



# Mobile PI Data Improves Tracking of Customer Power Outages at Duke Energy

Tim Murphy, IT Manager, PI Support Team,  
Duke Energy

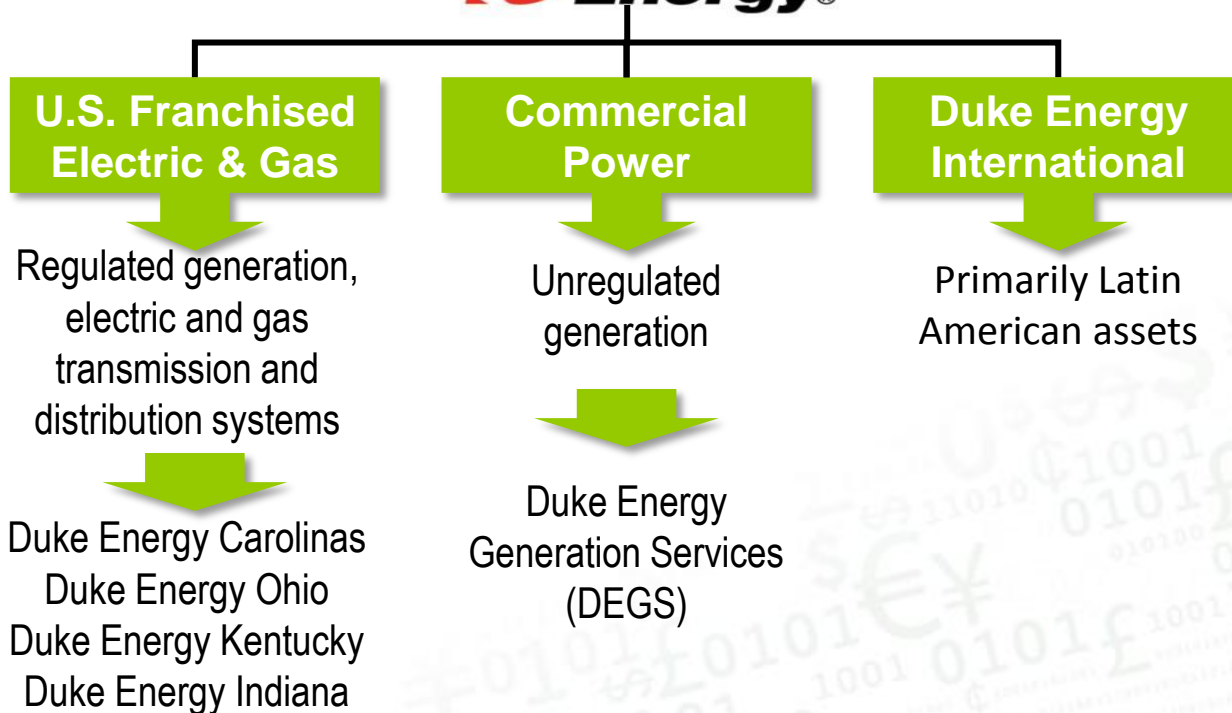
Michael Saucier, CEO, Transpara

# FACTS ABOUT DUKE ENERGY

- 150+ years of service
- 4 million customers
- Fortune 500
- \$50 billion in assets
- Stock dividends for 80+ years
- Traded on NYSE as DUK
- Dow Jones Sustainability Index

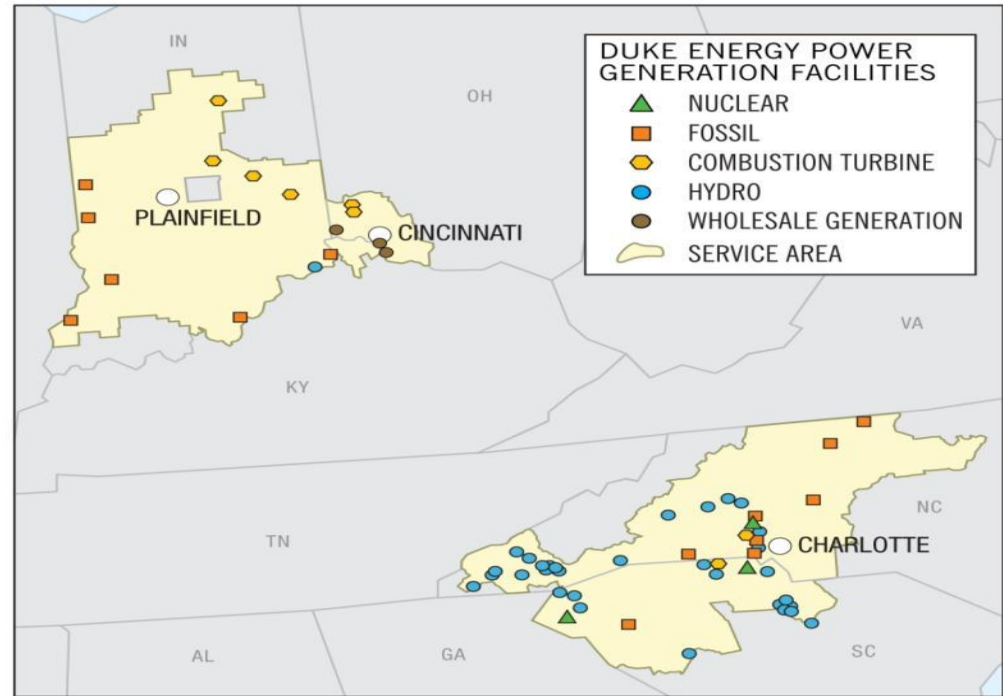


# THE BUSINESSES WE'RE IN



# U.S. FRANCHISED ELECTRIC AND GAS

- 5 states: North Carolina, South Carolina, Indiana, Ohio and Kentucky
- 47,000 square miles of service area
- 28,000 MW of regulated generating capacity
- 4.0 million retail electric customers
- 500,000 retail gas customers



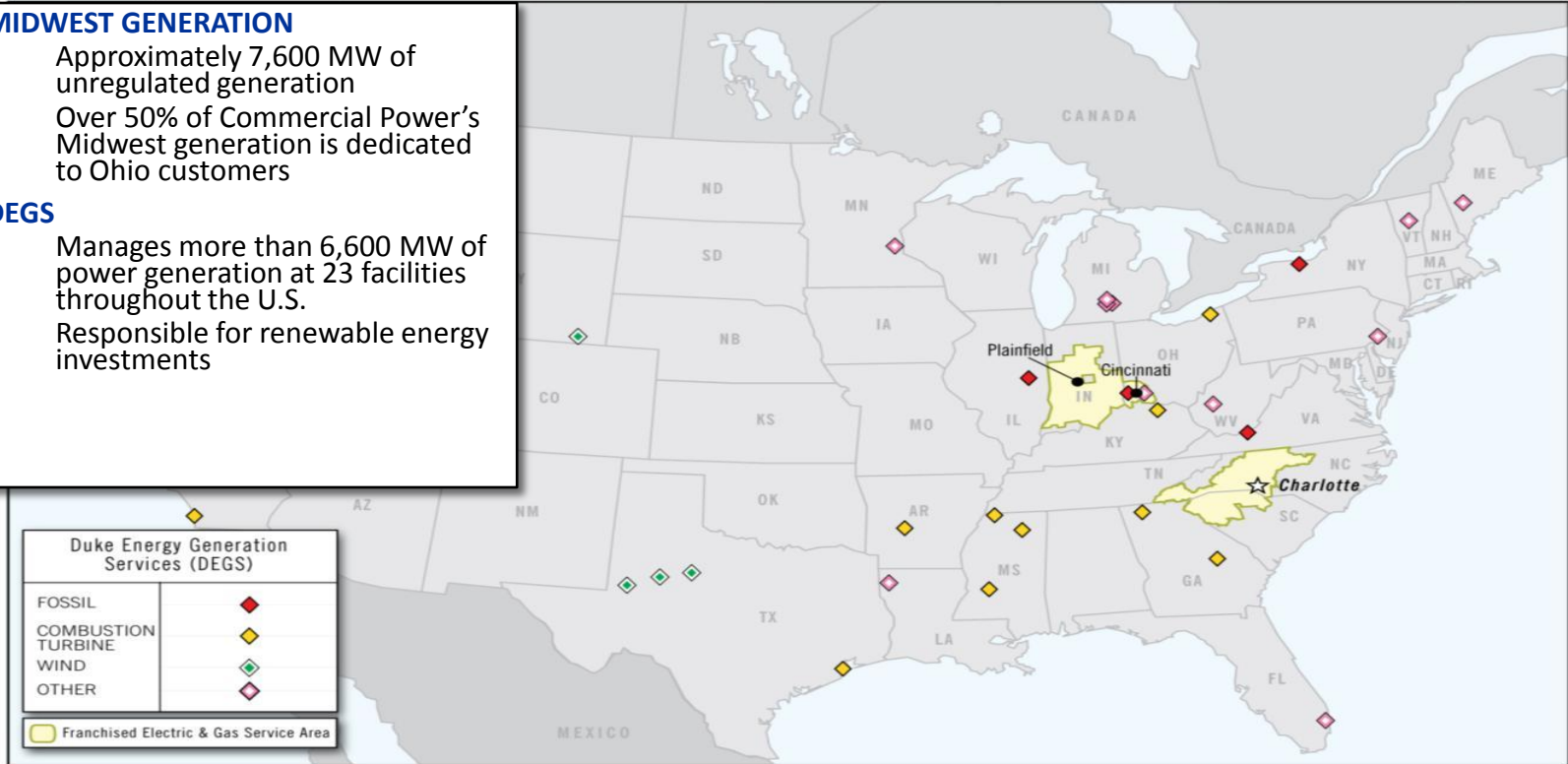
# COMMERCIAL POWER

## MIDWEST GENERATION

- Approximately 7,600 MW of unregulated generation
- Over 50% of Commercial Power's Midwest generation is dedicated to Ohio customers

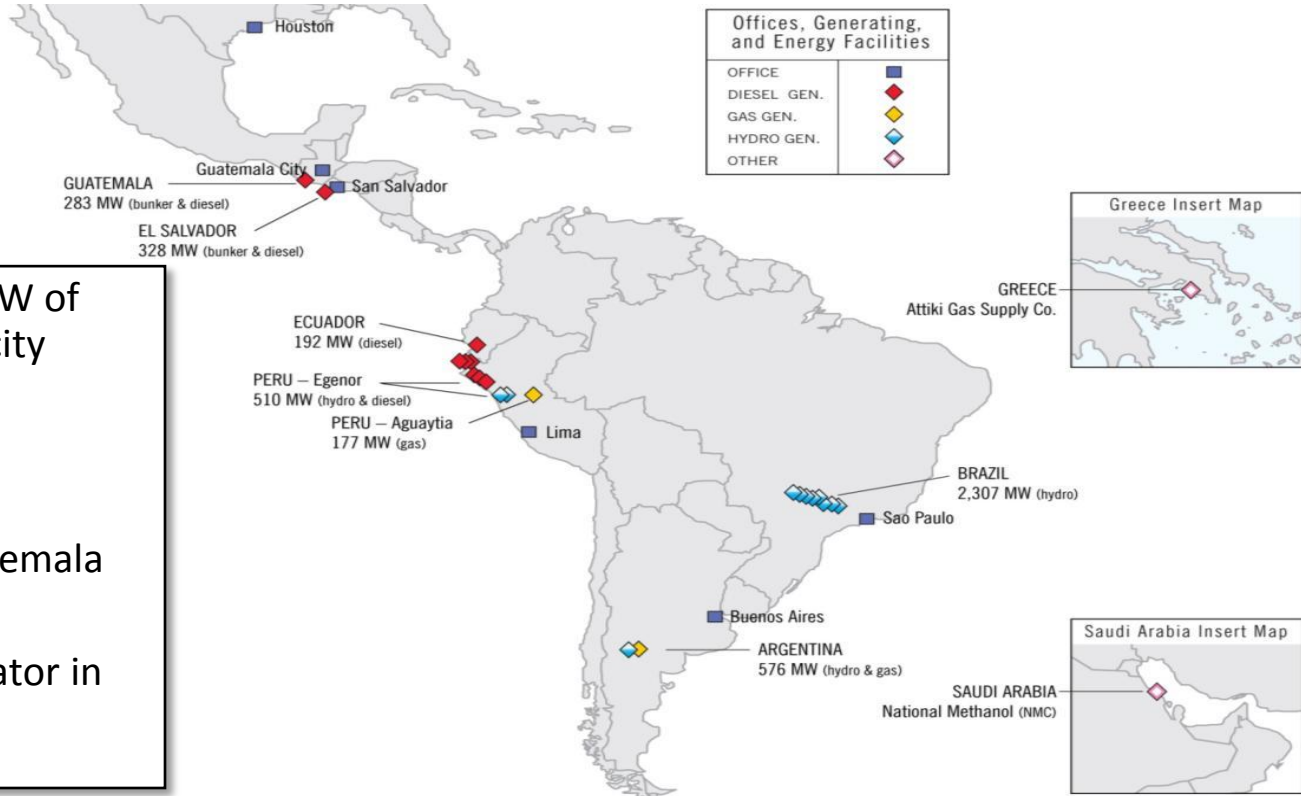
## DEGS

- Manages more than 6,600 MW of power generation at 23 facilities throughout the U.S.
- Responsible for renewable energy investments





# DUKE ENERGY INTERNATIONAL



- Approx. 4,000 MW of generating capacity
- 6 countries: Argentina, Brazil, Ecuador, El Salvador, Guatemala and Peru
- 4<sup>th</sup> largest generator in Latin America (based on net capacity)

# BACKGROUND

- Duke: a mature PI customer
  - 17 years
  - 95 sites
  - 3000+ users
  - 65 PI servers
    - collecting data for hundreds of thousands of points



# PI Software Environment

- Asset License Agreement
- PI Enterprise Server
- ProcessBook
- DataLink
- ACE
- PI WebParts
- PI Tag Monitor (built in-house, not OSIsoft product)
- PI Manual Editor (built in-house, not OSIsoft product)
- PI Applications
- Custom Data Extraction Interfaces (API/SDK)

# The Problem

- Bad weather causes customer power outages.
- Outages must be tracked during an event.
- Outages  $> 50,000$  must be reported to regulatory agencies.
- DOE-OE-417 Report – Must notify DOE within six hours when outages  $> 50K$  and is sustained for 1 hour.
- Copies to NERC and SERC.

# The Problem



# The Problem



# The Problem



# THE SOLUTION: MANUAL (prior to 2006)

- Customers report power outages.
- Predictor software estimates total outages.
- Charts of customer outages created manually (spreadsheet) for distribution.
- Data available only during a storm event.



# THE SOLUTION: AUTOMATED (2006)

- Utilized PI for managing this data
- Data from ORACLE feeds into PI every 15 minutes
- Data is displayed on Duke Energy's Internal Portal using PI WebParts
  - By State
  - By County
  - By Office

# THE SOLUTION: AUTOMATED North Carolina, South Carolina

**Announcements**

There are currently no active announcements. To add a new announcement, click "Add new announcement" below.

**Outage Trends (over past 24 hours)**

Type	Name	Notes	Modified
1	Outages_By_County	Use this option to select NC or SC county for viewing outages and events	12/9/2009 4:38 PM
1	Outages_By_Office	Use this option to select Duke office location for viewing outages and events	12/9/2009 4:38 PM

**Carolinas Outages**

**NC Outages**  
High  
NC Counties Customers Affected = 563 Outages; 3/18/2010 4:01:00 PM

**SC Outages**  
High  
SC Counties Customers Affected = 75 Outages; 3/18/2010 4:01:00 PM

**TOTAL**  
High  
All Counties Customers Affected = 641 Outages; 3/18/2010 3:47:00 PM

**Total Carolinas Outages (over past 8 hours)**

700  
600  
500  
400  
300  
200  
100  
0

3/18/2010 8:01:37 AM 8 Hour(s) 3/18/2010 4:01:37 PM

611 Outages  
40 Events

**Do you want to view PI outage data on your BlackBerry? Then contact [pisupportduke@duke-energy.com](mailto:pisupportduke@duke-energy.com) for additional details.**

KPI	Actual	Target
NC Outages	6	25
SC Outages	59	25
Total Outages	65	50

**Outage-Links**

- Blackberry PI (SE) Outage Page
- Blackberry PI (MW) Outage Page

# THE SOLUTION: AUTOMATED Indiana, Ohio, Kentucky

Home - DOMS - Windows Internet Explorer provided by Duke Energy

http://mtdptweb01.DOMS/default.aspx

Google

PI User Support

Welcome Murphy, Timothy A

**Duke Energy** OSISoft. DOMS

Home | OutageLink | **DOMS** | SOC | Regulated Gen SE | Regulated Gen MW | Non-Reg Gen | Wind Gen | Solar Gen | Hydro Central | PI Admin | Site Actions

View All Site Content

**Documents**

- Shared Documents
- Outage Management
- Outage Management Backup

**Lists**

- Calendar
- Tasks

**Discussions**

- Team Discussion

**Sites**

**People and Groups**

Robynne Bell

PI User Support > DOMS

**Announcements**

There are currently no active announcements. To add a new announcement, click "Add new announcement" below.

**Outage Management**

Type	Name	Modified By
Outages By Office		Mc Lean, Randy
Outages by County		Wiseman, Eric S

**Midwest Outages**

**IN Outages**

High

IN Counties Customers Affected = 94 Outages, 3/23/2010 9:31:00 AM

**OH Outages**

High

OH Counties Customers Affected = 15 Outages, 3/23/2010 9:31:00 AM

**KY Outages**

High

KY Counties Customers Affected = 3 Outages, 3/23/2010 9:31:00 AM

**Total Midwest Outages (over past 8 hours)**

120  
100  
80  
60  
40  
20  
0

3/23/2010 1:38:11 AM 8 Hour(s) 3/23/2010 9:38:11 AM

100 Outages  
10 Events

Do you want to view PI outage data on your BlackBerry? Then contact [pisupportduke@duke-energy.com](mailto:pisupportduke@duke-energy.com) for additional details.

**BlackBerry**

Duke Energy as of 10:10:2008

Home | Outage Summary | All Sites

KPI	Actual	Target
NC Outages	6	25
SC Outages	59	25
Total Outages	65	50

**Links**

- BlackBerry PI (MW) Outage Page
- BlackBerry PI (SE) Outage Page

Done Local intranet 100%

# THE SOLUTION: AUTOMATED

- Data available around the clock, 365 x 24 x 7.
- An alert was established to notify key personnel after # outages reached 20K
- An alert was established to notify compliance personnel after # outages reached 50K

# THE SOLUTION: Mobile

- Piloted Transpara's Visual KPI during Fall 2008
- Purchased Visual KPI in 2009
- Existing outage metrics now available on mobile devices
- Extends “reach” of PI applications to new class of users

# THE SOLUTION: Mobile

- Currently 43 users receiving customer outage data on four types of Blackberry devices
  - 8830 World Edition
  - Storm
  - Tour
  - Bold

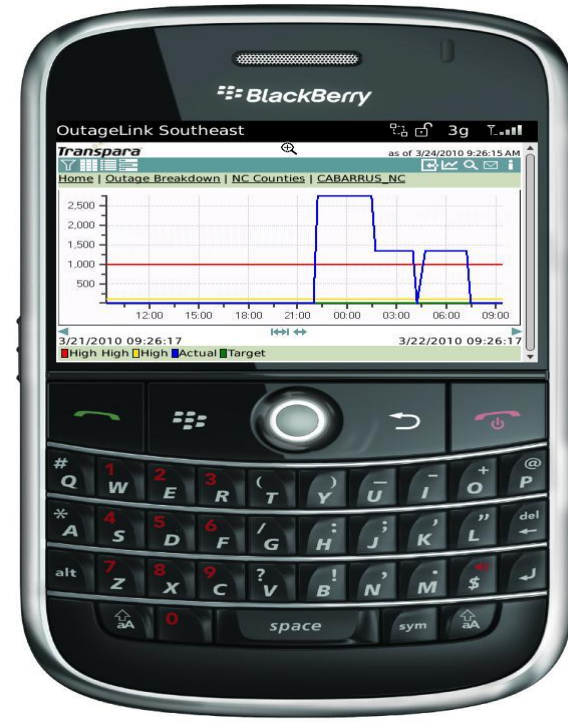
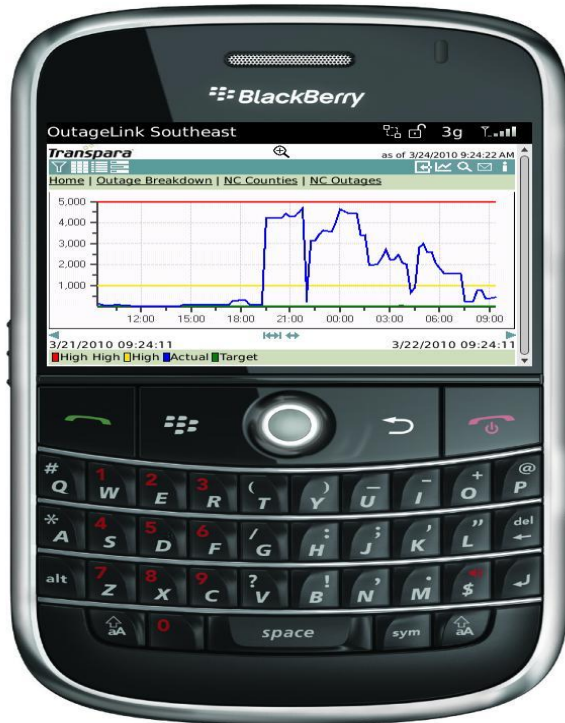




# THE SOLUTION: Mobile



# THE SOLUTION: Mobile



# RESULTS

- Eliminated around the clock staff to chart customer outages during storms
- Data available immediately via company portal to anyone that needs it
- Multiple visual formats available via PI WebParts
- Data now available 365 days per year, 24x7

# RESULTS

- Maximized Availability of PI Data
- Data available on mobile device any time, any where

# Other Examples of PI WebParts

The screenshot shows a web browser window titled "Happy Jack Wind Farm Real-Time Data". The dashboard is divided into several sections:


- Turbines On-line**: A table showing real-time data for the wind farm.
- Configure**: A link to configure the data.
- Legend**: A key for the turbine status indicators.
- Turbine Status**: A list of 14 turbines, all of which are currently "On-Line".
- Image**: A photograph of a wind turbine in a field.

Turbines On-line	
Site Power Export	16.59 MW
Current Windspeed	7.07 m/s
Current Temperature	25 F

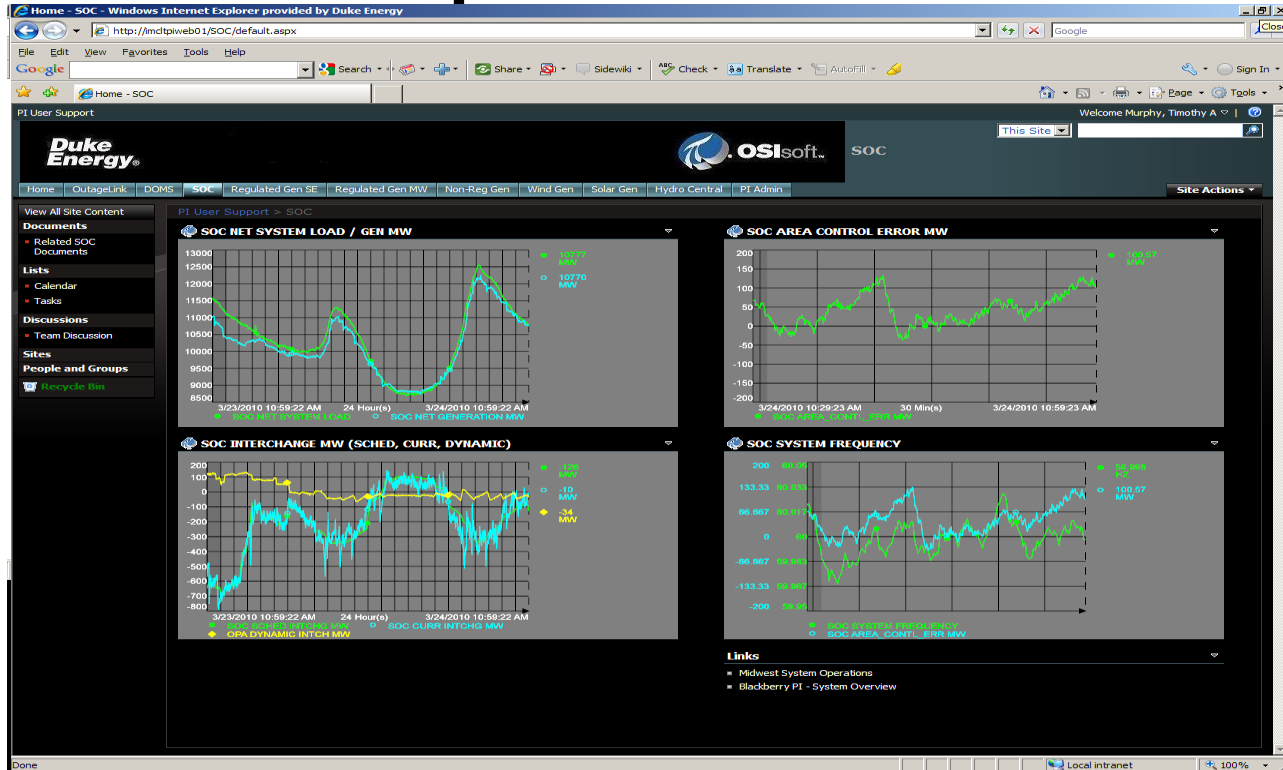
Turbine Status	
● WTG #1	● WTG #8
● WTG #2	● WTG #9
● WTG #3	● WTG #10
● WTG #4	● WTG #11
● WTG #5	● WTG #12
● WTG #6	● WTG #13
● WTG #7	● WTG #14

**Legend**

- On-Line
- Fault
- Low Wind Speed
- High Wind Speed

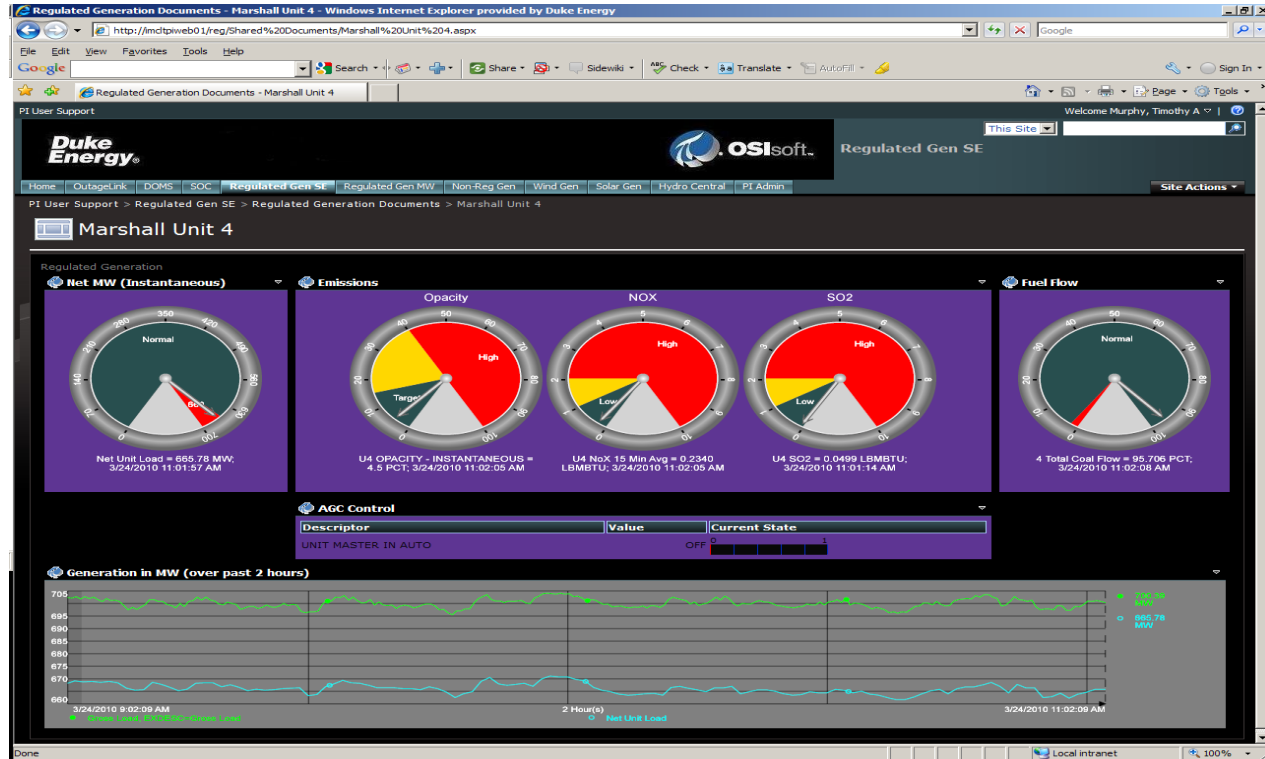


# Other Examples of PI WebParts





# Other Examples of PI WebParts



# Other Visual KPI Displays

- Lake Levels
- Generation Levels
- Wind Speed
- Plant Data (temperatures, pressures, etc)
- Breaker Status
- Balancing Authority Statistics

# Other Visual KPI Examples

## Wind Generation



# Other Visual KPI Examples

## Wind Speed



# Other Visual KPI Examples

## Carolinas Generation

Transpara

as of 3/25/2010 8:42:59 AM

Home | Generation Unit Summary | All Scorecards

Scorecard: Nuclear Summary												
CNS U1 1226 MW	CNS U2 1230 MW	MNS U1 0 MW	MNS U2 1202 MW	ONS U1 903 MW	ONS U2 907 MW	ONS U3 915 MW						
Scorecard: Fossil Summary												
ALN U1 122.3 MW	ALN U2 0.0 MW	ALN U3 282.0 MW	ALN U4 293.7 MW	ALN U5 262.4 MW	BLC U1 1204 MW	BLC U2 0 MW	BUK U3 -6.6 MW	BUK U4 0.0 MW	BUK U5 80.9 MW	BUK U6 66.9 MW	CLF U1 0.0 MW	CLF U2 0.0 MW
CLF U3 0.0 MW	CLF U4 0.0 MW	CLF U5 0.0 MW	DRV U1 0.0 MW	DRV U2 0.0 MW	DRV U3 0.5 MW	LFE U1 0.0 MW	LFE U2 0.0 MW	LFE U3 185.6 MW	MAR U1 399.5 MW	MAR U2 399.3 MW	MAR U3 0.0 MW	MAR U4 700.5 MW
RIV U4 0.0 MW	RIV U5 0.0 MW	RIV U6 0.0 MW	RIV U7 0.0 MW									
Scorecard: Hydro Summary												
BE U1 0.0 MW	BW U1 10.6 MW	BW U2 10.7 MW	BR U1 0.0 MW	BR U2 2.8 MW	BR U3 2.7 MW	CL U1 0.0 MW	CC U1 14.3 MW	CC U2 14.3 MW	CC U3 14.1 MW	CF U1 0.0 MW	CF U2 79.1 MW	CF U3 79.0 MW
CF U4 0.0 MW	DB U1 43.2 MW	FC U1 9.7 MW	FC U2 9.7 MW	FC U3 9.6 MW	FC U4 11.0 MW	FC U5 8.7 MW	GS U3 0.0 MW	GS U4 1.7 MW	GS U5 0.0 MW	GS U6 0.0 MW	GF U1 0.0 MW	GF U2 0.0 MW
GF U3 0.0 MW	GF U4 0.0 MW	GF U5 0.0 MW	GF U6 0.0 MW	KE U1 0.0 MW	KE U2 0.0 MW	LO U1 0.0 MW	LO U2 9.7 MW	LO U3 9.6 MW	MI U1 0.0 MW	MI U2 12.5 MW	MI U3 15.8 MW	MI U4 15.8 MW
NN U1 4.2 MW	NN U2 3.4 MW	NN U3 4.2 MW	NN U4 3.3 MW	OX U1 -0.5 MW	OX U2 18.9 MW	RH U1 0.0 MW	RH U2 0.0 MW	RH U3 9.4 MW	RC U1 0.0 MW	RC U2 0.0 MW	RC U3 0.0 MW	RC U4 0.0 MW
RC U5 0.0 MW	RC U6 0.0 MW	RC U7 0.0 MW	RC U8 0.0 MW	TC U1 8.0 MW	TH U1 0.0 MW	TX U1 3.9 MW	TX U2 0.0 MW	WA U1 15.9 MW	WA U2 16.3 MW	WA U3 15.7 MW	WA U4 15.7 MW	WA U5 16.2 MW
WY U1 16.1 MW	WY U2 16.5 MW	WY U3 16.6 MW	WY U4 15.9 MW									
Scorecard: Pumped Storage												
BD U1 -2.9 MW	BD U2 -0.3 MW	BD U3 -1.9 MW	BD U4 -5.2 MW	JO U1 0.0 MW	JO U2 0.0 MW	JO U3 150.0 MW	JO U4 0.0 MW					
Scorecard: CT Summary												
LCT U1 0.0 MW	LCT U2 0.0 MW	LCT U3 0.0 MW	LCT U4 0.0 MW	LCT U5 0.0 MW	LCT U6 0.0 MW	LCT U7 0.0 MW	LCT U8 0.0 MW	LCT U9 0.0 MW	LCT U10 0.0 MW	LCT U11 0.0 MW	LCT U12 0.0 MW	LCT U13 0.0 MW
LCT U14 0.0 MW	LCT U15 0.0 MW	LCT U16 0.0 MW	MC U1 0.0 MW	MC U2 0.0 MW	MC U3 0.0 MW	MC U4 0.0 MW	MC U5 0.0 MW	MC U6 0.0 MW	MC U7 0.0 MW	MC U8 0.0 MW	RO U1 0.0 MW	RO U2 0.0 MW
RO U3 0.0 MW	RO U4 0.0 MW	RO U5 0.0 MW										

■ Low Low ■ Low ■ Good ■ High ■ High High ■ Unknown ■ Not In Service ■ N/A







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