Utilizing BPL to create a 21st Century Grid
Agenda

- Electrical Infrastructure Review
- TXU Electric Delivery - Current Relationship
- Project Status and Lessons Learned
- Governmental Encouragement
- Delivering the Intelligent Grid
Agenda

- Electrical Infrastructure Review
- TXU Electric Delivery - Current Relationship
- Project Status and Lessons Learned
- Governmental Encouragement
- Delivering the Intelligent Grid
Without greater investment, the existing U.S. system will not reliably support the increasing demand for energy.

Source: EPRI
... Compounded by a Historical Lack of Investment in R&D and Infrastructure ...

U.S. investment in energy R&D in $ billions

- 1990: $6B
- 2000: $4B (50% decrease)

Private sector R&D investment (1995) for various industries as a % of net sales

- Medicine: 10.5%
- Comm Equip: 10.0%
- Svcs: 7.5%
- Trans Equip: 6.0%
- Chem: 4.5%
- Energy: 0.5%

U.S. federal R&D support for energy is only about 4% of total federal energy R&D outlays

Source: EPRI
... Causing Outages that Cost Customers Billions Annually ...

U.S. economic cost of outages in $ billions/year

- **2003 est. loss**: $100B
- **2020 expected loss**: $300B

- Today, outage costs represent 1% of GDP
- This loss represents a cost of $0.50 for every $1 spent on electricity
- Technology investments could reduce outage costs by 50-80%
- If no investment is made to transform the grid system, the annual cost of outages is estimated to reach $300 billion by 2020

Source: EPRI
TXU Electric Delivery has achieved top quartile cost and reliability performance...

U.S. electric delivery company performance 05; SAIDI¹

Resulting In Industry-Leading Reliability Performance

TXU Electric Delivery’s target

TXU

Top quartile cost

Top quartile SAIDI

Distribution O&M and capital cost ($/customer)

TXU Electric Delivery has achieved top quartile cost and reliability

¹ Excluding major events and planned outages
CURRENT & TXU

> CURRENT is designing, building and will operate the Broadband over Power Line network covering the majority of the TXU Electric Delivery service area including the Dallas-Fort Worth Metroplex and other communities.

> CURRENT will provide retail, wholesale and other communications services to end-use customers, municipalities, and Internet Service Providers (ISP).

> TXU Electric Delivery will procure enhanced utility services such as automated meter reading (AMR) communications, fiber optic data transport and network monitoring services from CURRENT.
The CURRENT BPL System

- Internet Voice over IP
- Carrier POP
- CT View® Network Management System
- CT Coupler® & CT OTP™
- HomePlug® Modems at Premises
- CT Coupler & CT Bridge
- Metro Area Network
- Fiber or Wireless Backhaul
- Medium Voltage Primary
- Distribution-Point
- Current Node CT Coupler & CT Backhaul-Point
- Low Voltage Lines
- CT Coupler & CT Bridge
- Medium Voltage Primary
- Low Voltage Lines
- Current Communications Group
- Confidential Information
Agenda

> Electrical Infrastructure Review
> CURRENT – TXU Relationship
> Project Status and Lessons Learned
> Governmental Encouragement
> Delivering the Intelligent Grid
# BPL Project Teams

- Data Integration
- BPL Design/Standards
- ROW/Permitting/Joint-Use
- Training
- Smart Grid – AMR, Voltage, Outage
- Operations

- Data Flow/Data Architecture
- Disaster Recovery
- Regulatory/Legal
- Workforce Management
- Core Network
- Municipality Outreach
- Distribution Automation

*Managing TXU deployment is a joint effort*
Project Challenges

- Communication / education
- Process development / improvement
- Impact and coordination of multiple organizations within electric utility
- Educating communities
- Texas-sized scale

Traditional Vendor Supplier Relationship vs. Integrated Collaborative Relationship
Project Timeline

- Construction began in 4th quarter 2006
- 100 meter BPL trial completed in 2006
- Past 30K homes presently and construction resources and efficiencies continue to increase
- Production meter trial underway presently
- Retail broadband trial underway by Current
- Anticipating 200K plus homes passed and meters installed in 2007
- Project scheduled to be completed in 2011
Case Study 2007-1: Secondary Neutral Failure

This Message is automatically generated. Do not reply to this email.

Click here to view the Secondary Neutral Failure Report for 12/10/2006 - 12/11/2006

Thank you,
Smart Grid Support

What happened here?

Details
Case Study 2007-1: Secondary Neutral Failure ... So What Happened??

“During our field investigation a loose split bolt connection was found. The bad connection was between the 2/0 and #4 copper neutral”

Photo of Connection

Voltage Data Before / After Repair
Case Study 2007-3

> Feature ID: 54295906 – Transient Secondary Fault
Case Study 2007-3: Transient Secondary Fault

Investigation Trigger:
Current Look Low Voltage Notification
Case Study 2007-3:
Field Technician with Current Look Report
Case Study 2007-3: Transient Secondary Fault

Detailed Findings

“This is a 37.5 KVA, 120/240v transformer with 2/0 copper conductor connecting it to the secondary bus. One conductor had rubbed against the cooling fin of the transformer and burned the conductor for about 10” back to the secondary bushing of the transformer. This leg was carrying no load at the time that it was checked. The voltage on the bus was 121, 115, 236. We were able to cut out the burned piece, clean up the transformer bushing and had enough slack in the transformer leg to reattach to the bushing. The voltage after repairs were made was 121, 121, 242 at both the transformer bushings and the secondary bus. The load on the transformer legs is now reasonably balanced.”
Benefits Derived from BPL

- Substation security and monitoring
- Substation communication
- Improved outage management response
- Network information for diagnostic purposes
- GIS and CIS data validation
- Automated meter reading
- Integrated platform for 21st century Smart Grid applications
Agenda

- Electrical Infrastructure Review
- TXU Electric Delivery - Current Relationship
- Project Status and Lessons Learned
- Governmental Encouragement
- Delivering the Intelligent Grid
SB 5 was established to encourage and accelerate the development of a competitive and advanced service environment:

- Promotes competition among and investment in advanced networks by:
  - Authorizing broadband over power line systems
  - Reducing regulations on telecom providers
- Clarifies municipal jurisdiction
- Defines utility cost recovery criteria
- Outlines financial structure between utility and BPL operator
Agenda

- Electrical Infrastructure Review
- TXU Electric Delivery Relationship
- Project Status and Lessons Learned
- Smart Grid Vision
- Governmental Encouragement
- Delivering the Intelligent Grid
Delivering the Intelligent Grid

> The future is now. BPL is the critical foundation to creating the envisioned intelligent grid and Texas is the proving ground that BPL, as a technology, can be deployed on a large scale and with a significant scope.
Thank you for joining us today.