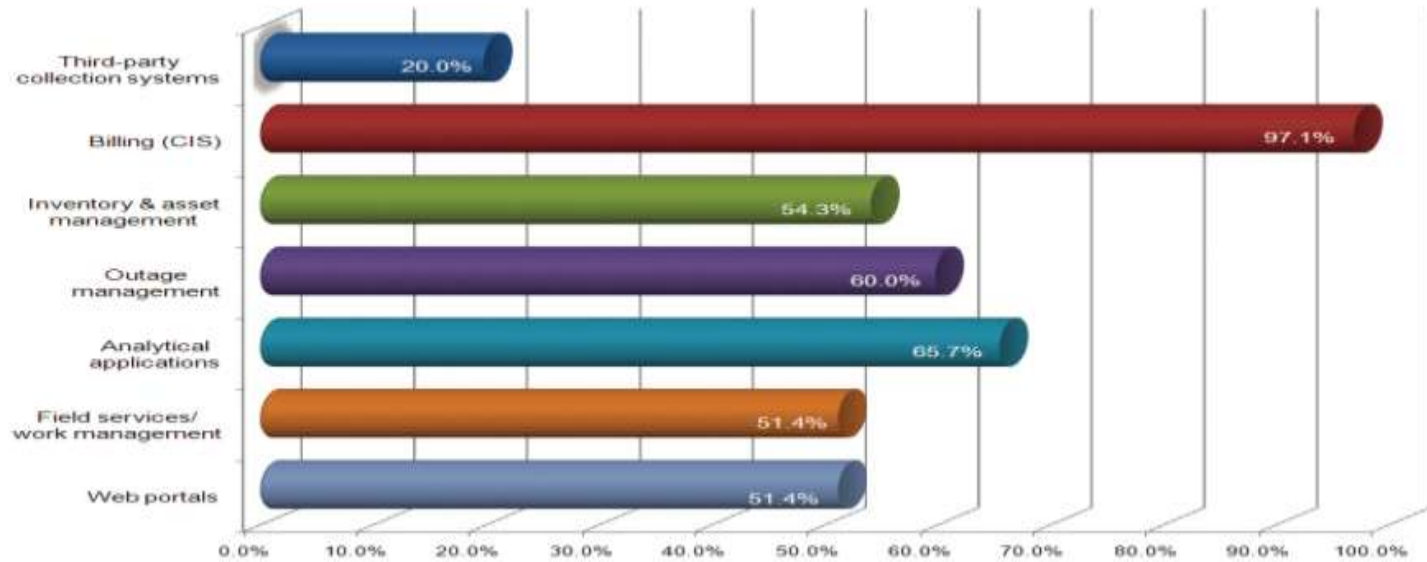
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For every million meters served by a smart meter operations team ...

- More than 2,000 meter exchanges per day during deployment
- More than 1,000 customer moves per day (assumes 25 percent yearly turnover)
- 10,000 missing reads per day (assumes 99 percent daily read success)
- 20 meter failures per day (assumes a 0.5 percent annual failure rate)
- 10,000 data changes per day
- More than 96,000,000 meter reads per day (assumes 15-minute data intervals)

Functional Elements in the Utility That Utilize the MDM Platform

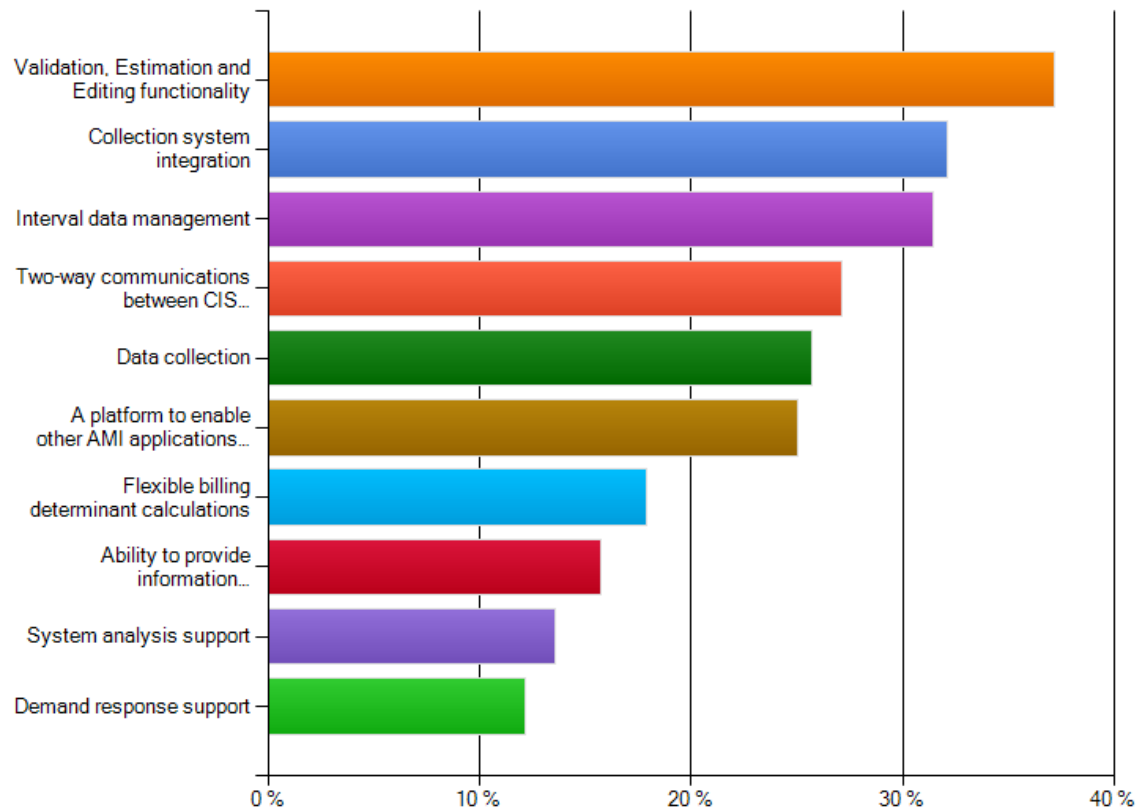


Integration remains a challenge

Average rating of satisfaction with current MDM solution as it relates to the following areas:	
Aspect	Average Rating
Aggregating meter reads	3.88
AMI integration ease	3.58
Balances security and usability	3.55
Calculating billing determinants	3.70
CIS integration ease	3.52
Estimating invalid or missing reads	3.77
Evaluation of AMI network operations	3.90
Exception Management	3.63
Handling of meter exchanges	3.37
Net metering support	3.40
OMS integration ease	3.36
Overall functionality	4.06
Scalability	3.97
Security	3.71
Supporting large rollouts of smart meters	3.96
Value to utility	3.84
Validation/Estimation/Editing (VEE)	3.94
Vendor support to utility	3.84

Critical aspects of a MDM

Top 10 Critical Aspects of a Meter Data Management System



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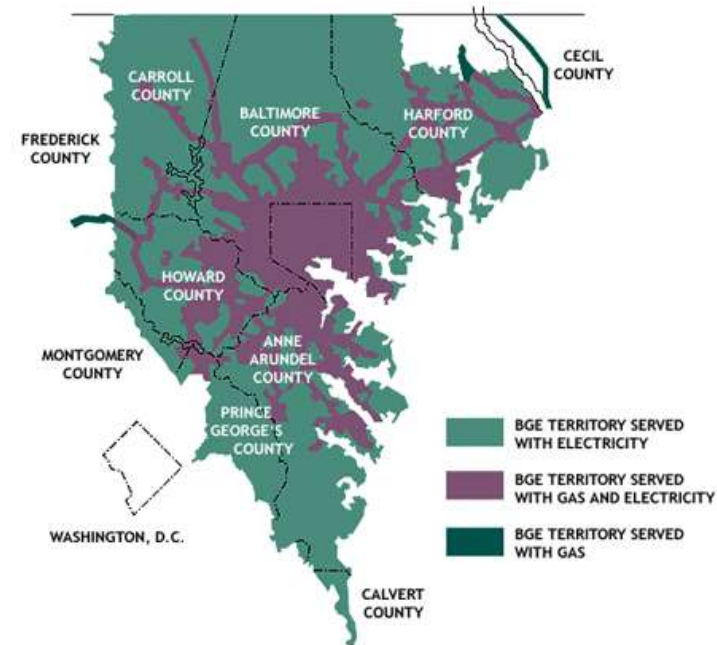
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- Founded in 1816, Baltimore Gas & Electric is the nation's first gas utility and one of the earliest electric utilities
 - Headquartered in Baltimore, MD
 - Holding company is Constellation Energy
- Regulated distribution utility with more than 3,200 employees
- More than 1.2 million electric customers and approximately 650,000 gas customers
- Electric assets: 248 substations
- Natural gas assets: 2 peak-shaving plants and 9 gate stations

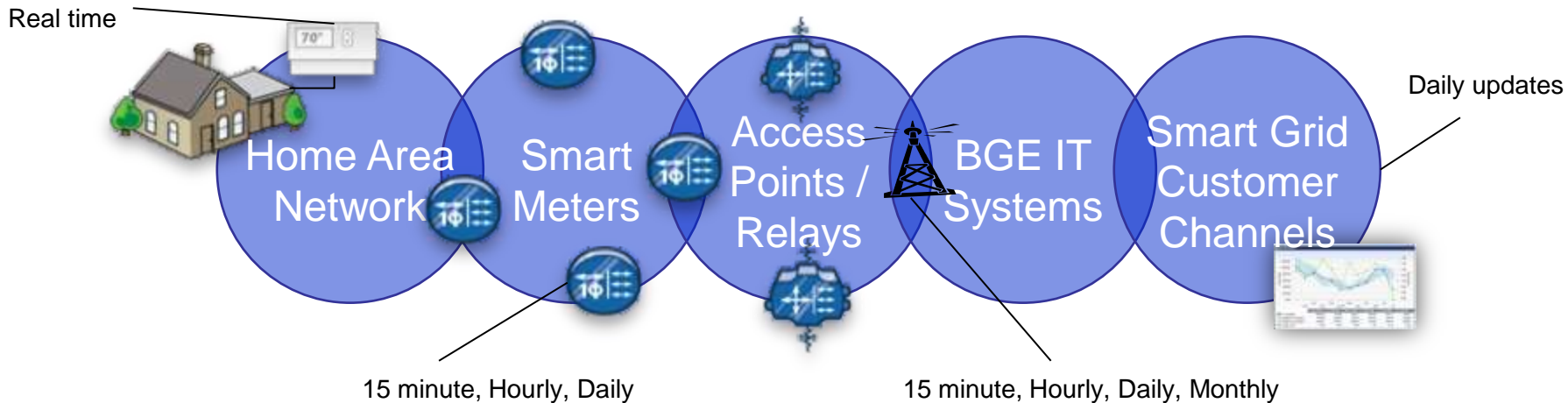
Service Territory:

- 2,300 square miles (electric)
- 800 square miles (gas)



Smart Grid initiatives are fundamentally changing how utilities interact with customers and the information that customers expect from the utility. Exchange of information to support Real Time Pricing, Energy Conservation, and Energy Analytics are just some of the immediate initiatives driving a more open exchange of data.





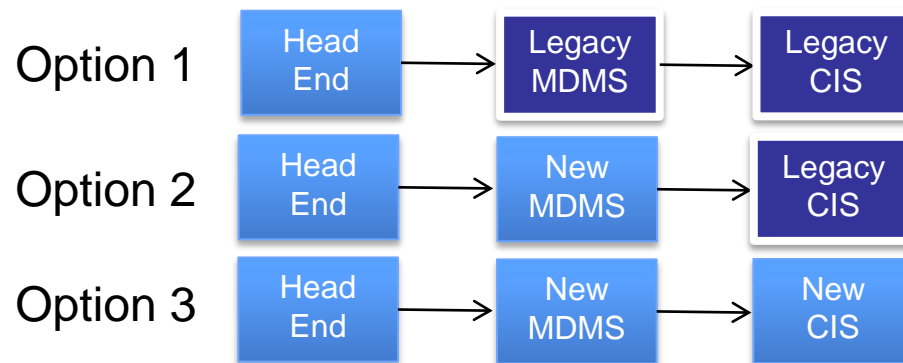
As utilities roll out smart meters, the volume of data they need to manage will grow exponentially.

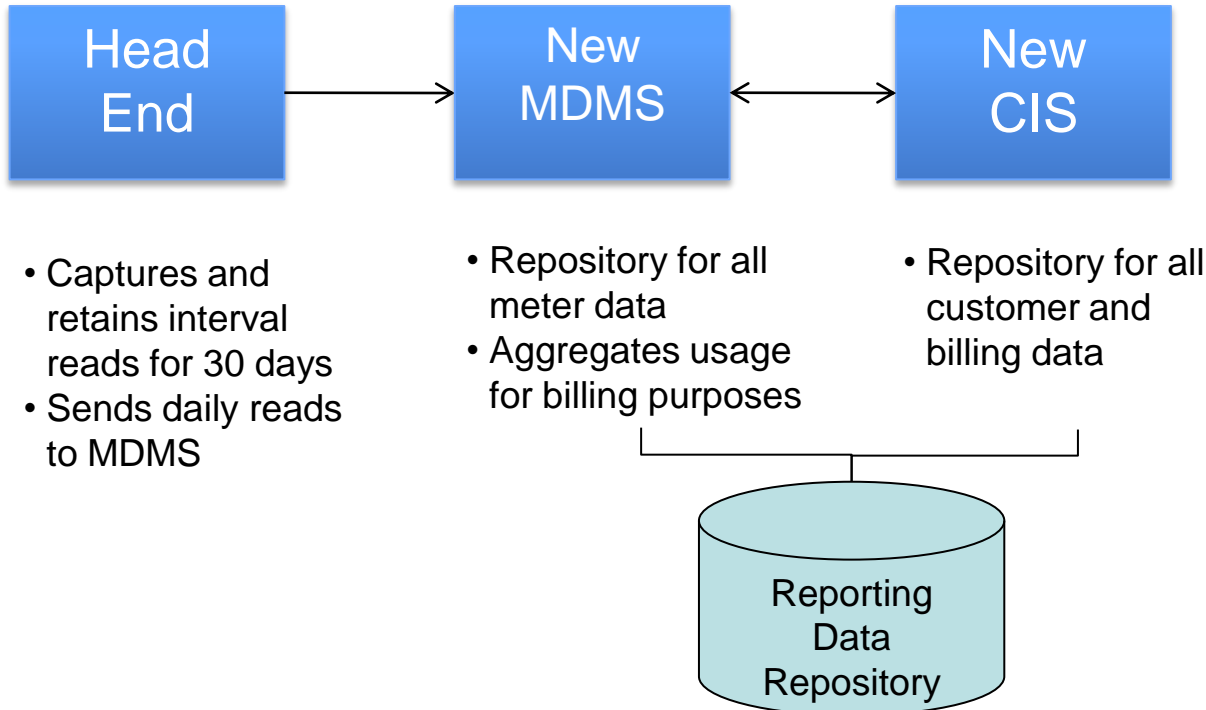
- 15 minute interval reads will be captured at the Head End
- Hourly reads will be transmitted to the utility's Meter Data Management System (MDMS)
- Hourly and Monthly reads will be leveraged to compute usage and billing
- Various intervals of usage will be available for customers to view daily

Utility data growth will grow exponentially, increasing storage costs and requiring a robust system to capture, aggregate and provide analytics to the billing system, reporting system, and customer portals.

Embarking on a Smart Grid Initiative requires utilities to rethink their systems infrastructure. Merely exchanging existing meters for smart meters may have unintended consequences.

- Can your existing MDMS handle the volume of data?
- Can your existing Billing system continue to calculate bills in the desired window when an exponential amount of data is introduced?
- Are functions appropriately sourced to the right system?
- How will data be made available to customers?





BGE selected Option 3 and is implementing all of the system components in parallel due to the \$200 million DOE grant.

Customer Care & Billing



Meter Data Management

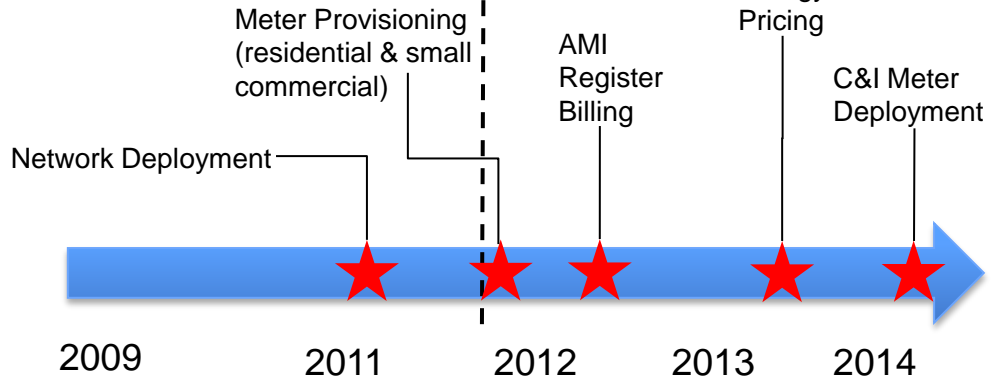


Smart Grid Initiative



25 months

22 months



- Complexity
- Integration: MDM to CC&B
- Resource requirements
- Expertise in the marketplace
- Preparing your organization to accept the solution



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Jon Pettit, PE

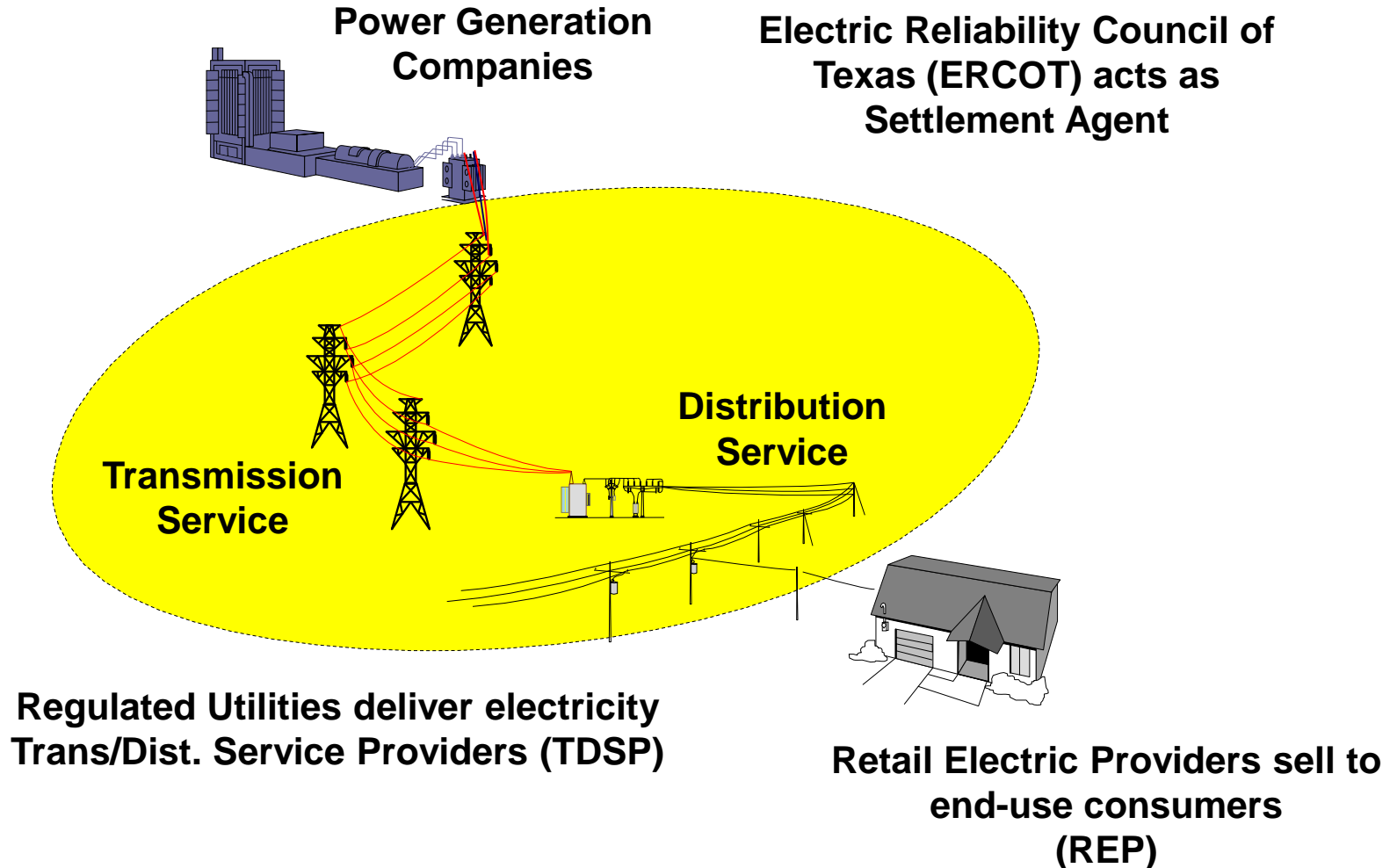
AMS Program Manager

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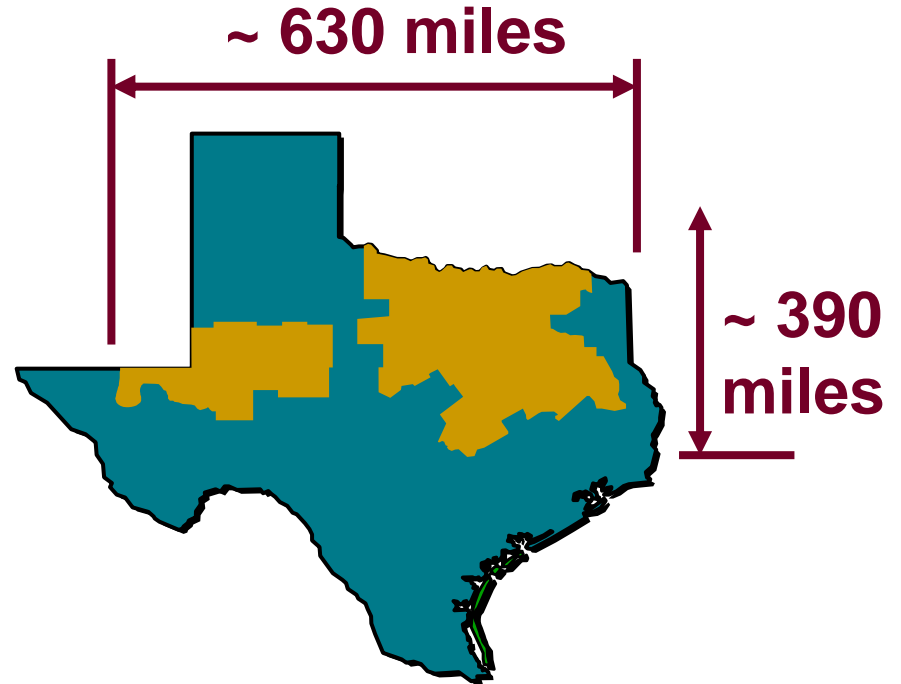
Texas Competitive Electricity Market



Oncor Profile

- 27,000 sq. miles
- 3.2 million meters
- 7.5 million people
- 107 customers (REPs)

- 6th largest T&D utility in US
- Over 1.7 million advanced meters deployed
- 2008-2012 deployment



AMI Functionality

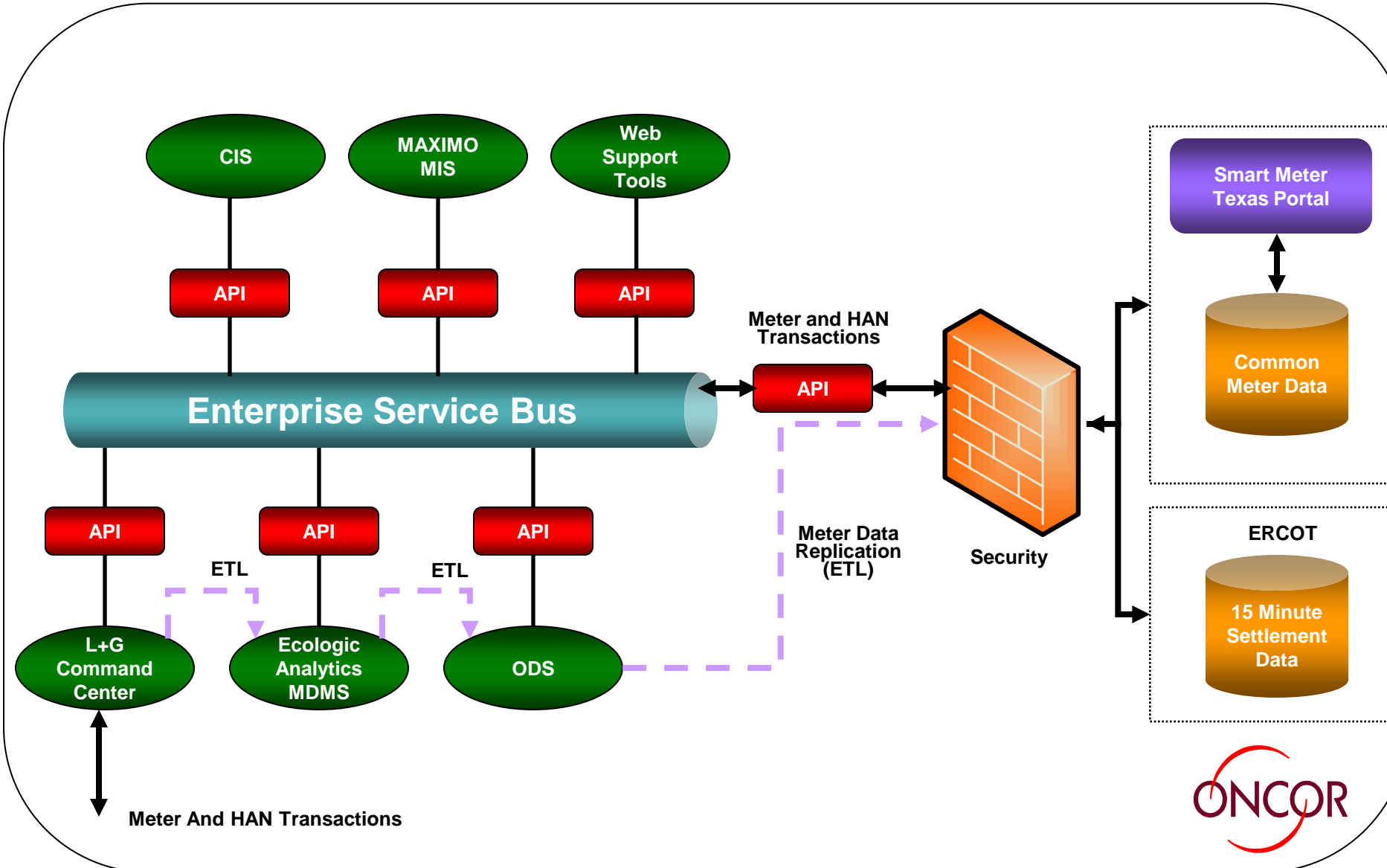
- 15 minute interval data
- Remote disconnect switch
- Provide on-demand readings
- Provide a common web portal
- ZigBee SE 1.0 HAN
- Provide last gasp / outage restorat



Role of MDMS

- **Perform VEE On Day After Meter Reading**
 - **Uniform Business Practice Rules**
 - **ERCOT (Load) Profiles**
 - **Data quality**
- **Automated Meter Connect / Disconnect Based On Market Transactions**
- **Not a billing system**
- **Not a service order management system**

Basic IT Structure



Implementation & Integration

- **Head end availability**
- **IEC-CIM standards**
- **Combination of legacy & SOA**
- **Batch vs. web services**
- **Complexity of testing**
- **Phased releases of functionality**
 - **Ability to add more functionality**

Business Processes

- **AMI will touch all, and change most**
 - **Not a technology upgrade**
- **Business unit participation**
 - **Metering & Revenue Departments**
 - **Change management**
 - **Training**
 - **Documentation**

Operations (AMI & IT)

- **Knowledge transfer (KT)**
- **Role of the MDM Analyst**
- **Data quality / transaction validation**
- **Exception treatment**
- **Vendor support**
- **Data retention**
- **Security (user roles, LDAP)**
- **Storage, servers, and network**

Lifecycle Management

- **Test environments**
 - **Additional licensing requirements**
 - **Maintaining test environments**
- **AMI roadmap vs. vendor roadmap**
- **Customization vs. COTS**
- **Future head end integration**
- **New metering technologies**

Closing Comments

- **Sponsorship and support**
- **Expect changes - new technology**
- **Be prepared for the meter data deluge**
- **Get real customer feedback**
- **Get a real demonstration**

For More Information



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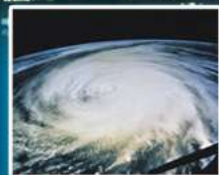
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Houston's Smart Grid:

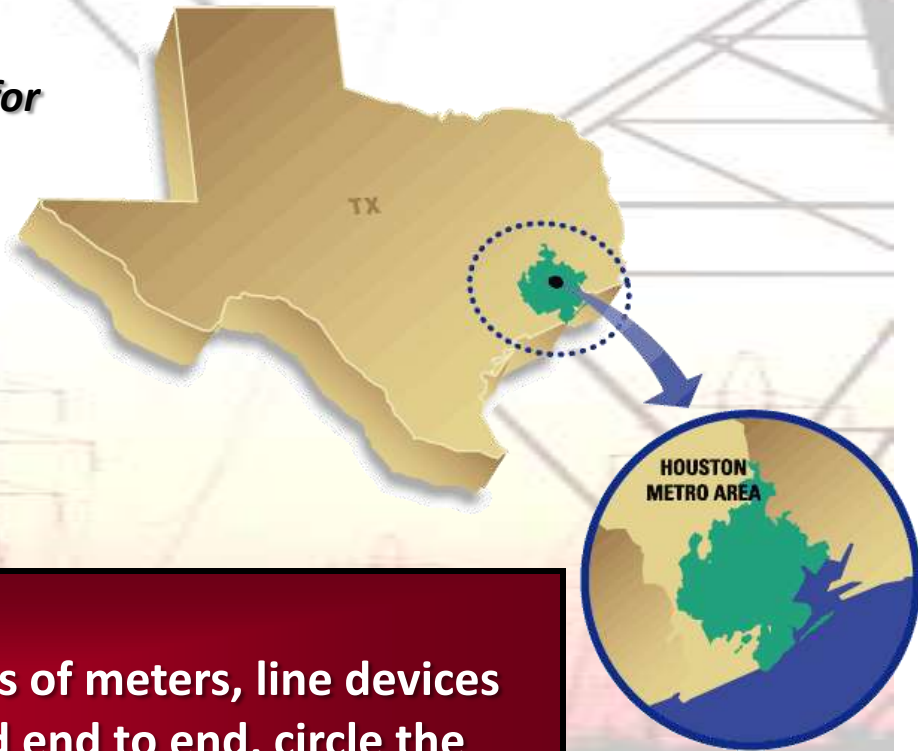
Transforming the Future of Electric Distribution & Energy Consumption

Presentation for Preparing for the Meter Data Deluge
June 2, 2011



CNP - Houston Metropolitan Area

- **5,000 square mile service area**
- **Approximately 2.2 million electric and 1.1 million gas meters**
- **Houston Electric**
 - **Delivers 77 billion kilowatt hours yearly for about 100 certified competitive retailers**
 - **Transmission and Distribution System**
 - ◆ **3,754 miles of transmission lines**
 - ◆ **48,232 miles of distribution lines**
 - ◆ **233 substations**

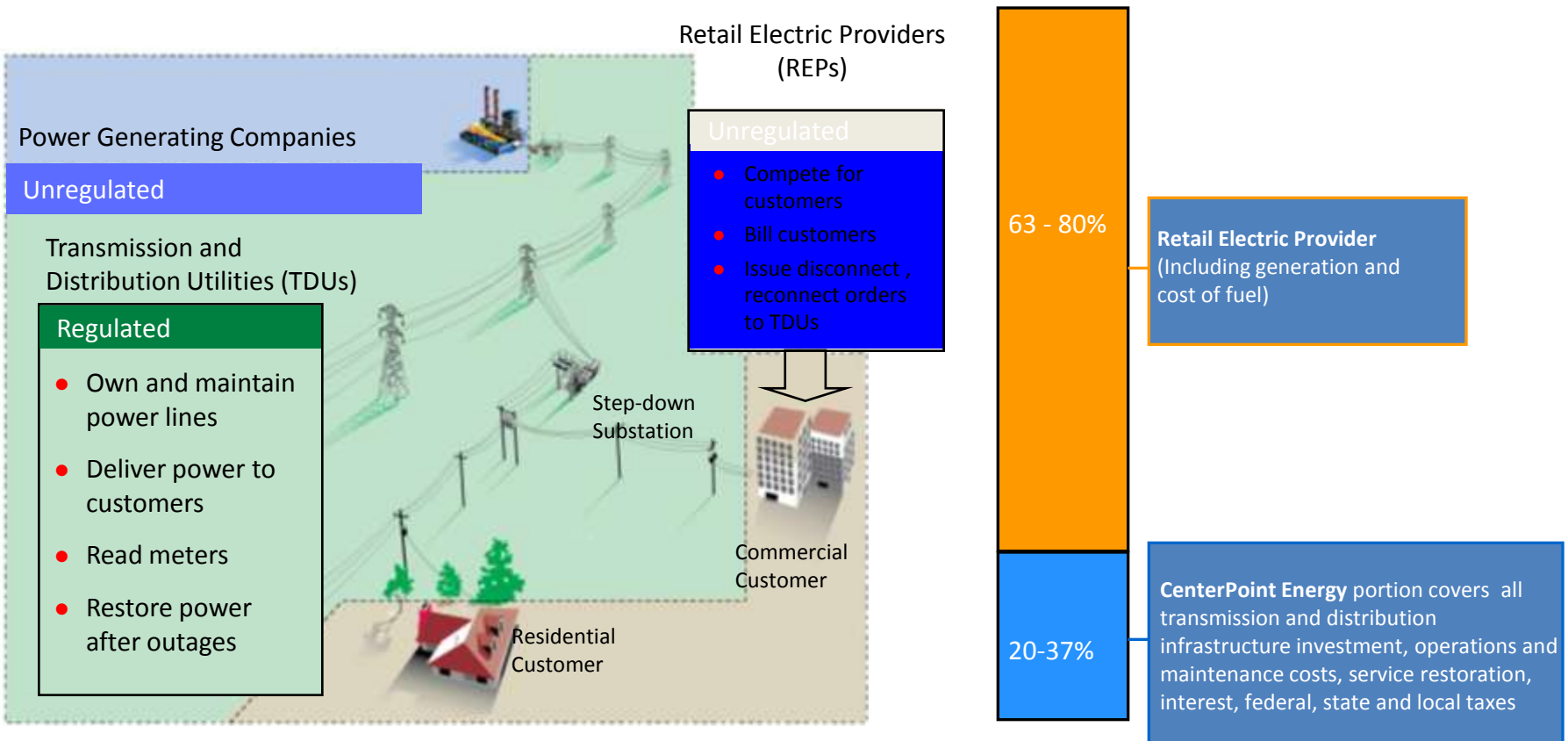


Electric Challenge:

Effectively monitor and control millions of meters, line devices and miles of delivery wire which, if laid end to end, circle the earth almost twice around the equator

The Texas Electric Market

Cost of electricity to residential customer



Power Generating Companies

Unregulated

Transmission and Distribution Utilities (TDUs)

Regulated

- Own and maintain power lines
- Deliver power to customers
- Read meters
- Restore power after outages

Retail Electric Providers (REPs)

Unregulated

- Compete for customers
- Bill customers
- Issue disconnect, reconnect orders to TDUs

Step-down Substation

Commercial Customer

Residential Customer

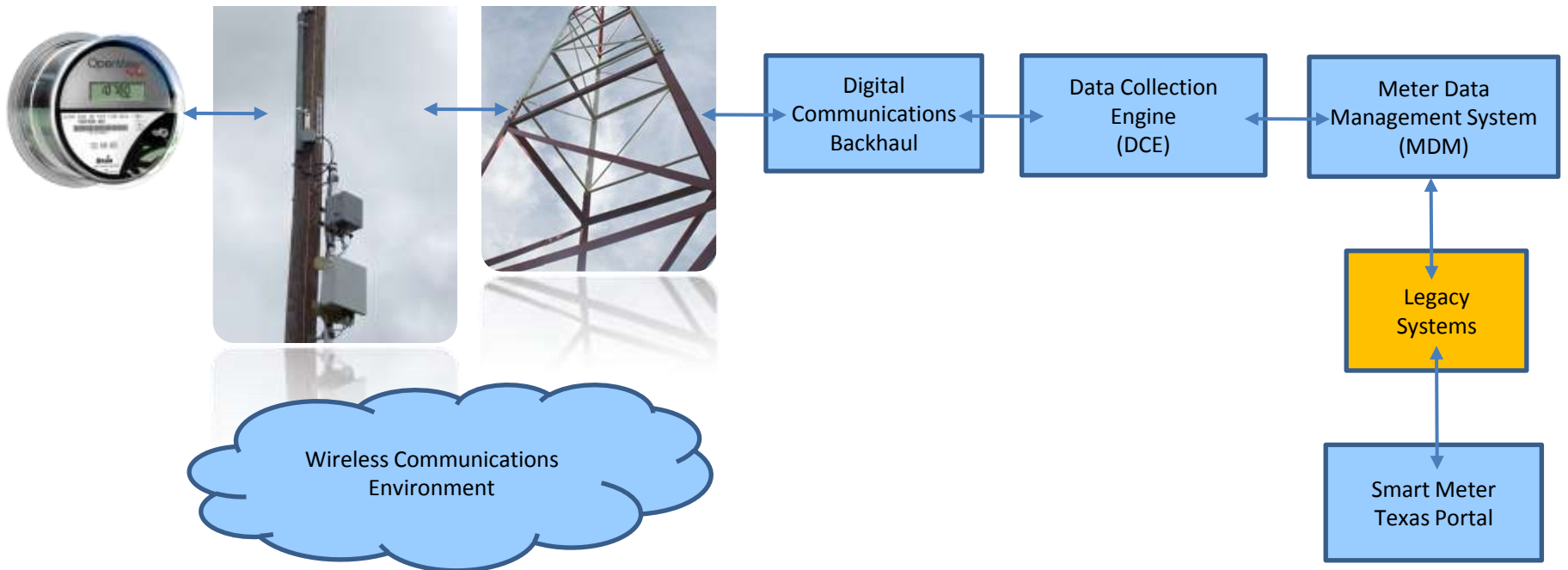
63 - 80%

Retail Electric Provider (Including generation and cost of fuel)

20-37%

CenterPoint Energy portion covers all transmission and distribution infrastructure investment, operations and maintenance costs, service restoration, interest, federal, state and local taxes

Components of our Advanced Metering System (AMS)



Combined with back office computer systems and integration, our AMS provides:

- Daily register reads
- Daily 15 minute interval reads
- Remote connect / disconnect / on-demand reads
- Access to data via Smart Meter Texas portal

Deployment

AMS Infrastructure deployed

- 1.3+ million AMS meters
- 3.8+ thousand AMS cell relays
- 90+ AMS take out points
- 497 HAN devices (IHDs) deployed and functioning (pilot)

Impact of Department of Energy grant

- \$150M for AMS acceleration and \$50M for IG start-up
- AMS completion moved from 2014 to 2012
- Start IG implementation inside 610 loop (15% of service territory)

Performance

- Average electronic service order execution time ~30-40 minutes with an average completion success rate: ~95%
- # of service orders completed electronically – over 870,000
- Interval Read Rate – Total Meters: ~96%

Challenges

- First-of-a-kind deployment
- Performance at operational scale
- Knowledge transfer
- Volume of data
- Business transformation
- Stakeholder Management



Things to consider



Systems

- Types of environments --- legacy mainframe, database
- Interfaces

Processes

- Tracking/Monitoring deployment
- Monitoring/Resolution of non-communicating meter
- Utilization of event data

Communication

- Knowledge transfer
- Training

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