



Creating Real-Time Situational Awareness Across Your Entire Wind Operations

Presented by **Scott J. Marion**, Program Specialist
Real-Time / Plant Applications



Agenda

- Corporate Overview
- Wind Fleet / PI System Architecture
- 24/7 Wind Fleet Monitoring
- PI System & Versify's *V-RENEW*[®] Product
- Challenges, Solutions, Benefits
- Future Plans



An EDISON INTERNATIONAL[®] Company

Edison International

Edison Mission Group (EMG)

- 31 Wind Projects in 11 states
- Generating Capacity of nearly 2,000 megawatts
- Sixth Largest Operator of Wind Energy Projects in the U.S
- Edison Mission Energy (EME)
 - Midwest Generation (MWG)
 - 11,274 MW's
- Edison Mission Marketing and Trading (EMMT)
- Edison Mission Solutions, LLC

EMG's Wind Fleet

- 
- **Suzlon**
 - **GE**
 - **Clipper**
 - **Mitsubishi**
 - **VESTAS**
 - **Micon**
 - **SIEMENS**
 - **ZOND**

EMG PI System - Background

Previous PI System Challenges

- Originally “Designed” as a Data Historian ONLY
- Many Sites Utilizing “Desktop” Hardware -VS- Server Grade
- Data Inaccessible Externally Due to Network Failure
- Inability to Recover / Restore Lost Data
- Declining Performance due to Ever Increasing Module DB Size



EMG PI System - Today



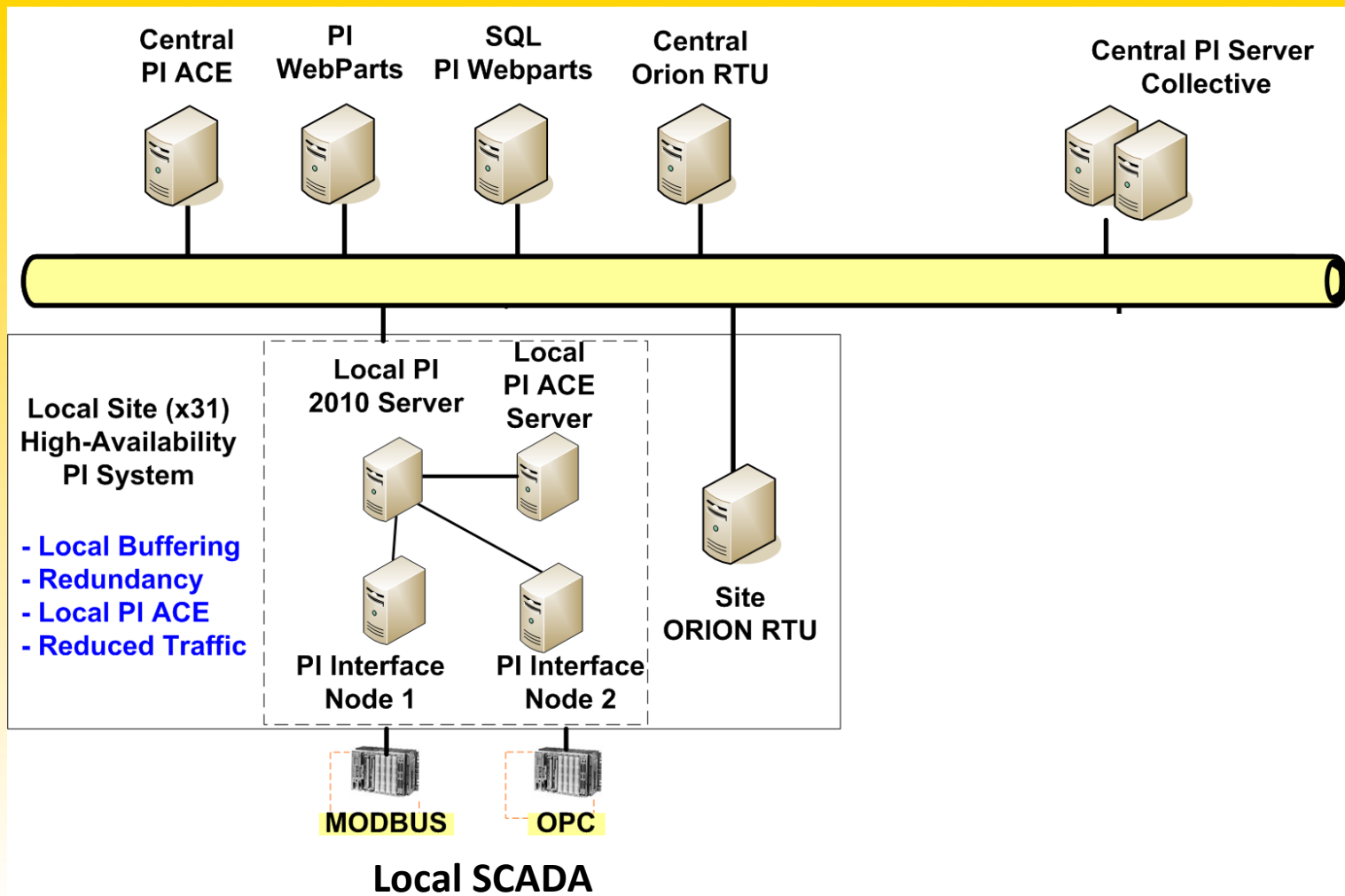
- EA Customer / EPM, COE, NOC
- PI Asset Framework
- PI ACE
- PI DataLink
- PI ProcessBook
- PI SDK
- PI Server, ModbusE, OPC
- PI System Management Tools
- PI Tag Configurator
- PI to PI Interface
- PI WebParts

Four Servers at Each Site

- PI Server 2010 / AF
- PI ACE
- Redundant / HA Interface Nodes

Major Benefits

- Increased Performance due to AF and Local PI ACE
- Sending only Enterprise Data across Network
- Mitigate Data Loss Due to Network or Hardware Failures



EMG's Challenge

24/7 Monitoring Performed by the OEMs

Wind Projects Maintenance Agreements Expire / Pay For Service

Reactive Operation / Ineffective Predictive Maintenance

Multiple Apps. for Viewing Real-Time Operational Data

Day Ahead Capability and Operational and Executive Reporting

EMG's Solution

Begin To Put People, Process, and Technology In Place
To Support In-House, 24/7 Wind Fleet Monitoring

Leverage The Investment In The PI System via EA Agreement
Invest in the PI System as our Real-Time Data Collection Platform

VERSIFY SOLUTIONS

V-RENEW Wind Monitoring and Performance Optimization
V-PERFORMANCE Plant Generation Monitoring and Analysis



OSIsoft Partner - Versify

- Based in Glenn Mills, PA...Versify Solutions Inc. develops leading software and services for professionals in the power industry
- Versify offers a unique portfolio of analytical applications and services providing key insights into Smart Grid, Generation Performance, NERC Compliance, and Trading Market Opportunities

V-RENEW®

**Wind Monitoring and Performance
Optimization Solution**

V-PERFORMANCE®

**Plant Generation Monitoring
and Analysis Solution**

- **Web Based “Suite” of Applications**
- **Hosted Solution**
- **Off The Shelf / Optional Custom Development**
- **Energy Industry Focus**



osisoft.

Why OSIsoft and Versify



VERSIFY
Intelligence. Empowered.

Ability to Leverage Current Investment in The PI System

OSIsoft EA Agreement / Hosted Solution / Web Based

EPM, COE, NOC / Software as a Service Model

Energy Industry Focus from Both Vendors

Manage ALL Generation Types with Familiar PI System Data



EDISON
MISSION GROUP

An EDISON INTERNATIONAL® Company

VERSIIFY Scope / Leveraging the PI System

Consolidated Dashboard Visualization

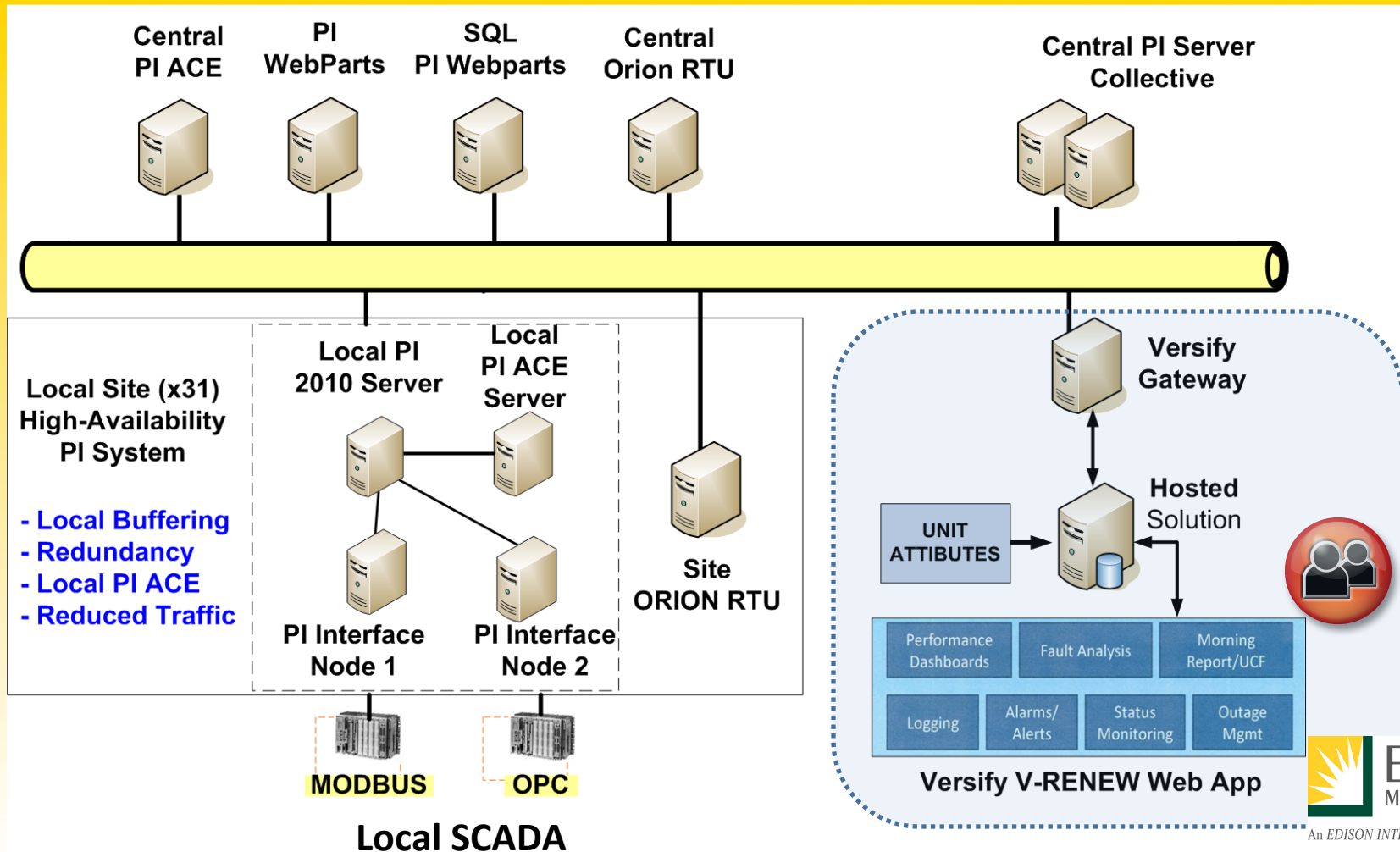
Alarm and Event Monitoring / Manual Event Logging

Unit Capability Reporting and Morning Operating Reports

Basic Fault Code Alarming / Reporting

Integrate Internal and External Sources

Query Historical and Real-Time Pi System Data

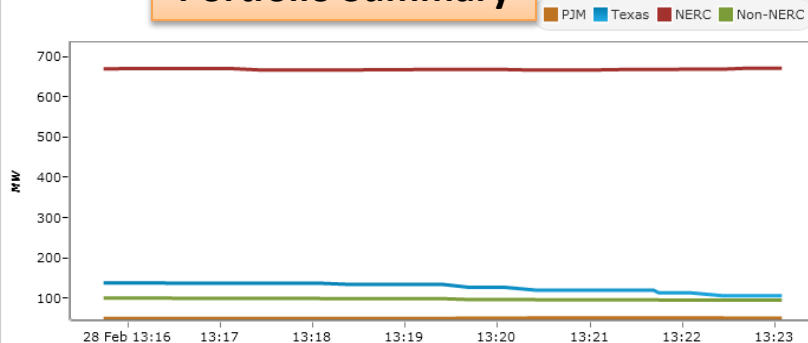


Status			
NAME	NPC	ACTIVE POWER	WIND SPEED (M/S)
Big Sky	239.4	47.4	8.6
Wildorado	161.0	63.6	18.8
Cedro Hill	150.0	42.3	14.7
Goat Wind	149.6	0.0	
Goat Wind 1	80.0	0.0	17.4
Goat Wind 2	69.6	0.0	19.9
Mountain Wind	140.7	123.3	
Mnt Wind 1	60.9	53.8	13.0
Mnt Wind 2	79.8	69.5	13.3
Taloga	129.6	116.1	14.1
San Juan Mesa	120.0	120.8	17.4
High Lonesome	100.0	95.9	7.7
Sleeping Bear	94.5	89.4	14.8
Elkhorn Ridge	81.0	47.5	5.4
Laredo Ridge	81.0	77.8	12.6
Pinnacle	55.2	-0.4	2.3
Jeffers	50.0	24.1	5.3
Lookout	37.8	3.5	5.2
Community Wind		13.7	3.9
Forward	29.4	0.0	2.3
Crosswind	21.0	15.3	10.7
Odin	21.0	12.6	9.8
Buffalo Bear	18.9	16.8	17.0
Spanish Fork	18.9	0.0	5.0
Hardin	14.7	12.6	11.8

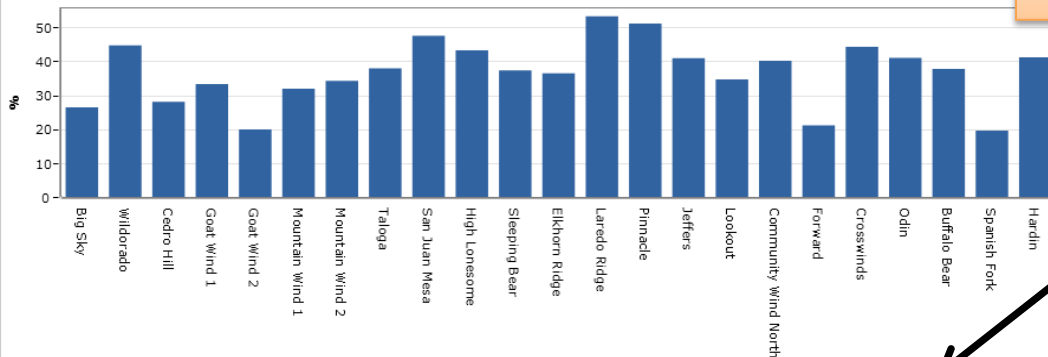
STATUS WINDOW

Portfolio Summary

ACTIVE POWER



CAPACITY FACTOR - MONTHLY



TURBINES ONLINE

REGION	CURRENTLY ACTIVE
PJM	125
Texas	134
NERC	391
Non-NERC	58

Consistent Layout

Fleet At a Glance

Leveraging PI System Data

Active Faults

Wind Overview - Wind Overview

WIND SITE	TURBINE SIZE	NPC	ACTIVE POWER	EXPECTED POWER	EXPECTED TURBINES	AVAILABLE TURBINES	UNAVAILABLE TURBINES	TURBINES ON-LINE	TURBINES FAULTED	CAPACITY CHANGE	CAPACITY ALARM	DERATE TIMER	TURBINE WIND SPEED
Big Sky	2.1	239.4	4.8	4.9	114	31	83	19.0		-174.3	Alarm	34.0	6.7
Wildorado	2.3	161.0	124.3	123.5	65	70	-5	70.0		11.5	OK	0.0	10.0
Cedro Hill	1.5	150.0	26.7	26.1	97	100	-3	100.0		4.5	OK	0.0	5.7
Goat Wind 1	1.0	80.0	5.0	7.8	80	80	0	62.0		0.0	OK	0.0	5.0
Goat Wind 2	2.4	69.6	2.1	3.0	28	28	0	20.0		0.0	OK	0.0	4.7
Mountain Wind	2.1	140.7	49.5	48.4				60.0		-2.1	OK	0.0	7.8
Taloga	2.4	129.6	123.8	126.5				54.0		7.2	OK	0.0	12.5
San Juan Mesa	1.0	120.0	101.5	100.0				116.0		4.0	OK	0.0	10.4
High Lonesome	2.5	100.0	16.5	15.5				36.0		-5.0	OK	0.0	6.3
Sleeping Bear	2.1	94.5	54.9	61.5	43	44	-1	44.0		2.1	OK	0.0	9.9
Elkhorn Ridge	3.0	81.0	74.1	77.9	27	27	0	27.0		0.0	OK	0.0	13.9
Laredo Ridge	1.5	81.0	78.4	78.0	53	53	0	52.0					
Pinnacle	2.4	55.2	53.4	52.8	21	23	0	23.0					
Jeffers	2.5	50.0	49.5	49.2	19	19	0	19.0					
Lookout	2.1	37.8	27.9	28.4	17	16	1	16.0					

VERSIFY
Wind Overview
Displaying PI Data



EDISON
MISSION GROUP

An EDISON INTERNATIONAL® Company

OPERATIONAL STATS

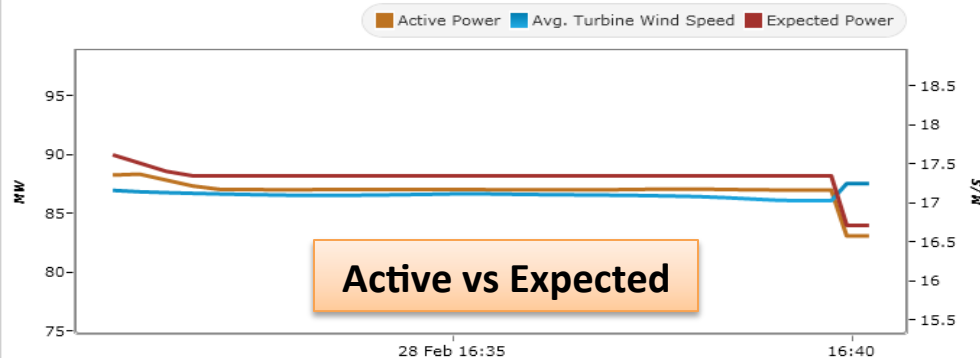
GENERATION MWH

TURBINES NOT GENERATING

	LAST HOUR	DAY	MONTH
Revenue Meter	85.1	995.3	22832.1
Sum of WTGs	87.3	1021.9	23576.9
Capacity Factor (%)	92.1	76.9	37.7
Output Factor (%)	98.8	79.1	50.4
Equivalent Availability (%)	94.7	97.7	96.3
Operating Efficiency (%)	98.7	97.1	93.2

Operational Stats

ACTIVE VS EXPECTED POWER



EVENTS



Sleeping Bear (Edit)

02/28/2012 15:03 -

Event ID: 597294

Turbine Fault

Turbine Fault: SB.T36 - FaultCode 138 - Pitch_LubricationStop

☐ Acknowledge

02/28/2012 15:03

auto

Active

Sleeping Bear (Edit)

02/28/2012 15:01 -

Event ID: 597291

Turbine Fault

Turbine Fault: SB.T

☐ Acknowledge

02/28/2012 15:01

auto

Active

Event Log

Sleeping Bear (Edit)

02/28/2012 14:51 -

Event ID: 597282

Turbine Fault

Turbine Fault: SB.T34 - FaultCode 138 - Pitch_LubricationStop

Display Timezone: CPT

02/28/2012 14:51

auto

Active

SCHEDULE



DATE	HE	AVAILABILITY (# OF WTG)	AVAILABILITY (MW)	ACTUAL (MWh)	AVG TURBINE WIND SPEED (m/s)
02/28/2012	1			51.12	9.39
02/28/2012	2			73.43	10.9
02/28/2012	3			67.05	10.51
02/28/2012	4			58.15	9.96
02/28/2012	5			48.01	9.27
02/28/2012	6				
02/28/2012	7				
02/28/2012	8				
02/28/2012	9			89.53	12.86
02/28/2012	10			85.27	12.29
02/28/2012	11			87.11	13.83
02/28/2012	12			87.48	14.53
02/28/2012	13			87.84	15.32

All times shown in: CPT

Unit Commitment





VERSIFY™

V-Performance 3.9.9.1 - Staging



Home



Portal



Events



Tools

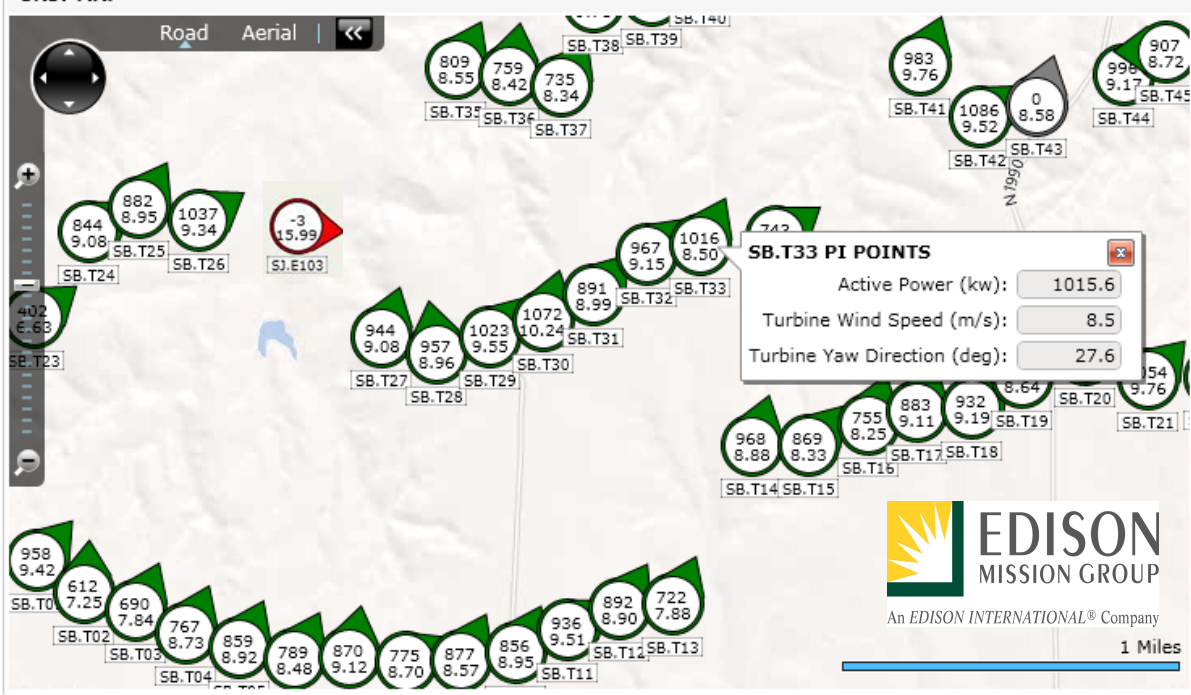


Logout

Sleeping Bear - Unit Map

Bing Maps and Site Specific PI System Data

UNIT MAP



Turbines Online: 100.0
Turbines Unavail: -3.0
Turbines Faulted:
Derate Timer: 0.0
Active Power: 122.5
Expected Power: 123.0
MET Twr Wind Spd: 9.4
Turbine Wind Spd: 9.8
Curtailment: No
MET Twr Com Stat: Good

Goat Wind 1

NPC: 80.0
No. of Turbines: 80.0
Turbines Expect: 80.0
Turbines Avail: 80.0
Capacity Change: 21.0
Capacity Alarm: Alarm
Turbines Online: 29.0
Turbines Unavail: -21.0
Turbines Faulted:
Derate Timer: 0.0
Active Power: 0.7
Expected Power: 2.1

smarion(EPT)
Logout

Home

Wind Overview

Wind Locations X

Fleet Report

Status

Wind

Name	NPC	Active Power	Wind Speed(m/s)
Big Sky:	239.4	26.1	5.8
Wildorado:	161.0	44.1	5.2
Cedro Hill:	150.0	15.6	3.2
Goat Wind:	149.6	102.4	
Goat Wind 1:	80.0	53.0	10.4
Goat Wind 2:	69.6	49.3	9.9
Mountain Wind:	140.7	62.4	
Mnt Wind 1:	60.9	29.9	8.9
Mnt Wind 2:	79.8	32.5	7.8
Taloga:	129.6	85.2	10.4
San Juan Mesa:	120.0	22.2	4.8
High Lonesome:	100.0	1.8	1.8
Sleeping Bear:	94.5	40.4	8.3
Elkhorn Ridge:	81.0	0.6	2.3
Laredo Ridge:	81.0	0.3	0.2
Jeffers:	50.0	1.2	2.8
Lookout:	37.8	0.9	4.4
Community Wind:	30.0	0.1	2.0
Forward:	29.4	-0.2	2.5
Crosswind:	21.0	6.7	7.6

Event Log

Event ID: 712795
Turbine Fault
Turbine Fault: BS.T114 - FaultCode 203 - Elec_ParkControlStop
☐ Acknowledge

Big Sky (Edit) 04/20/2012 01:32
04/20/2012 01:31 - auto
Event ID: 712794 Active
Turbine Fault
Turbine Fault: BS.T106 - FaultCode 203 - Elec_ParkControlStop
☐ Acknowledge

Big Sky (Edit) 04/20/2012 01:32
04/20/2012 01:31 - auto
Event ID: 712793 Active
Turbine Fault
Turbine Fault: BS.T103 - FaultCode 203 - Elec_ParkControlStop
☐ Acknowledge

Big Sky (Edit) 04/20/2012 01:32
04/20/2012 01:31 - auto
Event ID: 712792 Active
Turbine Fault
Turbine Fault: BS.T101 - FaultCode 203 - Elec_ParkControlStop
☐ Acknowledge

Big Sky (Edit) 04/20/2012 01:20
04/20/2012 01:15 - 04/20/2012 01:19 auto
Event ID: 712733 Cleared

Display Timezone: EPT

**Event Log Captures
Turbine Faults as well as
Allows for Manual Entry**

General

History

Locations

Details

Unit: Big Sky

Comment Type: Turbine Fault

Status: Active

Event Id: 712794

Broadcast To:

Start Time: 4/20/2012

15

01:31

End Time: <M/d/yyyy>

15

**Minimizing Down
Time Through Fault
Code Recognition**

Description

BS.T106 - FaultCode 203 - Elec_ParkControlStop

**Can This Fault be
Reset Remotely?**

Code: 203

Name: 203 - Elec_ParkControlStop

Category: Turbine Electric

Description: When the stop windfarm button has been initiated in SC Commander.
Stops every turbine in park based off ramp down rate

Affects Availability: Yes

Reset Type: Local / Remote

Remote Reset Allowable: AUTO RESET

Reset Criteria: If auto reset fails 3x within an hour, place turbine into manual stop
and notify field tech.

**Fault Generates
Event Log Entry**



EDISON
MISSION GROUP

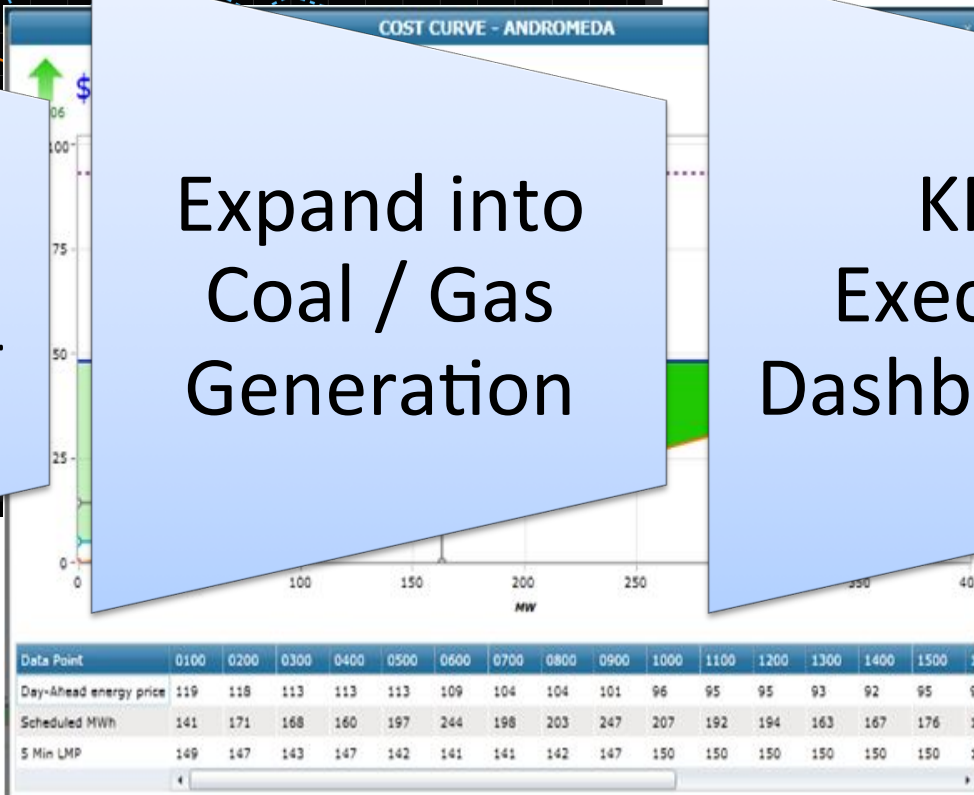
An EDISON INTERNATIONAL® Company

Future Plans

Maximize
Revenue
Through Real-
Time Pricing

Expand into
Coal / Gas
Generation

KPI /
Executive
Dashboarding



Real-time Situational Awareness

“Being able to successfully leverage the investment made into our PI System by exposing this data centrally through the Versify Application allows us to be more competitive today with the ability to adapt for the future”

- Edison Mission Group



An EDISON INTERNATIONAL® Company



Challenge

- OEM Contracts Expiring
- Growing Wind Fleet
- Reactive - vs- Proactive
- Multiple Platforms
- Transparency

Solution

- People, Process, Technology
- Leverage PI System
- Implement Versify's V-RENEW
- V-PERFORMANCE

Results and Benefits

- Accurate Day Ahead Schedule
- Real-Time Fleet Monitoring
- Nearly 3000 Remote Turbine Resets / Revenue

Conclusion

Garbage In / Garbage Out...Data Integrity!

Choose the Strategy That's Right For You

Flexible, Adaptable, and Integrated

Scott Marion

- EMAIL

SMarion@EdisonMission.com

- LINKEDIN

www.linkedin.com/in/mrscottmarion



An *EDISON INTERNATIONAL*® Company





THANK YOU

Brought to you by  **OSIsoft.**