SmartCurrents™: Technical Achievements and Practical Challenges

We transform energy into information to revolutionize the customer experience

July 28, 2010
DTE Energy

Electric Utility
- Detroit Edison

Gas Utility
- MichCon

Non-utility Operations
- Power & Industrial Projects
- Gas Midstream
- Unconventional Gas Production
- Energy Trading

Corporate & Other

Key Facts
- Gas and electric utility services to 2.7 million Michigan homes and businesses
- Energy-related services to businesses and industries nationwide
- Assets $24.2 Billion
- Revenue $8 Billion
- Employees 10,244

2009 Operating Revenues*
- Electricity 59%
- Gas 24%
- Non-Utility 17%

* Excludes Corp. & Other
DTE Energy’s Regulated Utility Businesses

**Detroit Edison**

- Largest electric utility in Michigan and one of the largest in country

**Generation**
- 11,084 MW electricity
- 9 fossil-fuel plants
- 1 nuclear power plant

**Distribution**
- 2.1 million customers

**MichCon**

- Purchases, stores and distributes natural gas throughout Michigan
- 1.2 million customers

**Detroit Edison and MichCon Service Area**
Locally, auto and steel production has experienced significant reductions in the past few years.

- After a dramatic decrease in the recent past, auto production is rising driven by sales growth.
- Steel tonnage is also up significantly from last year, feeding the growing auto production.
- Auto industry bailout saves southeast Michigan; though long-term recovery is still uncertain.
Capital Investments in excess of depreciation

- Mandated investments in environmental control technologies
- Base capital investments to upgrade infrastructure to maintain / improve system reliability

Going forward, a number of issues could negatively impact customer affordability
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**Capital Investments in excess of depreciation**

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**Operating Cost Pressure**

- Increasing coal transportation costs
- Increasing commodity prices
- Increasing benefits costs
- Inflation pressure
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- Climate Change Legislations
- MACT (Maximum Achievable Control Technology) for mercury
- Clean Air Interstate Rule (CAIR)
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- Average age for our fleet is 46 years, with a number of units approaching their end of useful life
- Unit abandonment strategy and future capacity additions will impact customer affordability
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**Slow Economic Recovery**
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- Potential challenge to the Comprehensive Energy package especially on Choice cap
Customer Affordability has become a significant driver of customer satisfaction
Addressing Customer Affordability involves a broader solution set that includes leveraging technology investments

- Proactively seeking and providing assistance to customers who are struggling to pay utility bills
- Developing and implementing targeted initiatives to improve overall customer satisfaction
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- Making mandated investments in our highest value-generating assets
- Strict capital discipline to mitigate affordability pressure

Intense focus on Customer Satisfaction

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Minimizing large, discretionary investments and pacing investments as much as possible
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  - Making mandated investments in our highest value-generating assets
  - Strict capital discipline to mitigate affordability pressure
  - Advanced Metering Infrastructure (AMI)
  - Smart Grid Technologies
  - Demand side management
  - Energy Optimization

- **Intense focus on continuous improvement to increase productivity**

- **Minimizing large, discretionary investments and pacing investments as much as possible**

- **Investing in technologies to balance customer affordability and customer satisfaction**

Addressing Customer Affordability involves a broader solution set that includes leveraging technology investments.
We closely monitor Smart Grid Issues and develop corresponding mitigation strategies.

**Smart Grid Issues**

- Demonstrating the value of the Smart Grid
- Dealing with the AMI Backlash
- Smart Grid Regulatory Issues
- Data Access / Privacy Issues

**DTE Energy’s Risk Mitigation Strategy**

- Currently developing a robust education and communication plan to ensure our major stakeholders understand the inherent value in Smart Grid technologies
- Will rollout technology slowly to ensure we can address customer issues proactively

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| Data Access / Privacy Issues      | • Collaborating with other utilities and EEI to develop a position in response to the Department of Energy’s Request for Information on this particular issue  
• This is a major discussion point within the Michigan Smart Grid Collaborative |
**Smart Grid = SmartCurrents**

SmartCurrents is DTE’s “brand” of Smart Grid, an extension of our existing GreenCurrents program.

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A memorable brand that leverages our GreenCurrents history and resonates with our customers.
SmartCurrents℠ Framework

SmartCurrents℠ will interface with existing assets, business processes, and computer applications.

Assets
(Poles, Wires, Transformers, Switches, Breakers, Capacitors, etc.)

Data

Telecommunications

Business Rules

Existing Applications

CSB       KCS       ESRI       EMS       Maximo       InService       MDM       EBS
SmartCurrents℠ Framework

SmartCurrents℠ incorporates new applications and includes several ongoing and proposed programs

Smart Meter  Smart Home  Smart Circuit  Energy Storage  DER  PEV

Advanced Metering Infrastructure  Distribution Automation  Distribution Management System  Substation Automation

CSB  ESRI  EMS  Maximo  InService  MDM  EBS

Data  Telecommunications  Business Rules

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(Poles, Wires, Transformers, Switches, Breakers, Capacitors, etc.)
SmartCurrents™ Framework

SmartCurrents™ is focused on corporate objectives and will help deliver first quartile performance

1st Quartile Performance

- Service Quality
- Customer Satisfaction & Affordability
- Operational Efficiency
- Smart Meter
- Smart Home
- Smart Circuit
- Energy Storage
- DER
- PEV

Advanced Metering Infrastructure

Distribution Automation

Distribution Management System

Substation Automation

CSB

ESRI

EMS

Maximo

InService

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Data

Telecommunications

Business Rules

Assets

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Goal

Objectives

Programs

New Applications

Existing Applications

Customer Satisfaction & Affordability

Operational Efficiency

Data

Service Quality

Smart Currents™ is focused on corporate objectives and will help deliver first quartile performance.
SmartCurrents℠ Framework

SmartCurrents℠ is a mix of existing and new applications, the programs dependent upon them, and supports operational goals and objectives.
DOE Grant FOA-58

- Announced the Funding Opportunity Announcement (DE-FOA-0000058) on June 25, 2009
- SGIG program will provide up to 50% percent cost matching for eligible smart grid projects with a maximum three-year duration
- The DOE set aside ~$3.4B for SGIG, but only $2B for applicants with projects in excess of $20 million

DECo Application

- Submitted a two-year investment plan under the SmartCurrents\textsuperscript{SM} program
- Under the DOE topic area of "Integrated and/or Crosscutting Systems", which is aimed at adding smart grid functions to multiple portions of the electric system
- Cost: $168M
  - $84 million from DECo and partners
  - $84 million expected from DOE grant

Latest Status

- DTE’s contract with the DOE for an $84 million matching grant was signed and executed April 26, 2010 and will be complete in 2012.
AMI
• 600,000 meters
• Rollout begins in Oakland County and continues in the surrounding areas, including the city of Detroit
• DECo offers OpenWay AMI solutions from Itron

Smart Home
• Smart appliances to 300 customers
• In-home displays (IHD) to 1,050 customers
• Programmable Thermostats (PCT) to 1,050 customers
• Dynamic pricing to 1,900 customers

Smart Circuit
• 55 circuit upgrades covering 11 substations at 3 distinct sites (Bloomfield, Milford, Commerce Lake)
• Sites will overlap with AMI installations in Oakland County

Information Technology (IT)
• Integrated IT systems to provide a complete and connected picture of the distribution network
• Security and Interoperability
Advanced Metering Infrastructure

Customer satisfaction and enhanced operations……

Devices/Systems

• Meters
• Cell Relays
• AMI Collection Engine and Meter Data Management (MDM) System

Key Features

• Bi-directional communication
• Daily meter reads of registers and hourly intervals
• Power outage and restoration notifications
• Power quality events (voltage fluctuation, momentaries etc.), notification and storage
• Remote disconnect/re-connect
• Net metering
• Advanced tamper detection and alarms

Bi-directional communication through three networks:

• Home Area Network (HAN)
• Local area Network (LAN)
• Wide Area Network (WAN) or Backhaul
AMI Deployment Sequence

Installation (As of July 1, 2011)
- 350,000 endpoints installed
Smart Home
Systems, Devices, and Functions

**Devices/Systems**

- Electric and gas AMI meters
- In-home displays (IHD)
- Programmable thermostats (PCT)
- Smart appliances
- Other utility meters
- Plug-in hybrid electric vehicle (PHEV)
- Local energy sources and storage (e.g., solar, wind etc.)

**Key Functions**

- Display of energy usage on IHDs
- Energy consumption information and remote thermostat control through Internet
- Dynamic pricing and pre-pay options
- Pre-programming of appliances to respond to dynamic pricing
Smart Circuit
Features and Systems

Key Features

• Self-healing
• Intelligent switching and fault diagnosis
• Voltage/VAR control
• A complete and connected picture of the whole system
• System level diagnosis and modeling applications to ensure reliability and efficiency
• Business intelligence to operators and functional organizations

Devices/Systems

Remote monitoring and control devices

• “Triple Single” Reclosers
• Automatic pole top switches
• Substation Remote Terminal Units (RTU)
• Capacitors retrofitted with remote SCADA control
• New distribution circuit design to provide additional switching options

Extended communication networks

• Field Communication Network (FCN) extended to key points in distribution system
• All devices support the DNP 3.0 communication protocol

Central Distribution Management System (DMS)

• Supervisory Control and Data Acquisition (SCADA)
• Energy Management System (EMS)
• Meter Data Management (MDM)
• Geographic Information System (GIS)
• Asset Management System (AMS)
• Outage Management System (OMS)
AMI with DOE/MPSC Grant Projects

The SGIG, combined with the balance of DOE & MPSC funded projects, touch all aspects of the Smart Grid and are geographically dispersed.
SmartCurrents℠ = Customer Satisfaction
- Shorter, less frequent outages
- Control of home energy consumption and cost
- Wind Power, Solar Power, and Electric Vehicles

SmartCurrents℠ = Green
- Reduced vehicle use for meter reading, fault locating, & repairs
- Integration of renewables
- Increased Electrical System Efficiency

SmartCurrents℠ = Jobs & Job Satisfaction
- 700 jobs for IT contractors and Overhead Lineman
- 350 permanent positions for suppliers
- Dispatch direct to trouble locations
- Reduced patrol time, particularly at night or in bad weather
- Better operating maps and mapping products