




Using Real-time Customer Interruption Data at Westar Energy

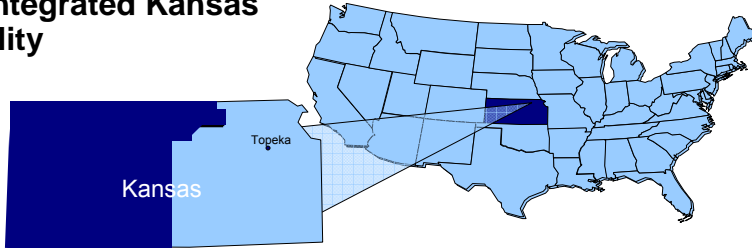
IEEE Transmission & Distribution Exposition

April 23rd, 2008


Rodney Robinson



Vertically Integrated Kansas Electric Utility




- Key Operational Facts:
 - ☞ ≈ 674,000 customers
 - ☞ More than 6,000 MW of generation
 - ☞ 11,000 sq mile service territory
 - ☞ 33,000 miles of T & D
 - ☞ 1,200 distribution circuits
 - ☞ 2,200 employees
 - ☞ Kansas retail market remains fully regulated
 - ☞ ≈ \$2.3 billion market cap



Westar Energy – Outage Management Process

- **Trouble Order System –**
 - ☞ In-house developed system
 - ☞ Connectivity model from customer back to transformer station, lateral, line segments & circuits
 - ☞ Anderson Customer Service System
- **ESRI Geographic Information System**
- **Motorola Mobile Data System**
 - ☞ Mobile Data Terminal Workstations
 - ☞ 370 Field Units
- **Landis & Gyr Energy Management System**



Real-time Data During Customer Interruptions

- **External Use:**
 - ☞ WR.COM
 - Customer Interruption Reporting & Summary Status
 - Publicly Available Customer Interruption Count by County
- **Internal Use:**
 - ☞ Outage Scope – Customer Interruption Summary
 - Geographic display of substations with customer interruptions
 - Tabular information for each office
 - ☞ Geographic Information System (GIS) display of customer interruptions down to:
 - Entire circuit
 - Laterals
 - Transformer

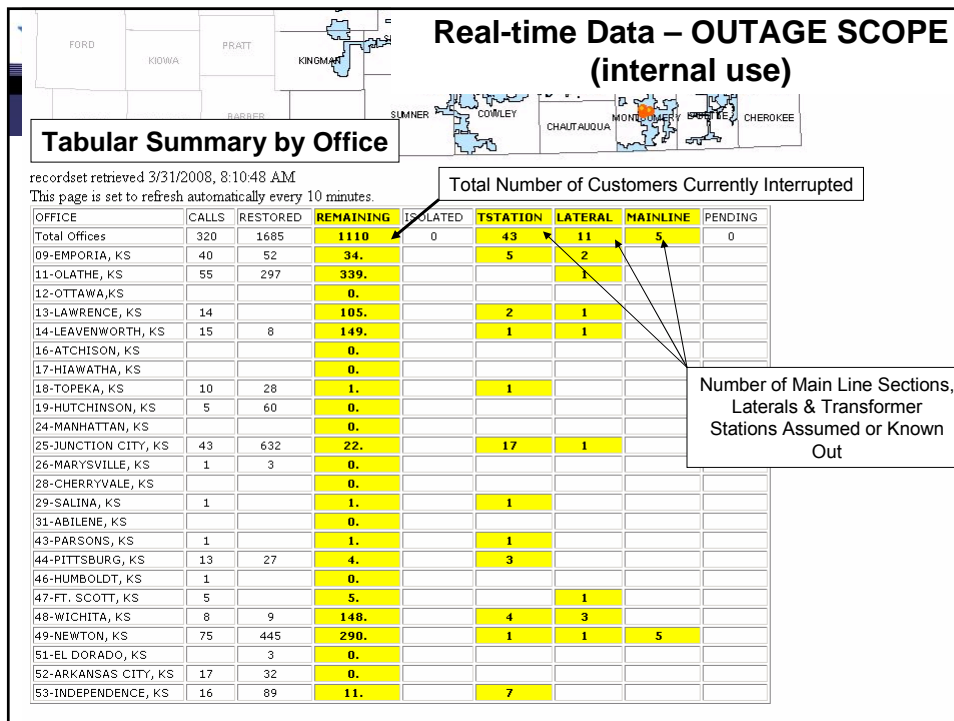
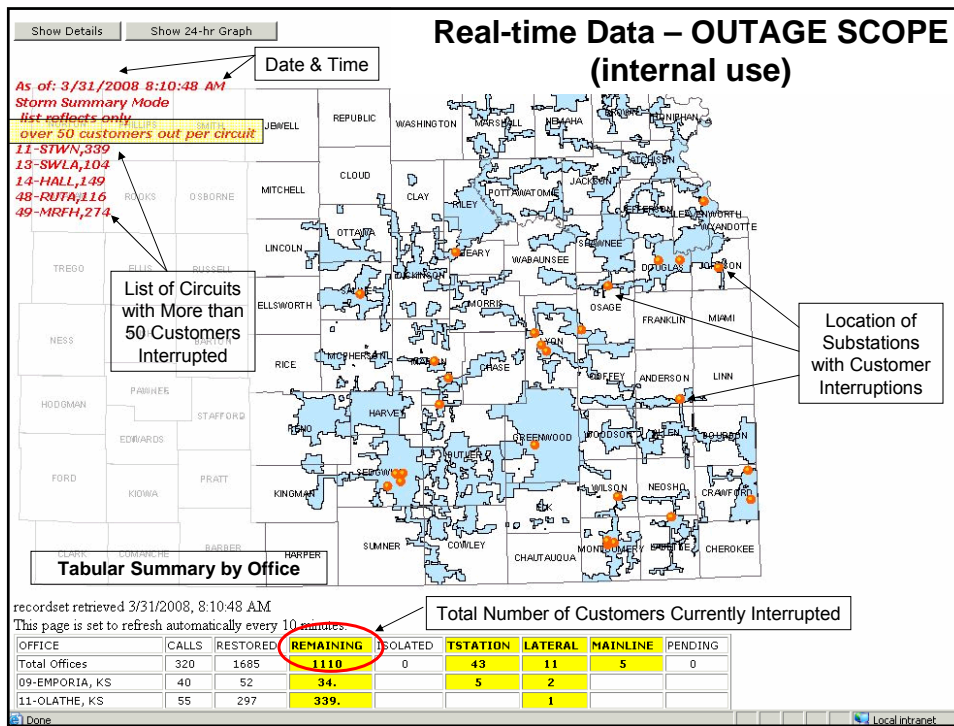


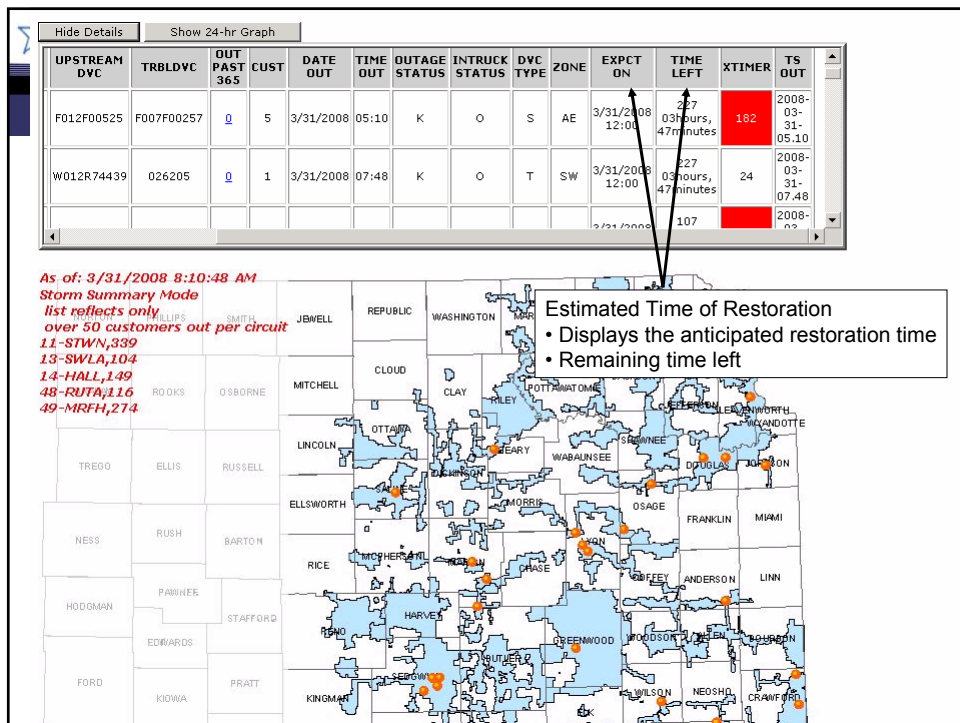
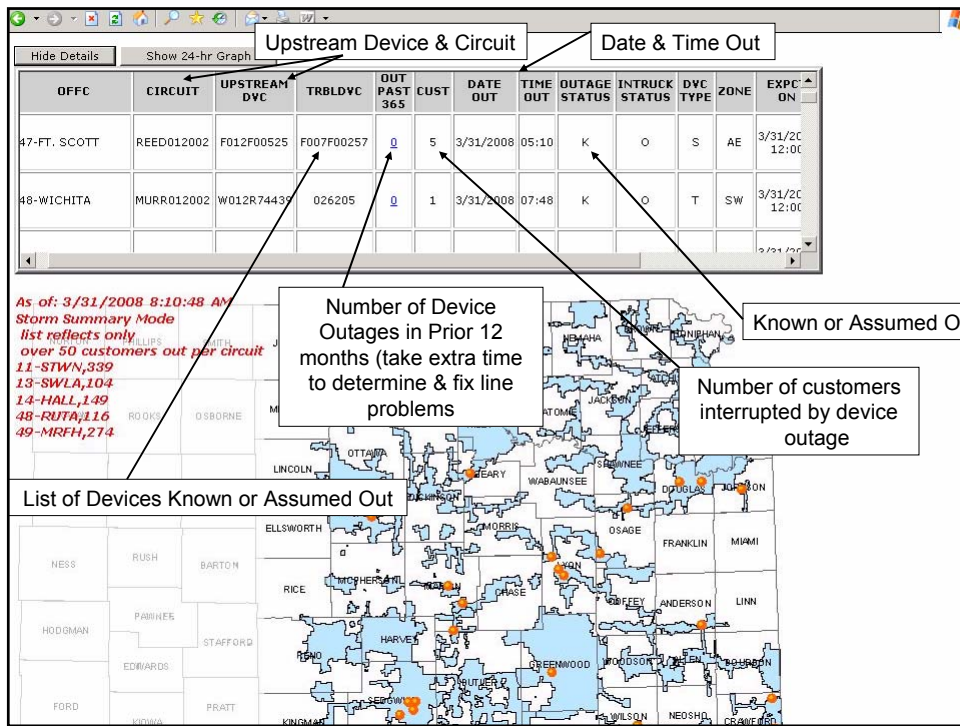
OUTAGE SCOPE

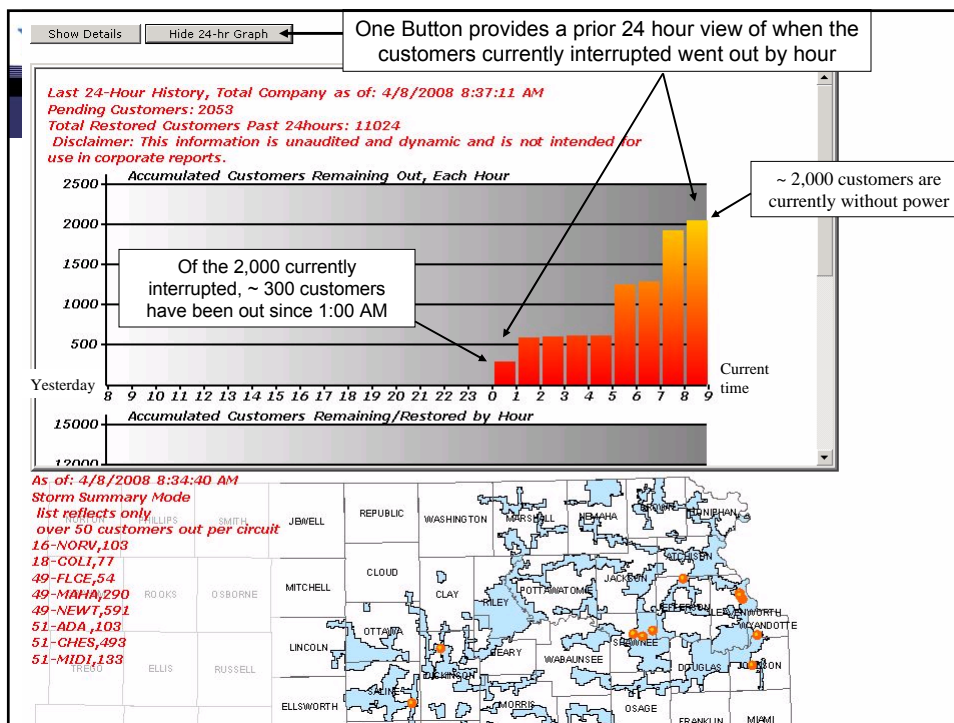
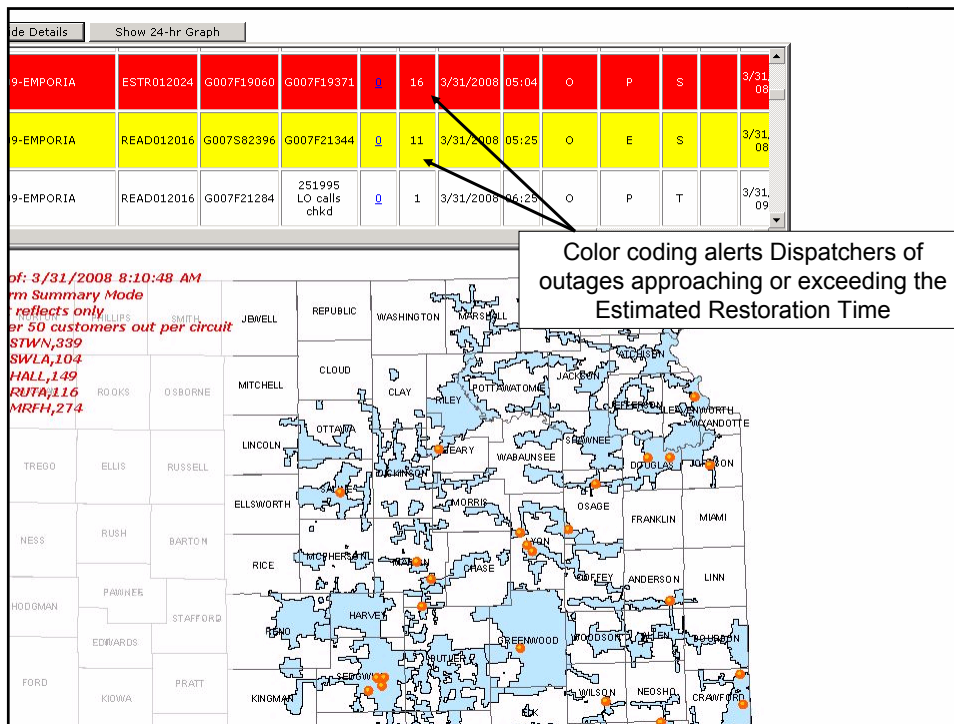
**Customer Interruption Summary
by Office and Circuits**


(Internal Use)

The figure is a slide titled "OUTAGE SCOPE" with a subtitle "Customer Interruption Summary by Office and Circuits". It includes a decorative header with images of industrial facilities, a truck, and workers. The text "(Internal Use)" is centered below the subtitle.





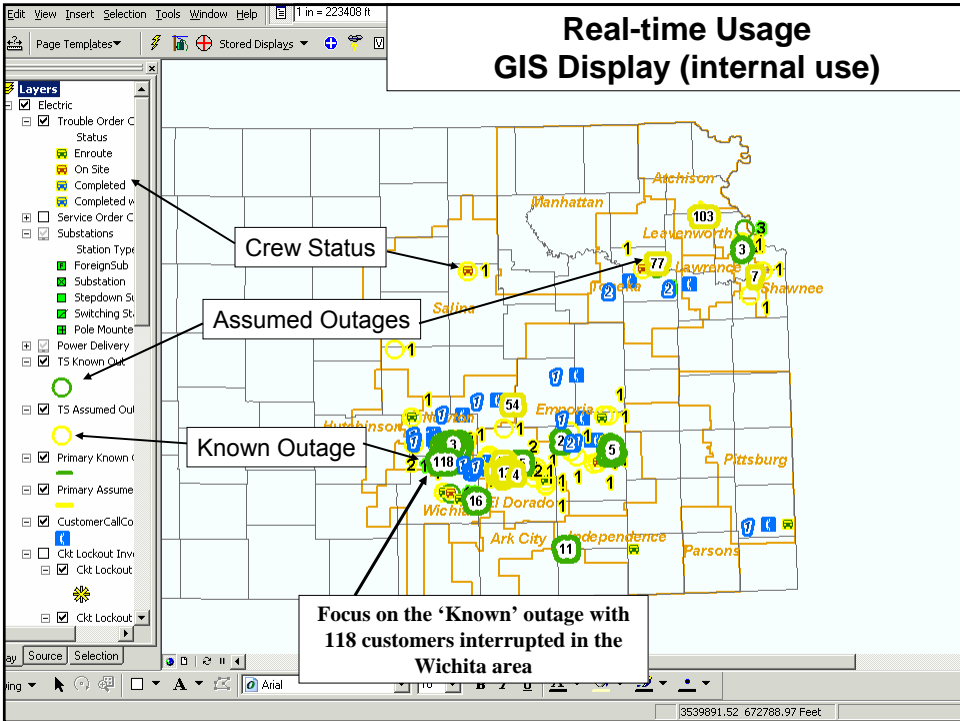


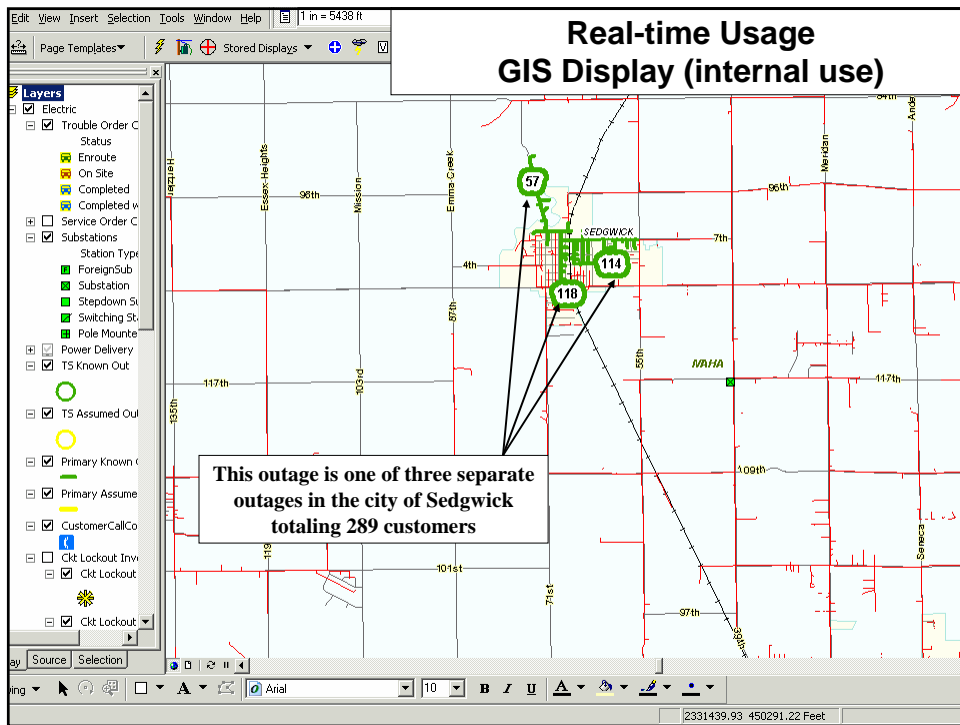
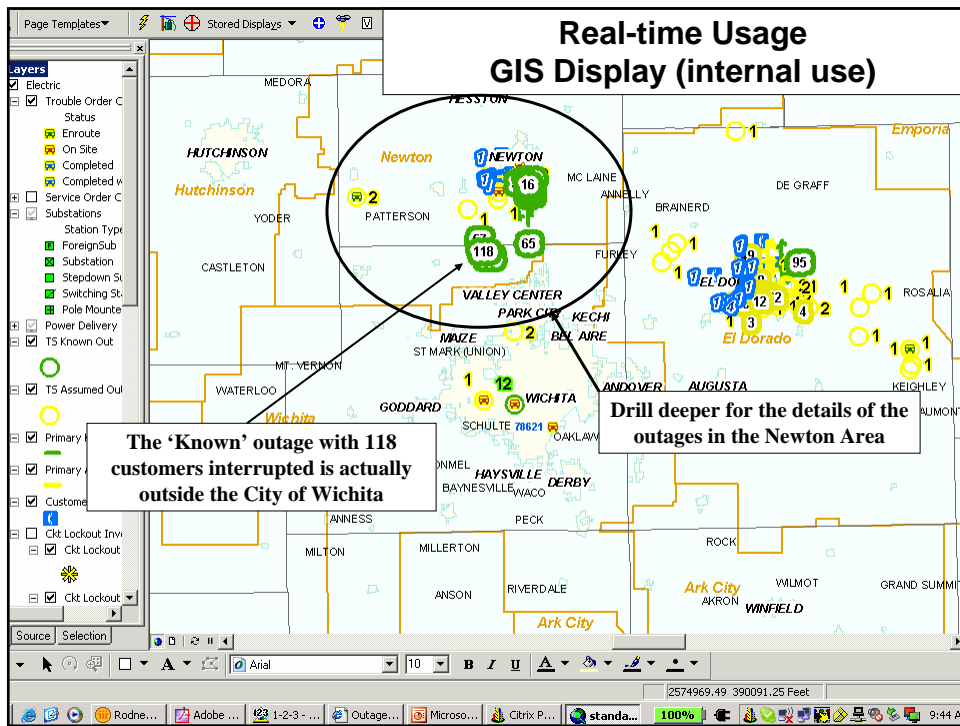


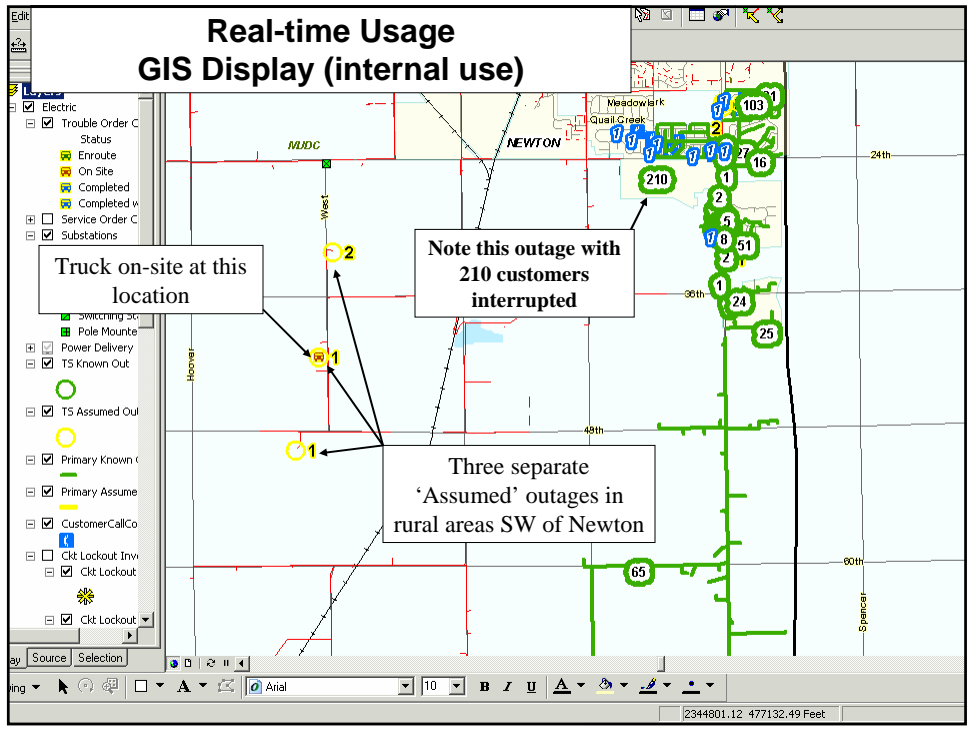
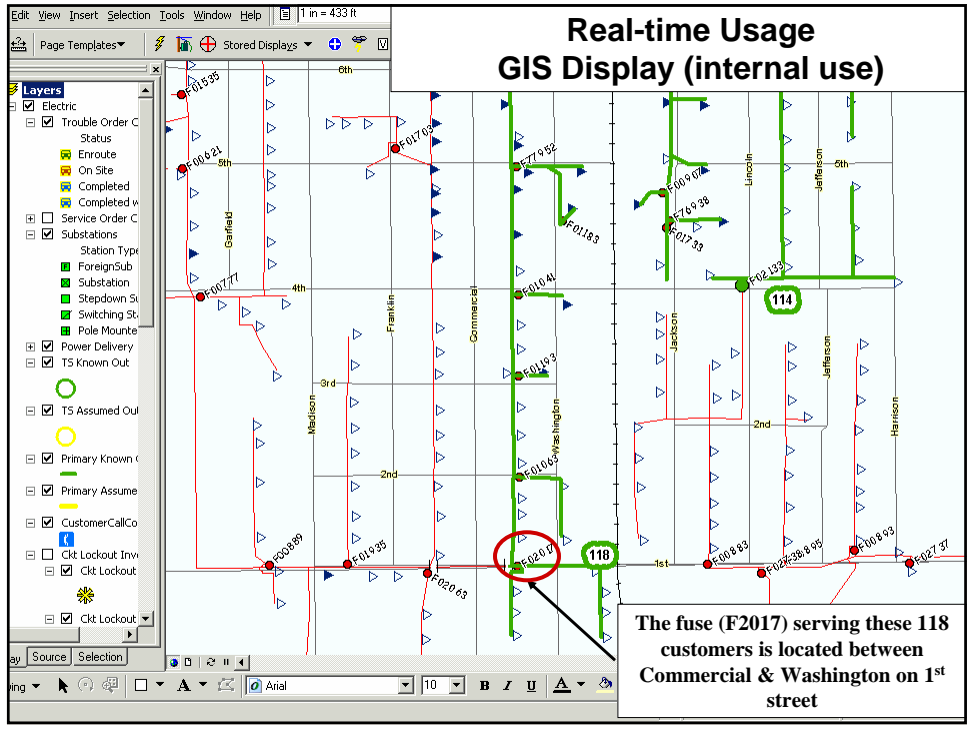
GEOGRAPHIC INFORMATION SYSTEM

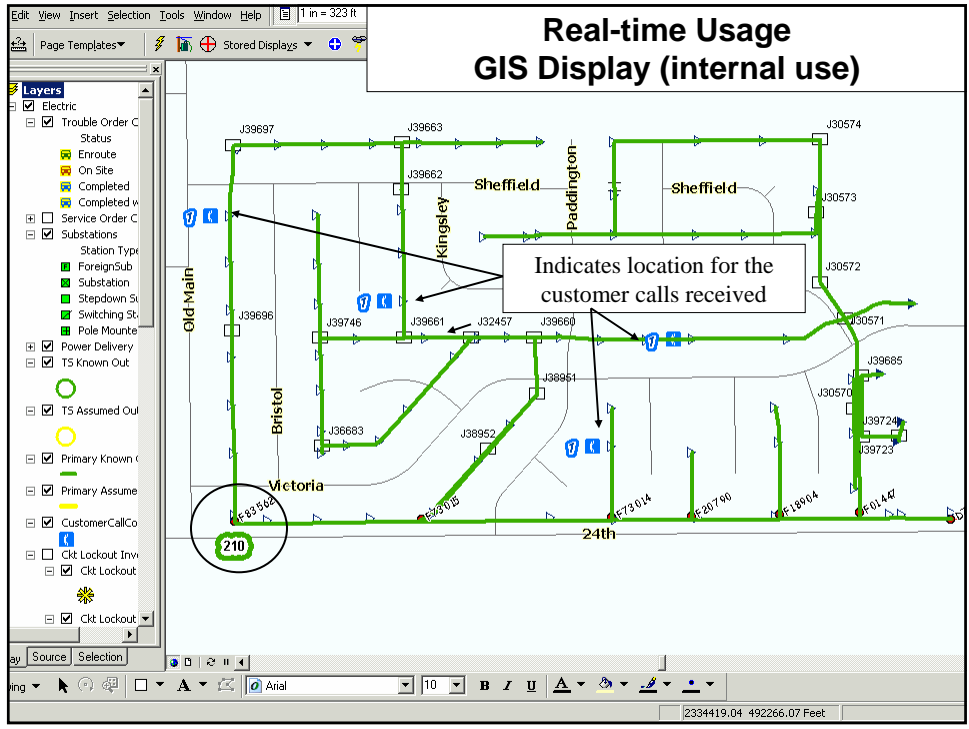
Real-time Display of Customer Interruptions

(Internal Use)









WR.COM


**Customer Interruption Summary
by Office and Circuits**

(External Use)

HOW MANY DOLLARS DOES IT SAVE TO CHANGE A LIGHT BULB?

Click here to see how it adds up with our lighting calculator.

Doing whatever it takes to keep the lights on.



RESIDENTIAL CUSTOMERS

From paying your bill online to learning home safety, we can help you get things done right.

[Click here](#)

BUSINESS CUSTOMERS

From surge protection to energy consulting, we can help you succeed in your business.

[Click here](#)

- News
- About Us
- Contact Us
- Careers
- Investors

- Residential Customers
- Business Customers
- Energy Efficiency
- Outage Information**
- Site Map

Latest News

March 13, 2008

- Power plant honored for safety and health practices.

[Our comprehensive energy plan](#)

[More News...](#)

MY ELECTRIC ACCOUNT

login:

password:

[Forgot your password?](#)

[Create an account](#)

[Sign in](#)


© Westar Energy, All Rights Reserved, 2008
[Privacy Policy](#), [Terms of Use Agreement](#), [Technical Support](#)

Selecting 'Outage Information' provides both Geographic and Tabular Customer Interruptions Information


News
Residential Customers
Business Customers
Energy Efficiency
Careers
Investors

WR.COM Customer Interruption information (External Use)

Also, Customer Can Report interruptions



Outage Information & Storm Center



[Outage Map](#)
Summary of current outages

- [Report a power outage online](#) (Sign-in required)
- Call toll-free 1-800-LIGHT KS (1-800-544-4857)

[2007 Ice Storm Information](#)

1-800-LIGHT KS is for power outages or emergencies, including flickering lights, lines down or other damage-related problems. This is a high-volume automated system that allows you to report an outage without a busy signal or waiting on hold. Be prepared to enter your address, phone number or Westar Energy account number.

[Update your account information](#) - By ensuring that your phone number and other information on your account is current, you make it easier for us to pinpoint your location in a power outage.

[Outage Restoration Priorities](#)
[Generator Safety Tips](#) - If you choose to use a generator, please do so with caution

[Preparing for Storm Outages](#)

A little planning can help you prepare your home and family when severe weather and power outages happen.


Start by developing shelter plans for severe storm and tornado conditions. Assemble a "storm kit" and keep it centrally located. It should contain:

- Emergency telephone numbers
- Flashlights and fresh batteries

[Home](#) | [Contact Us](#)
[About Us](#) | [Site Map](#)

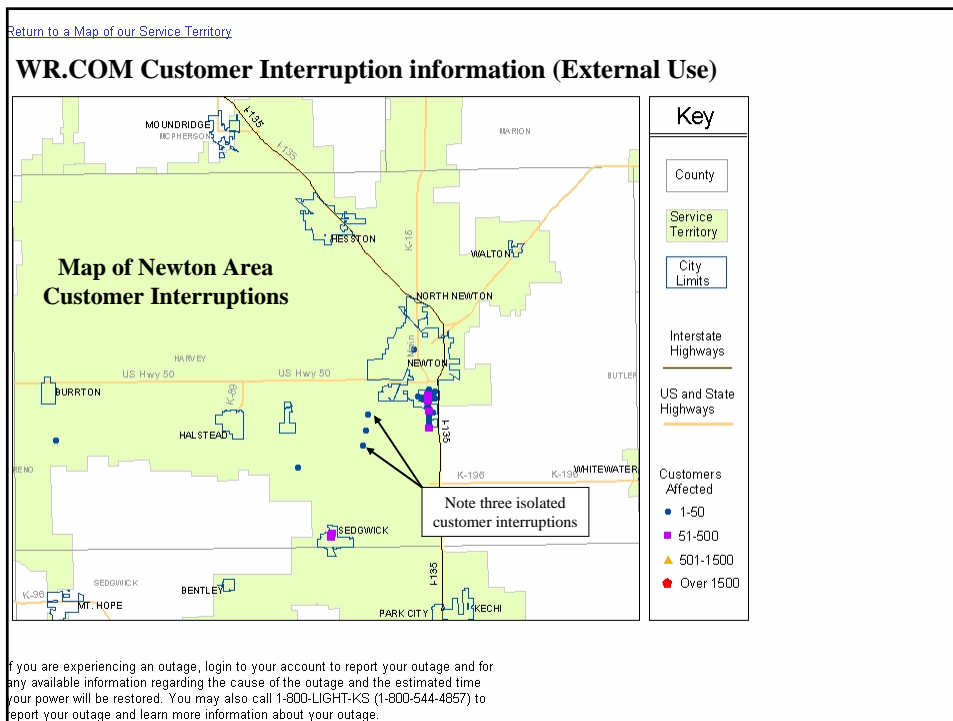
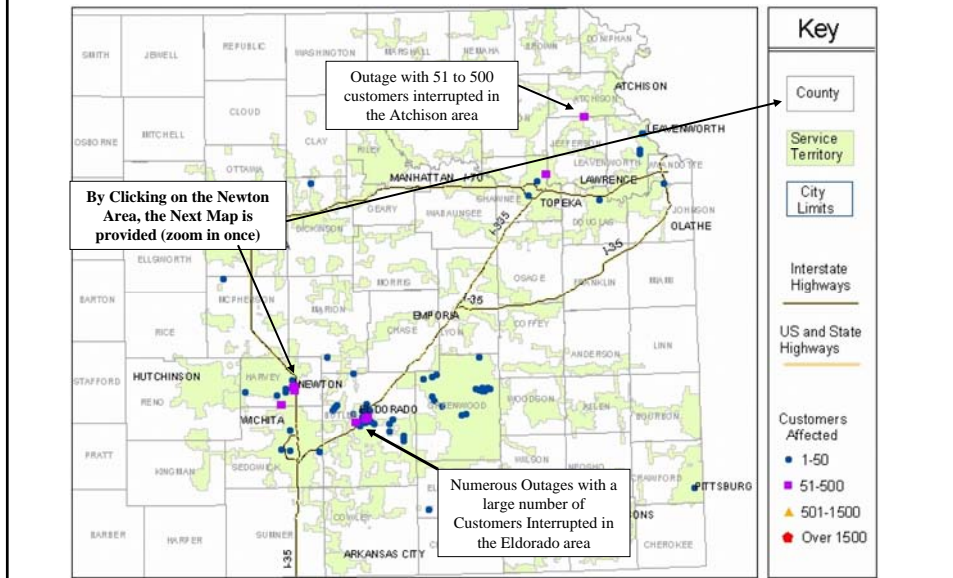
Current Customer Interruptions provided Geographically or Tabular by County

ADD UP THE SAVINGS WITH OUR ENERGY CALCULATOR



Additional Information is Provided on General Restoration Priorities and Preparations for Storm Outages

WR.COM Customer Interruption information (External Use)



If you are experiencing an outage, login to your account to report your outage and for any available information regarding the cause of the outage and the estimated time your power will be restored. You may also call 1-800-LIGHT-KS (1-800-544-4857) to report your outage and learn more information about your outage.

This is a summary of the outages affecting Westar Energy customers in the counties below.

This table updates every 10 minutes. There may be a few minutes' delay from the time an outage is reported to the time that outage is reflected on this web site.

Last updated: Apr 8 2008 09:45 AM

County	Customers Served	Customer Outages*
Butler	21214	801
Crawford	15869	1
Dickinson	5690	1
Douglas	44114	2
Elk	1516	11
Greenwood	5166	55
Harvey	15713	898
Jefferson	5545	103
Johnson	30522	1
Leavenworth	26392	14
Marion	2875	1
McPherson	2192	1
Sedgewick	218866	31
Shawnee	81442	80
Total		2000

* Approximation

[View a map of outages](#)

Is your phone number current? By keeping the information on your account current, you help Westar Energy pinpoint your location. [Update your account now.](#)

To report an outage, [login here](#) or call 1-800-LIGHT-KS (1-800-544-4857). Our online service or automated reporting line is the most efficient way to report your outage. Please don't assume that we know your electricity is out.

WR.COM Customer Interruption information (External Use)

County by County Comparison of Customers Served and Number of Customers Interrupted



OUTAGE CENTRAL

Device Outage and Customer Interruption Data Available Immediately After Restoration

(Internal Use)



OUTAGE CENTRAL

Retrieval of Device Outage Information (Internal Use)

Substation Drop Down

- Any
- ANDO-ANDOVER
- BEEC-BEECH
- BELL-BELL
- BOEL-BOEING
- BU05-BU REC #5
- BULL-BU REC #11
- CANA-CANAL
- CENT-CENTENNIAL
- CHEN-CHENEY RES
- CHIS-CHISHOLM

Anyone can sort any Serving Office, Substation, Circuit, Time Period or Cause to obtain outage records for further analysis

Serving Office Drop Down

- Any
- 02-MISSION, KS
- 09-EMPORIA, KS
- 11-OLATHE, KS
- 12-OTTAWA, KS
- 13-LAWRENCE, KS
- 14-LEAVENWORTH, KS
- 16-ATCHISON, KS
- 17-HIAWATHA, KS
- 18-TOPEKA, KS
- 19-HUTCHINSON, KS

OUTWeb 2008

Serving Office: Any Substation: Any Circuit: Any

Device: _____

Between Dates: (YYYY-MM-DD) from 2008-04-01 to 2008-04-14

Normalized: Normalized IEEE 1366

Duration: 6 min and greater

Show DVC Cust Circuit Only

Any Planned Flag Any System Type Any System Volts Any Partial Pwr Flag

Sort Order: 1 Date/time 2 Circuit 3 Office 4 Cause 5 Incident

Any Cause

- All Tree Cause
- No Cause 01, 12, 25, 28
- 01-CUSTOMER REQUEST
- 03-EQUIPMENT FAILED
- 09-OVERLOAD
- 10-TREES/VEGETATION
- 11-PUBLIC DAMAGE
- 12-CUSTOMER PROBLEM
- 15-ANIMALS/WILDLIFE
- 16-OTHER
- 17-LIGHTNING
- 18-EXTREME WIND
- 19-ICE STORM

Any Failed Equip

- 01-OVERHEAD PRIMARY
- 02-SECONDARY
- 03-SERVICE
- 04-CUSTOMER EQUIPMENT
- 05-TRANSFORMER
- 06-SEC/SERV CONNECT
- 07-PRIMARY CONNECT
- 08-ARRESTER
- 09-DISTRIBUTION SWITCH
- 10-TS CUTOUT
- 12-UNDERGROUND PRIMARY
- 13-UNDERGROUND EQUIPMENT
- 15-ELBOW/POT HEAD

Note: As of 1/27/2006, New methods and procedures have been implemented for normalizing our outage data. The IEEE 1366 method for normalizing outage data is the accepted method for Westar and began in 2005. The KCC 10pot method is the mandated method by the KCC and began in 2005. The Old method should be used for data previous to 2005.

OUTAGE CENTRAL

Retrieval of Device Outage Information (Internal Use)

OUTWeb 2008

Serving Office: 48-WICHITA, KS Substation: FARB-FARBER Circuit: 012002

Device: _____

Between Dates: (YYYY-MM-DD) from 2006-01-01 to 2008-04-14

Normalized: Normalized IEEE 1366

Duration: 6 min and greater

Show DVC Cust Circuit Only


Any Planned Flag Any System Type Any System Volts Any Partial Pwr Flag

Sort Order: 1 Date/time 2 Circuit 3 Office 4 Cause 5 Incident

Note: As of 1/27/2006, New methods and procedures have been implemented for normalizing our outage data. The IEEE 1366 method for normalizing outage data is the accepted method for Westar and began in 2005. The KCC 10pot method is the mandated method by the KCC and began in 2005. The Old method should be used for data previous to 2005.

Sorted by a dt_out, a tm_out, a nm_circ, a cd_off, a cd_out_cause, a id_incndnt 10Serving office: 48, Substation: FARB, Circuit: 012002, Device: . Between: 2006-01-01 and 2008-04-14


OFFC	CUST	DUR	CAUSE	COMMENT	DVC	ISOEQ	PH	DT OUT	TM OUT	NM CIRC	CIRC CUST	INCIDENT	ISOL EQ	OLD NORM	IEEE 1366	KCC 10PCT	FAILED	PLN
48	12	33	10	refused	SW	W007F02479	C	5/18/2006	07:21	FARB012002	1192	0605180802433	12	N	N	N		N
48	3	71	10	refused sw trees	SW	W007F05507	B	6/8/2006	19:20	FARB012002	1192	0606082035377	12	N	N	N		N
48	11	37	10	refused/tressin pri.	SW	W007F05515	B	9/17/2006	08:29	FARB012002	1198	0609170913255	12	N	N	N		N
48	9	59	10	head tree trim in future	SW	W007F06027	A	1/24/2007	05:27	FARB012002	1210	0701240640229	12	N	N	N		N
48	21	679	10	put up pri.	SW	W007F77491	A	6/30/2007	03:12	FARB012002	1215	0706301528508	12	N	N	N		N
48	5	1130	10	PUT UP THE PRI AFTER TREES WERE TRIMMED	SW	W007F06353	B	8/24/2007	10:15	FARB012002	1218	0708250509198	12	N	N	N		N



OUTAGE CENTRAL

Retrieval of Device Outage Information (Internal Use)

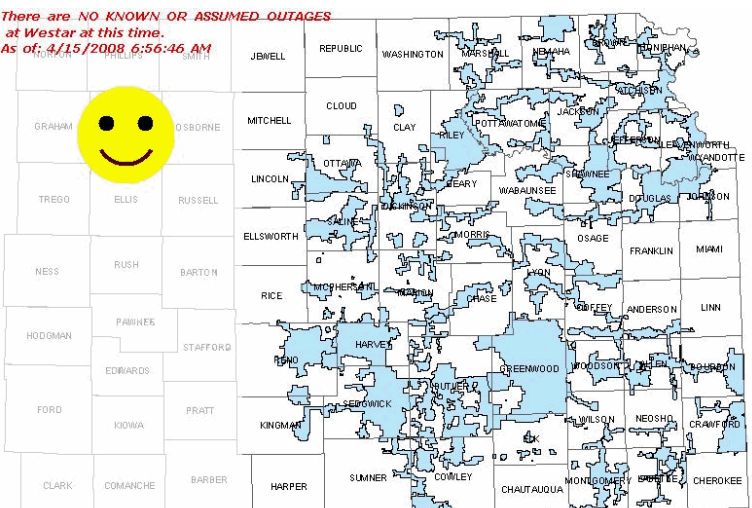
- Outage Central retrieves device outage records immediately after restoration.
- Outage Central is available to all Power Delivery personnel.
- Query results can be copied and moved to Excel or another database for further analysis.



OUTAGE SCOPE

THERE ARE ALWAYS THOSE TIMES WHEN WE DO NOT NEED AN OUTAGE MANAGEMENT SYSTEM AND EVERYONE IS HAPPY

There are NO KNOWN OR ASSUMED OUTAGES at Westar at this time. As of: 4/15/2008 6:56:46 AM



The map displays the following Kansas counties: JEWELL, REPUBLIC, WASHINGTON, MARSHALL, NEMAHA, LINN, GRAHAM, OSBORNE, MITCHELL, CLOUD, CLAY, POTTSWATOMIE, JACKSON, LINCOLN, OTTAWA, DEARBORN, WABALUSE, FRANKLIN, DOUGLAS, JOHNSON, TREGO, ELLIS, RUSSELL, ELLSWORTH, MORRIS, OSAGE, FRANKLIN, MIAMI, NESS, RUSH, BARTON, RICE, MOOREHEAD, HARVEY, OSAGE, FRANKLIN, MIAMI, HODGMAN, FABUSHER, STAFFORD, HARVEY, OSAGE, FRANKLIN, MIAMI, FORD, EDWARDS, PRAIT, KINGMAN, SEWICK, GREENWOOD, WOODSON, LINN, CLARK, COMANCHE, BARBER, HARPER, SUMNER, DOWLEY, CHAUTAUGUA, MONROE, NEOSHO, CRAWFORD, and CHEROKEE.



QUESTIONS AND ANSWERS



Thank you for the opportunity to share
Westar's Outage Management Systems



Westar December 9-17th, 2007 Ice Storm

*There are NO KNOWN OR ASSUMED OUTAGES
at Westar at this time.
As of: 12/9/2007 12:00:00 AM*

