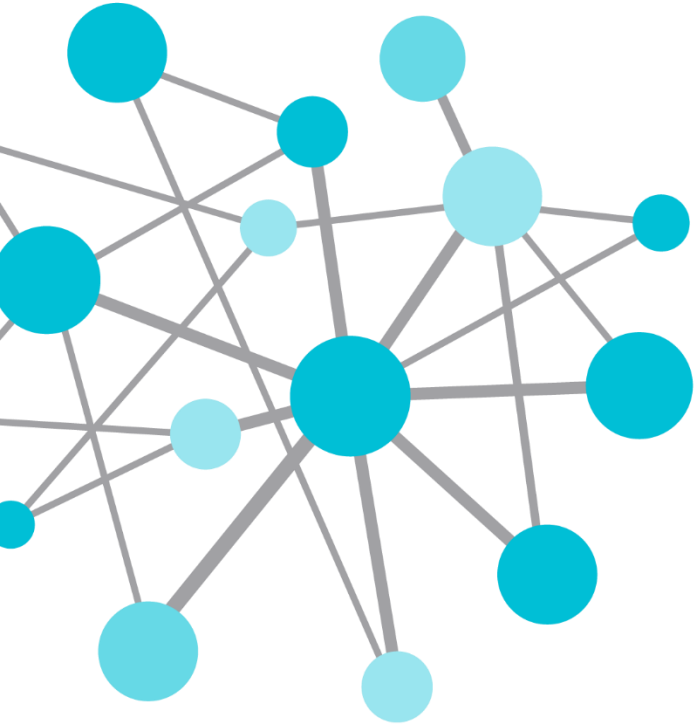

OSIsoft PI System Overview for T&D

Presented by **Miguel Chavero, OSIsoft, LLC**
EMEA P&U Industry Principal

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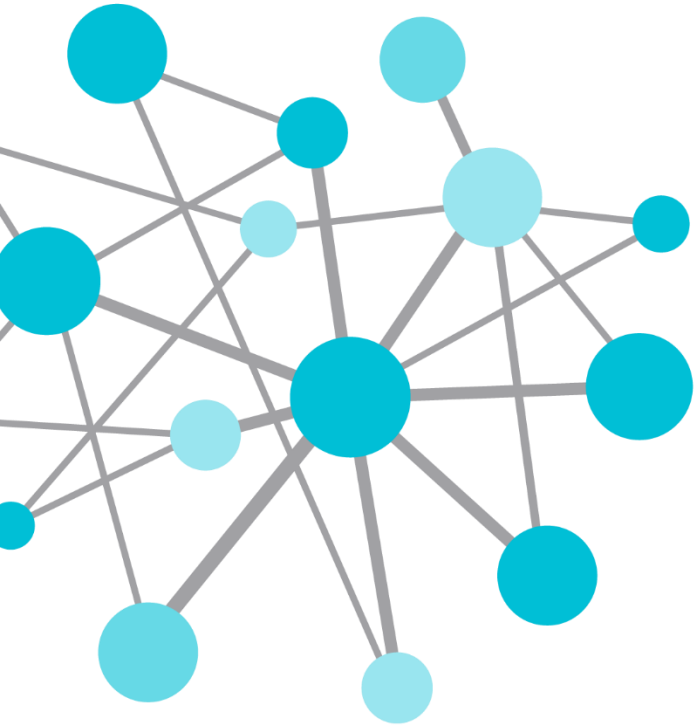

THANK YOU!!!
KIITOS!!!

FINGRID

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Agenda

- The Company
- PI System: Real Time Infrastructure for the Enterprise
- T&D Industry Pain Points
- T&D Showcases
- PI & Smart Grid
- Q&A

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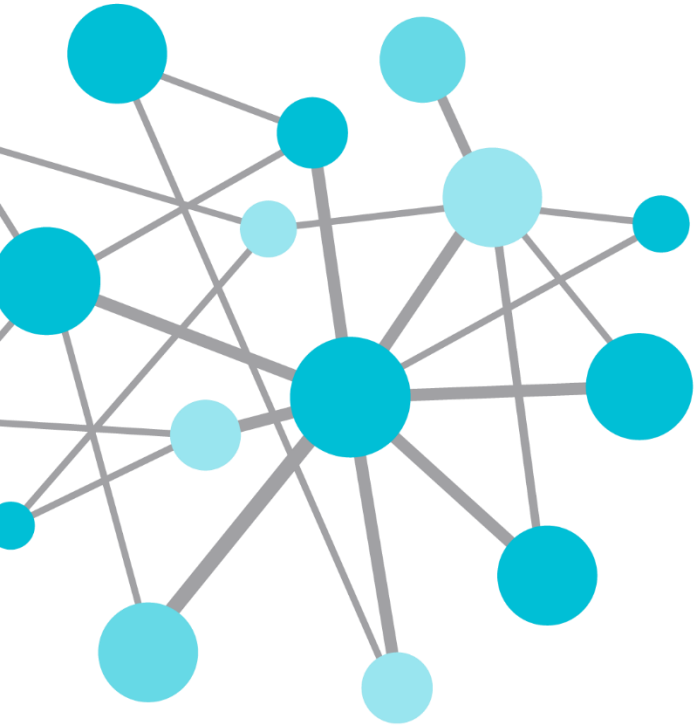

1.

The Company

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Who we are? OSI Soft overview

Founded in **1980**

14 000 Sites,
4 000 Customers
123 Countries

Revolutionary customer support

Privately held

Global presence, Offices worldwide

Power & Utilities
Oil & Gas
Chemicals
Metals & Mining

Over 20% of revenue invested in R&D

1000 Employees

65% of Global 500 process & manufacturing

Market Leader
"Enterprise infrastructure for streaming data & events"

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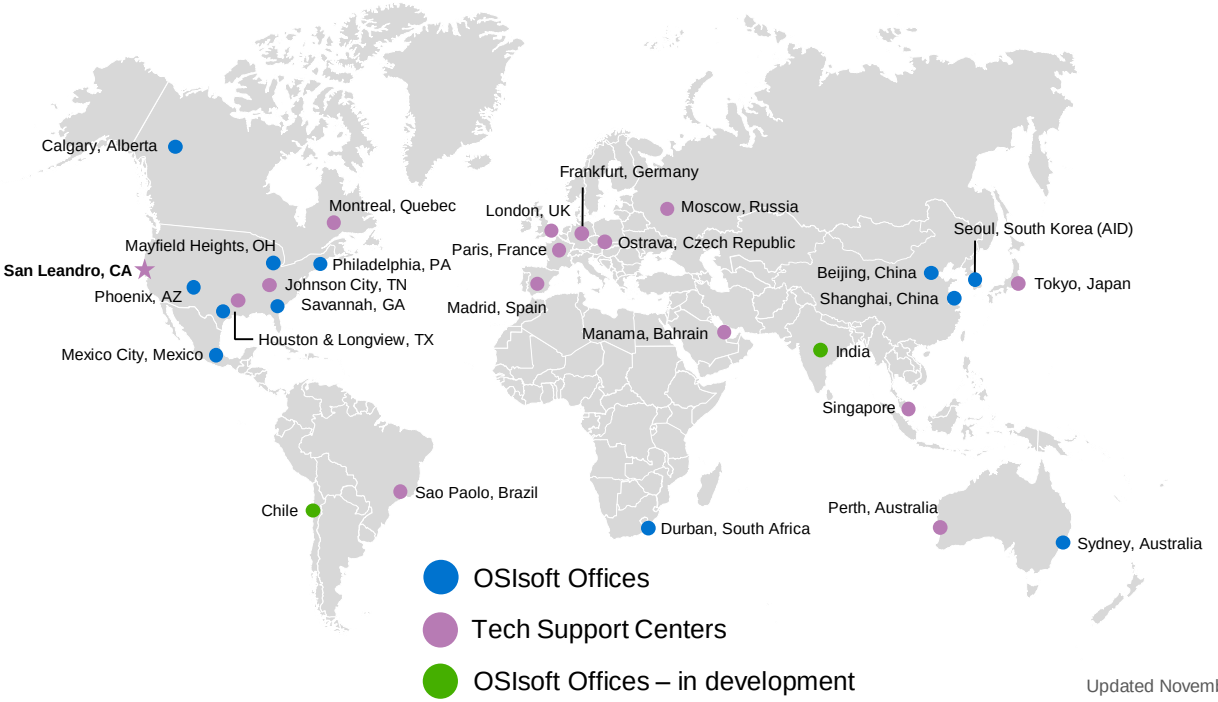
Who we are? OSI Soft overview



Updated November 2013

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Who we are? OSI Soft overview

Power & Utilities	**OSIsoft is ranked 1st in the power industry -** DTE Energy, PSE&G, Entergy, British Energy, Iberdrola
Oil & Gas	**100% of the global Top 10 producers use the PI System -** BP, Shell, Chevron, ExxonMobil, Pemex, Total, Petrobras
Chemicals & Petrochemicals	**40 of top 50 Chemical Companies rely on the PI System -** Dow Corning, Eastman Kodak, Cytec, Rhodia
Pharmaceuticals, Food & Life Sciences	**Nine of the Top 10 pharmaceuticals use the PI System -** Amgen, Bayer, PDL, Allergen, Johnson & Johnson, Roche
Materials, Mines, Metals & Metallurgy	**The PI System is installed in the world's largest mining companies -** Cemex, Cargill, BHP Billiton Yabulu, Codelco
Pulp & Paper	**400 sites from worldwide leaders use OSIsoft to manage their mills -** Abitibi, Cascades, Inc., International Paper, MeadWestvaco
Critical Facilities, Data Centers & IT	**Innovative use of PI System to monitor complex IT environments -** Microsoft, US Army, Cisco Systems

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Defacto Standard in Power and Utilities

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8

OSIsoft European Selected T&D

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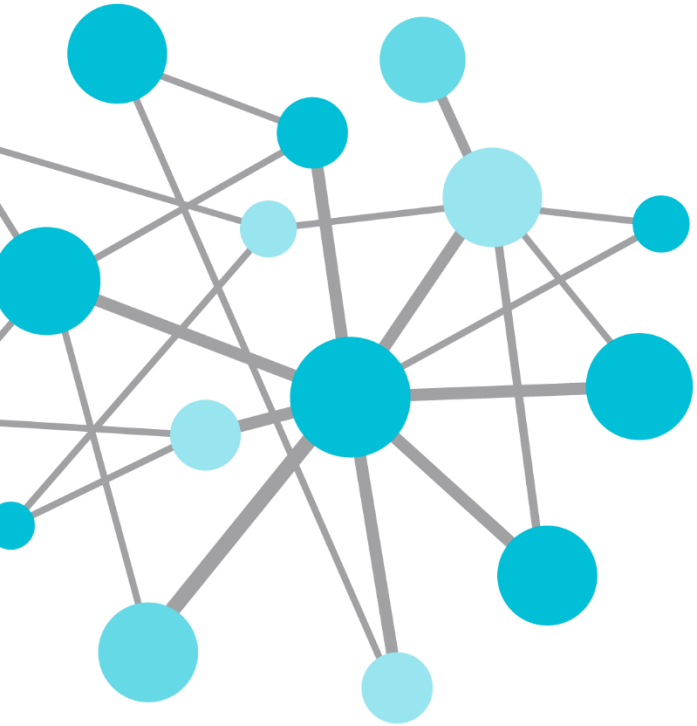

2.

PI System Infrastructure

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PI System Infrastructure

in·fra·struc·ture [in-fruh-struhk-cher]

"It can be generally defined as the set of interconnected structural elements that provide a framework, supporting an entire structure of development[1]"

Traits of an Infrastructure

http://en.wikipedia.org/wiki/Infrastructure

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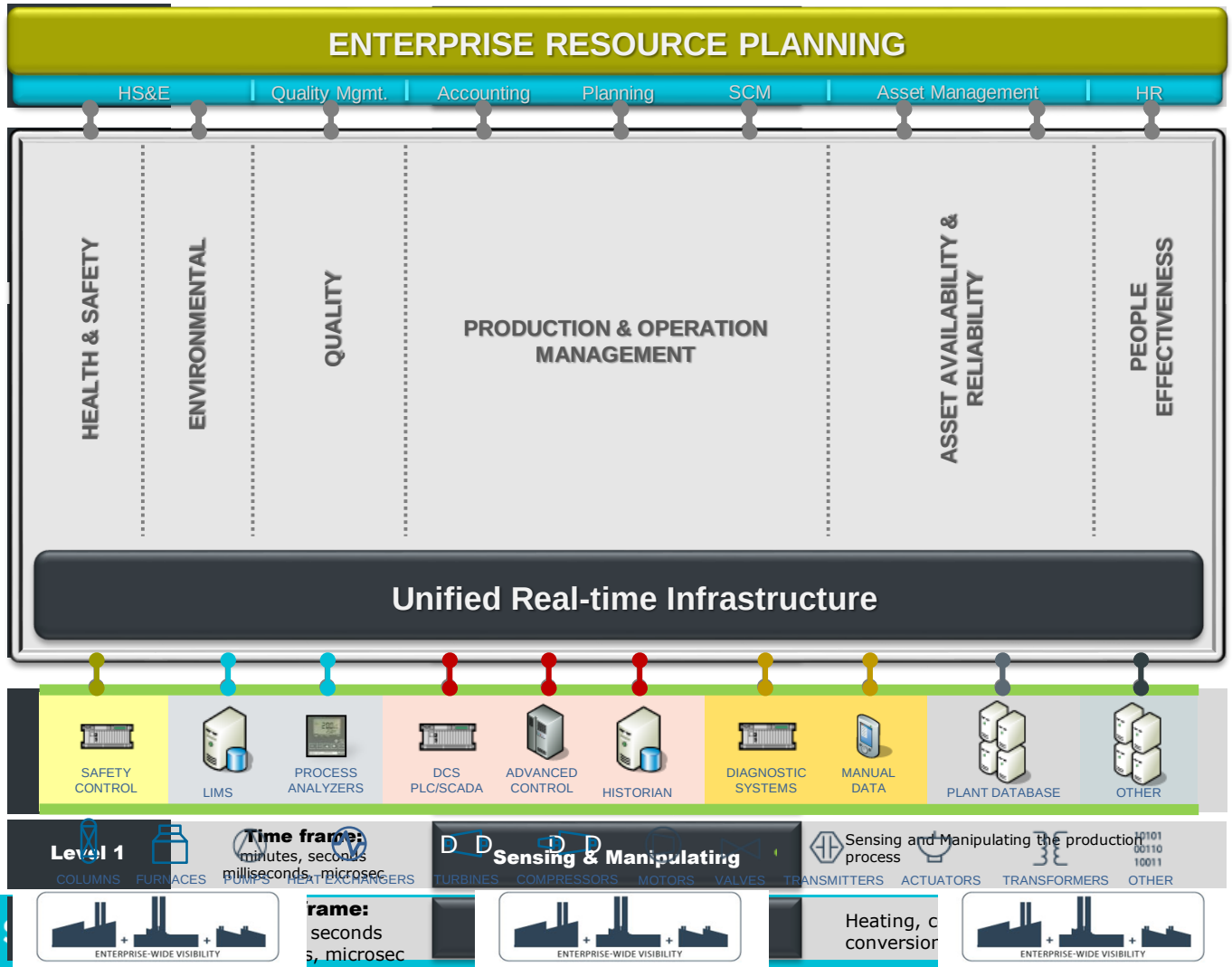
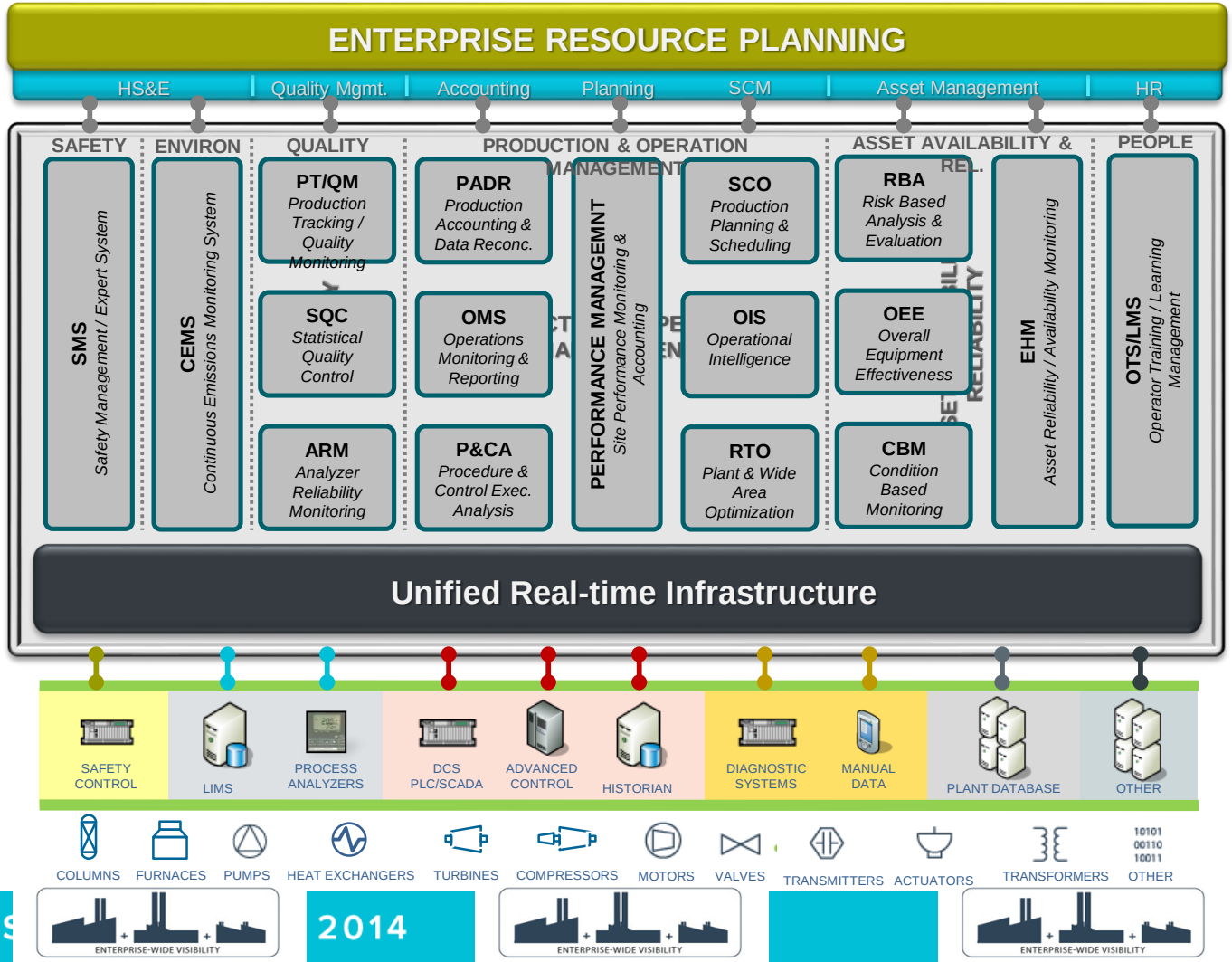

ENTERPRISE RESOURCE PLANNING
HS&E
Quality Mgmt.
Accounting
Planning
SCM
Asset Management
HR
HEALTH & SAFETY
ENVIRONMENTAL
QUALITY
PRODUCTION & OPERATION MANAGEMENT
ASSET AVAILABILITY & RELIABILITY
PEOPLE EFFECTIVENESS
Unified Real-time Infrastructure
SAFETY CONTROL
LIMS
PROCESS ANALYZERS
DCS PLC/SCADA
ADVANCED CONTROL
HISTORIAN
DIAGNOSTIC SYSTEMS
MANUAL DATA
PLANT DATABASE
OTHER
Level 1
Time frame:
minutes, seconds
milliseconds, microsec
Sensing & Manipulating
Sensing and Manipulating the production process
COLUMNS
FURNACES
PUMPS
HEAT EXCHANGERS
TURBINES
COMPRESSORS
MOTORS
VALVES
TRANSMITTERS
ACTUATORS
TRANSFORMERS
OTHER
ENTERPRISE-WIDE VISIBILITY
ENTERPRISE-WIDE VISIBILITY
ENTERPRISE-WIDE VISIBILITY


ENTERPRISE RESOURCE PLANNING
HS&E
Quality Mgmt.
Accounting
Planning
SCM
Asset Management
HR
SAFETY
ENVIRON
QUALITY
PRODUCTION & OPERATION MANAGEMENT
ASSET AVAILABILITY & RE...
PEOPLE
SMS
Safety Management / Expert System
CEMS
Continuous Emissions Monitoring System
PT/QM
Production Tracking / Quality Monitoring
SQC
Statistical Quality Control
ARM
Analyzer Reliability Monitoring
PADR
Production Accounting & Data Reconc.
OMS
Operations Monitoring & Reporting
P&CA
Procedure & Control Exec. Analysis
PERFORMANCE MANAGEMNT
Site Performance Monitoring & Accounting
SCO
Production Planning & Scheduling
OIS
Operational Intelligence
RTO
Plant & Wide Area Optimization
RBA
Risk Based Analysis & Evaluation
OEE
Overall Equipment Effectiveness
CBM
Condition Based Monitoring
RELIABILITY
EHM
Asset Reliability / Availability Monitoring
OTS/LMS
Operator Training / Learning Management
Unified Real-time Infrastructure
SAFETY CONTROL
LIMS
PROCESS ANALYZERS
DCS PLC/SCADA
ADVANCED CONTROL
HISTORIAN
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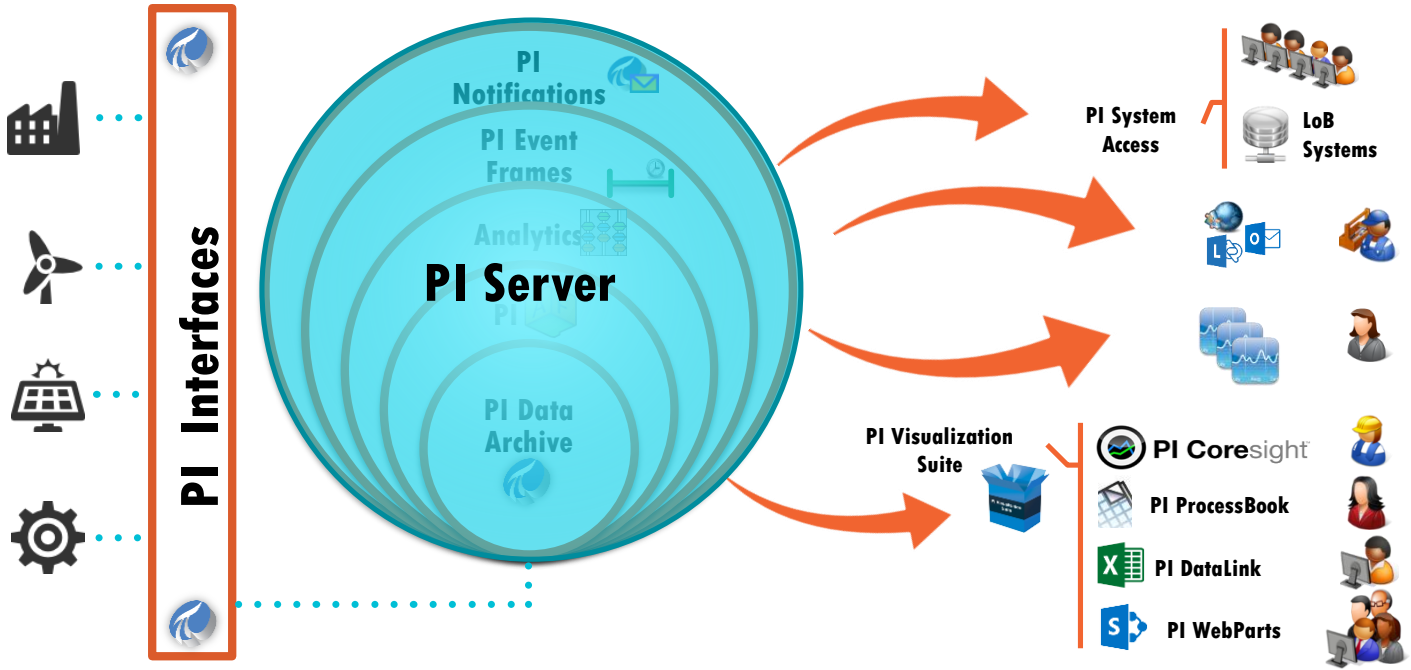
TRANSMITTERS
ACTUATORS
TRANSFORMERS
10101
00110
10011
OTHER
ENTERPRISE-WIDE VISIBILITY
ENTERPRISE-WIDE VISIBILITY
ENTERPRISE-WIDE VISIBILITY

PI System Infrastructure



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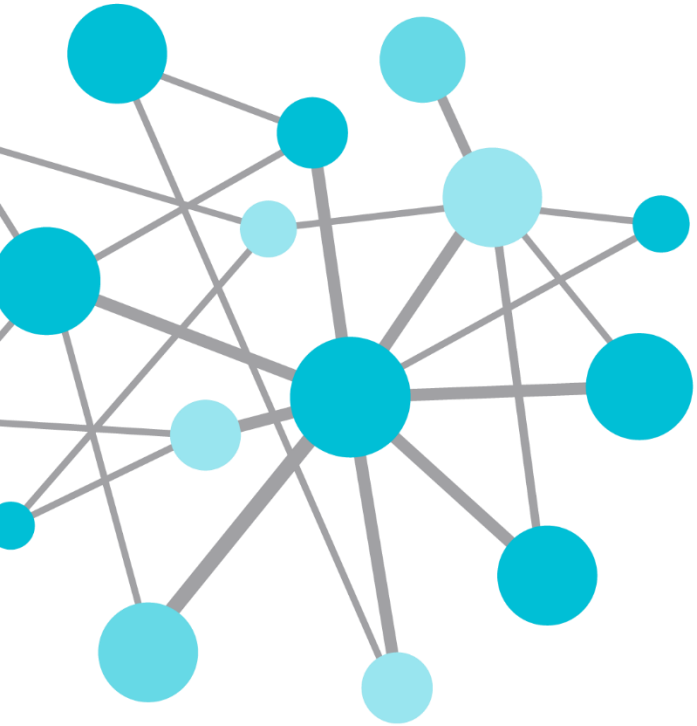

3.

T&D Industry

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T&D Industry Pain Points

- *Aging Infrastructure*
- *Asset Management*
- *Budget Constraints*
- *Islands of data*
- *Renewables integration*
- *Distributed Generation*
- *Smart Grid Integration*

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T&D Industry

- *How does T&D use PI?*
  - **To operate the T&D Grid**
    - Provide flexible system overviews for operational situations
    - Monitor substation and distribution field devices
    - Distribute operational information to corporate users
    - Archive data for later event reporting and analysis
    - Reconstruct system conditions for post-mortem analysis
  - **To plan the T&D Grid**
    - Integrate trending and analysis into engineering studies
    - View load patterns, create forecasts, measure system utilization
    - Provide load reports for regulatory cost-of-service studies

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T&D Industry

- *How does T&D use PI?*
  - **To construct and maintain the T&D Grid**
    - Monitor equipment performance and prioritize maintenance
    - Diagnose equipment operation problems
    - Archive critical equipment and event information from SCADA, substation IEDs, and field devices for later analysis
    - Identify best periods for new system construction
    - Avoid unnecessary or untimely capital expenditures
  - **To protect critical infrastructure**
    - Monitor IT infrastructure supporting Transmission assets
    - Integrate and correlate time-sensitive information across enterprise

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T&D Industry

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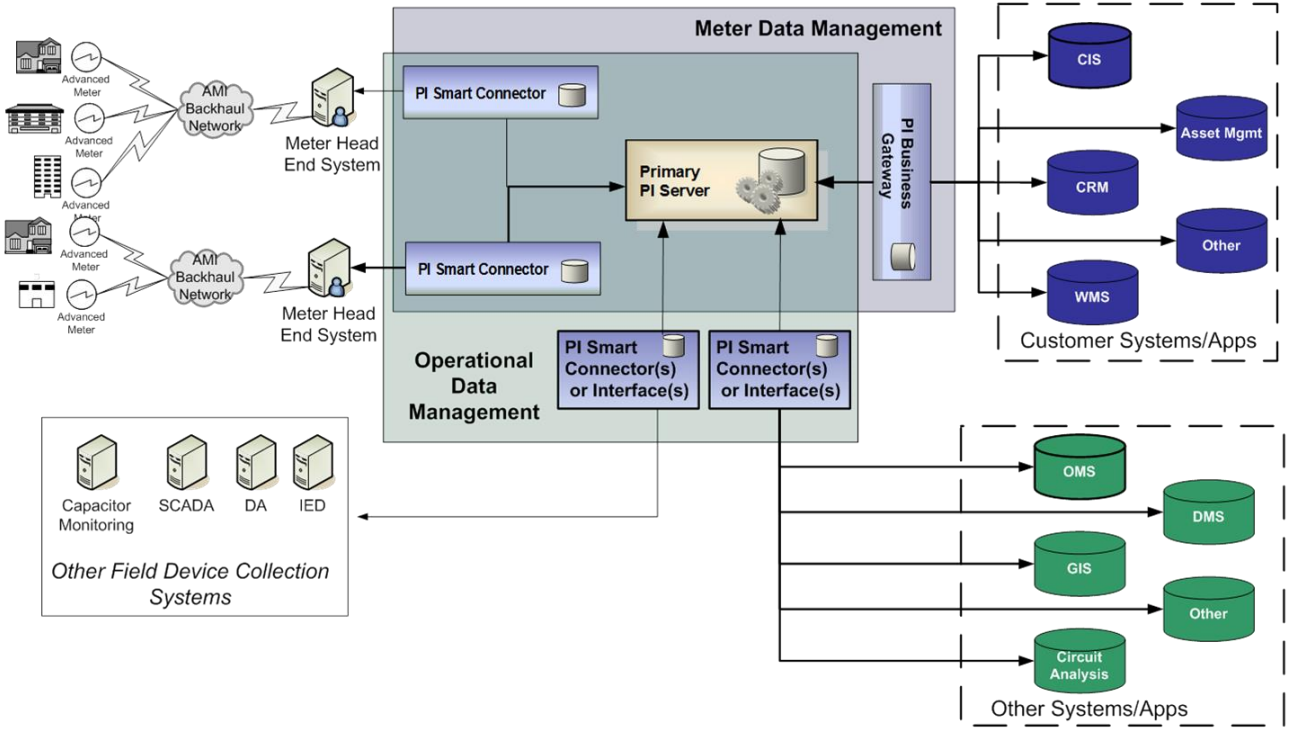
T&D Industry



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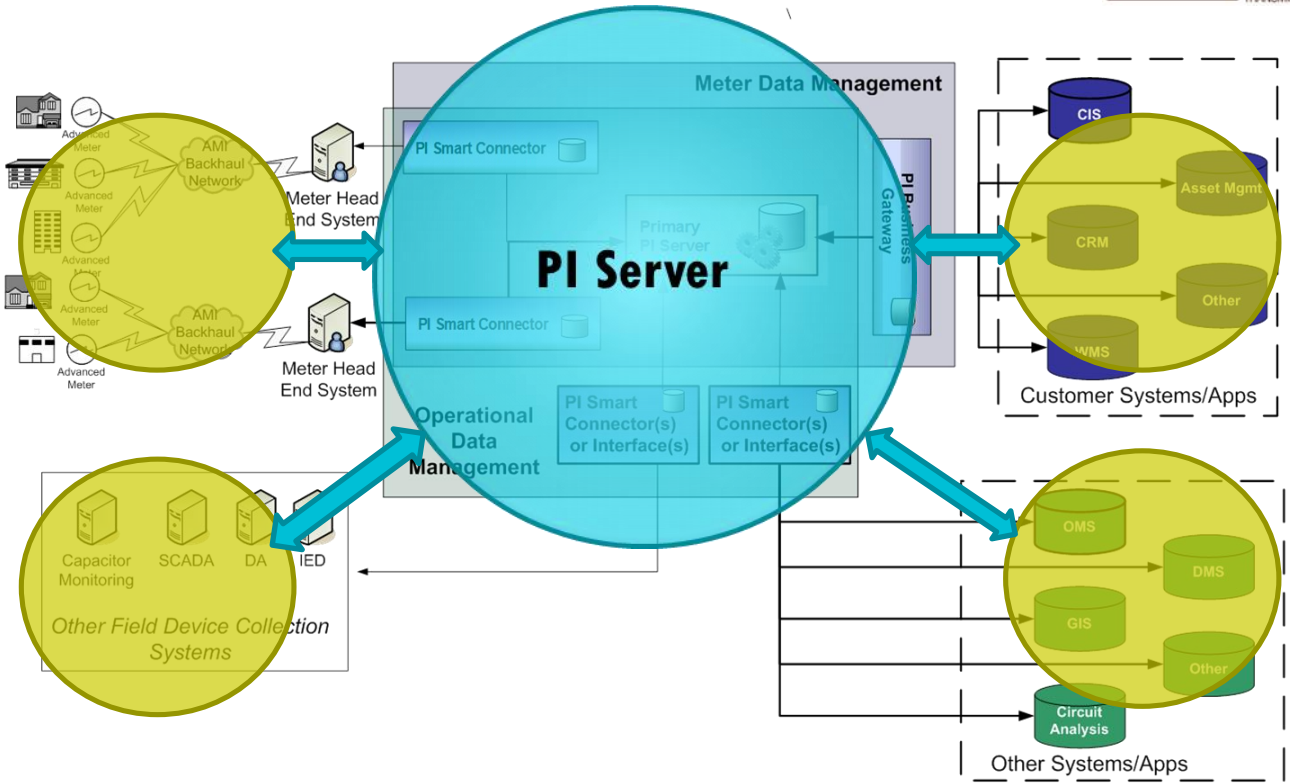
T&D Industry



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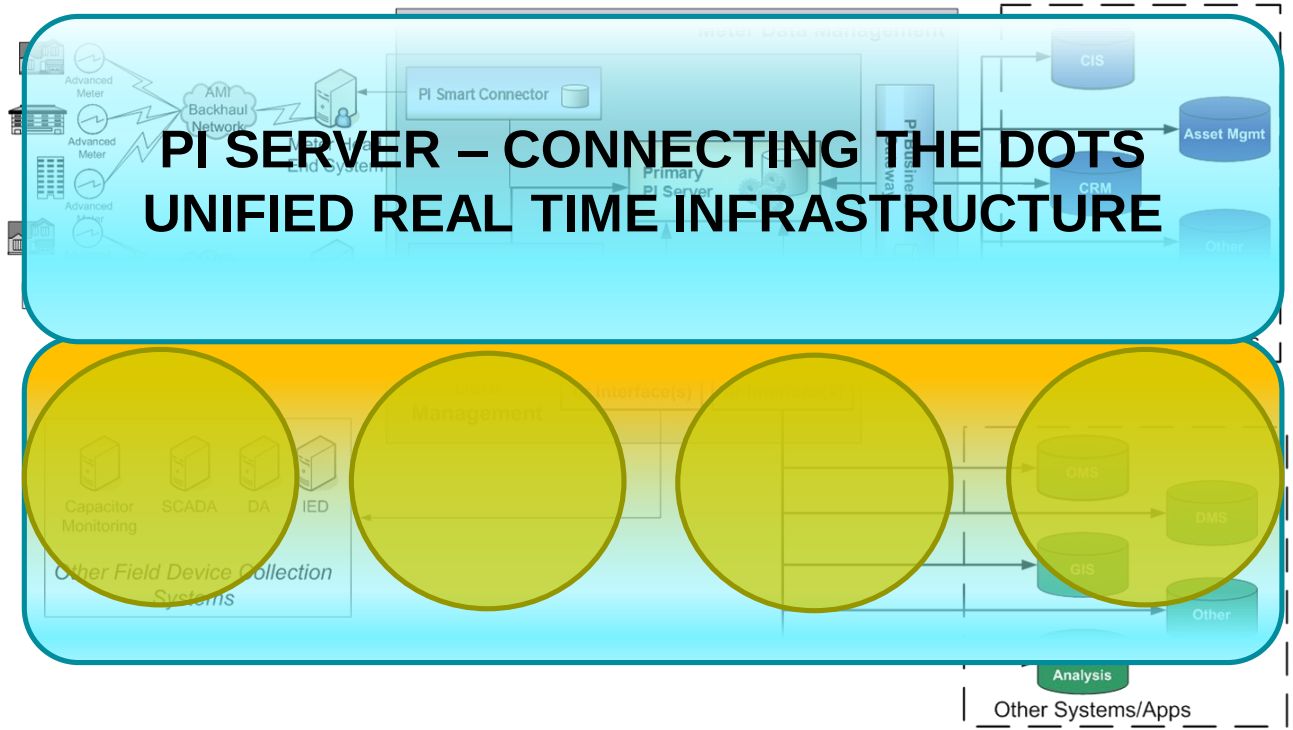
T&D Industry



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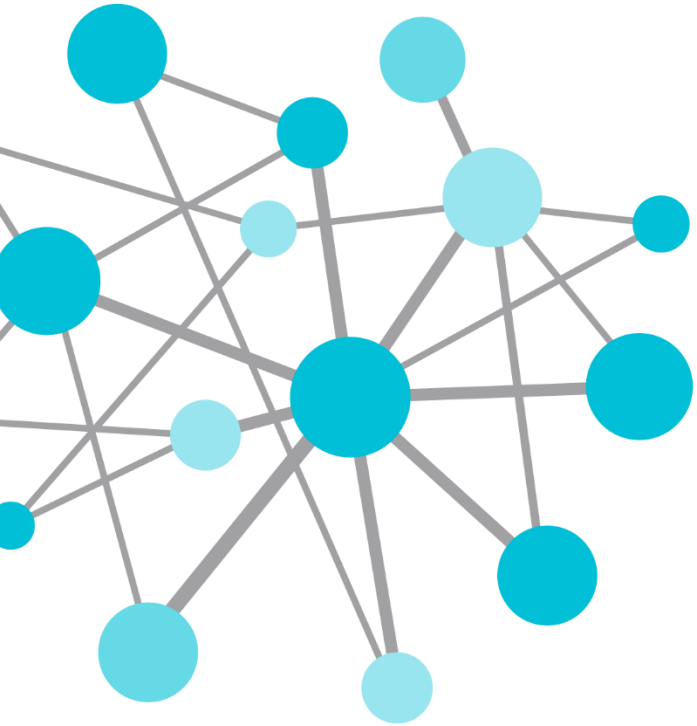

4.

T&D Showcases

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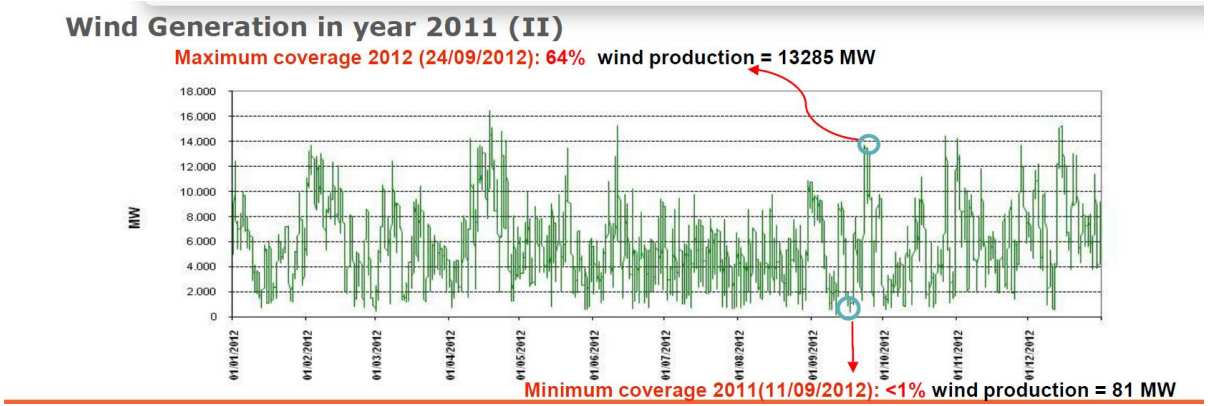
T&D Showcases

- **Advanced Grid Operations**
  - **Renewable wind and solar integration**
    - **Managing the intermittent power**

RED ELÉCTRICA DE ESPAÑA



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T&D Showcases

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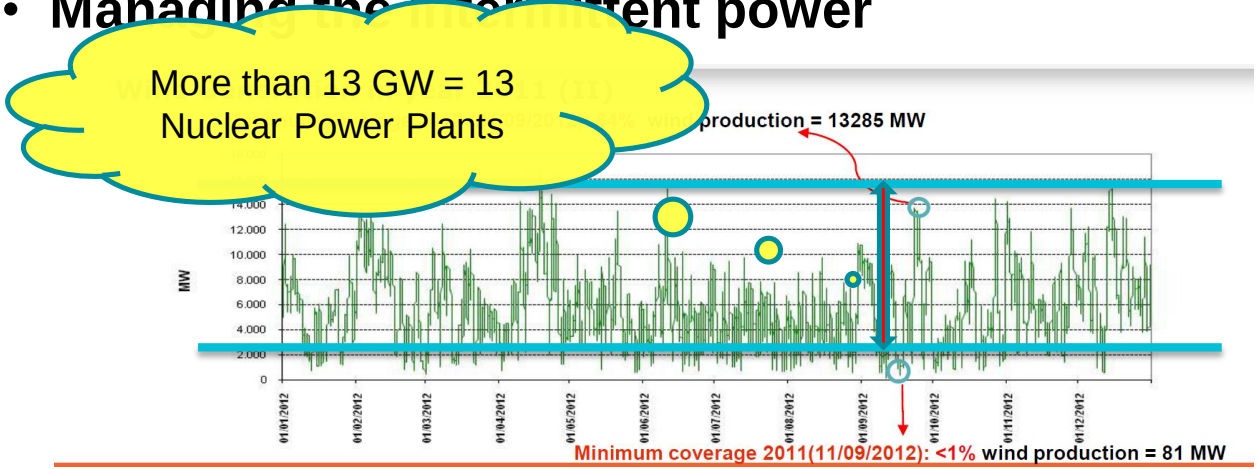
RED ELÉCTRICA DE ESPAÑA



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T&D Showcases

- **Advanced Grid Operations**
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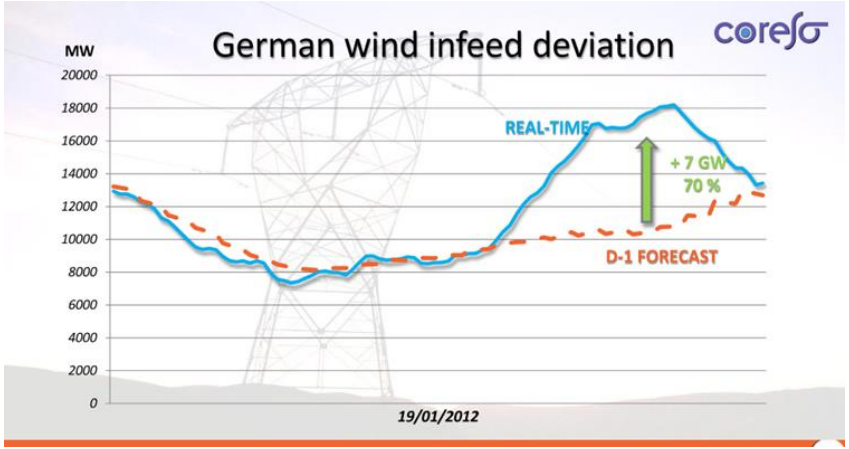
    - **Managing the intermittent power**



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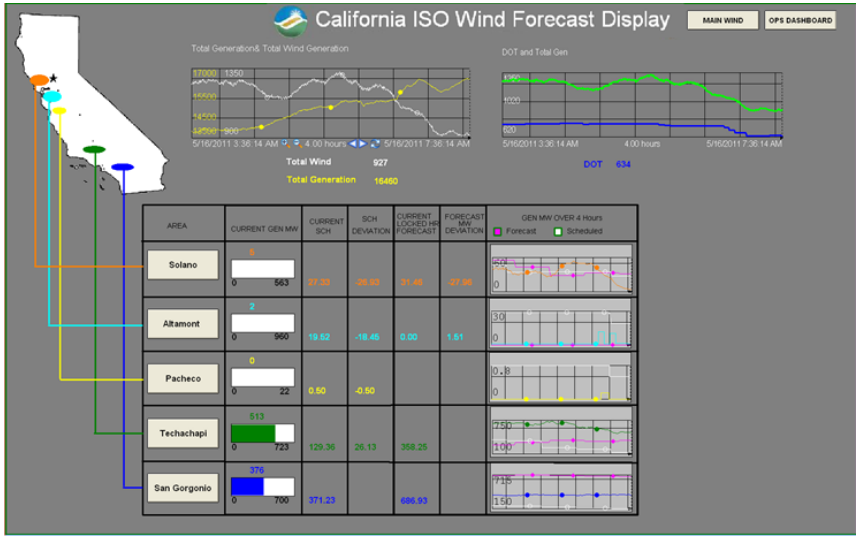
T&D Showcases

- **Advanced Grid Operations**
  - **Renewable wind and solar integration**

Realtime Loadforecasting -
The Cockpit



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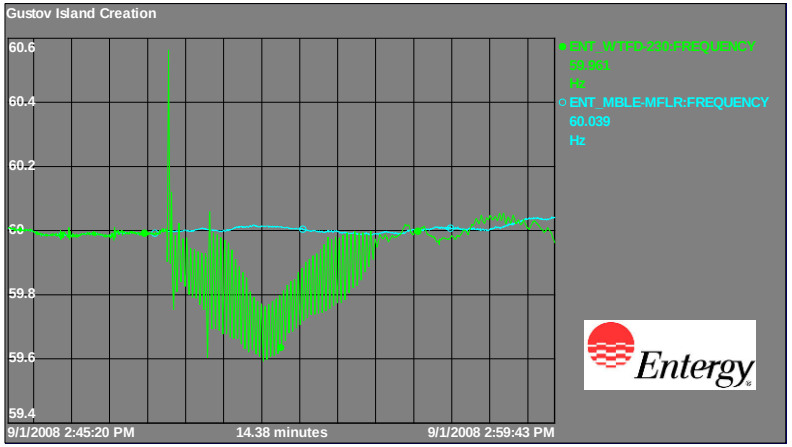
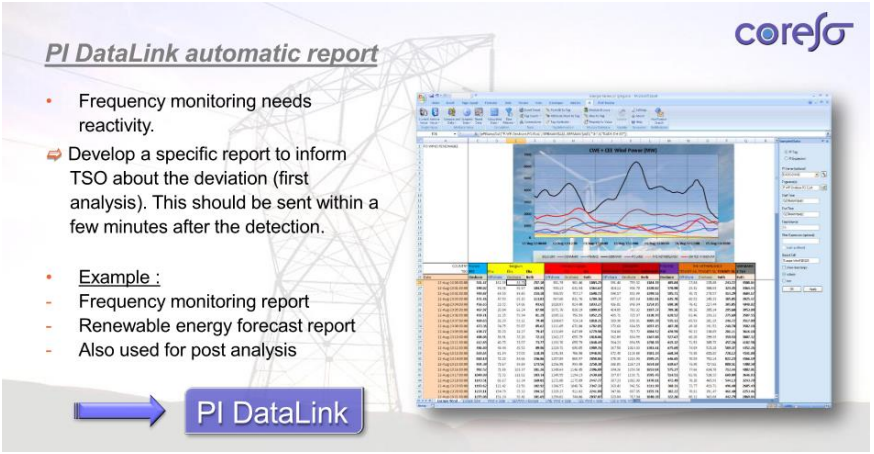
T&D Showcases

- **Advanced Grid Operations**
  - **Intelligent Decision Support (RCA)**





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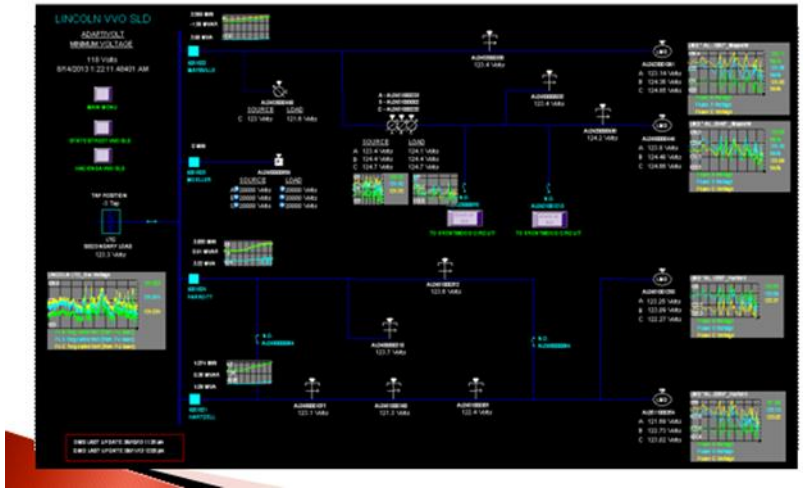
T&D Showcases

- **Advanced Grid Operations**
  - **Wide Area Voltage / VAR Management**



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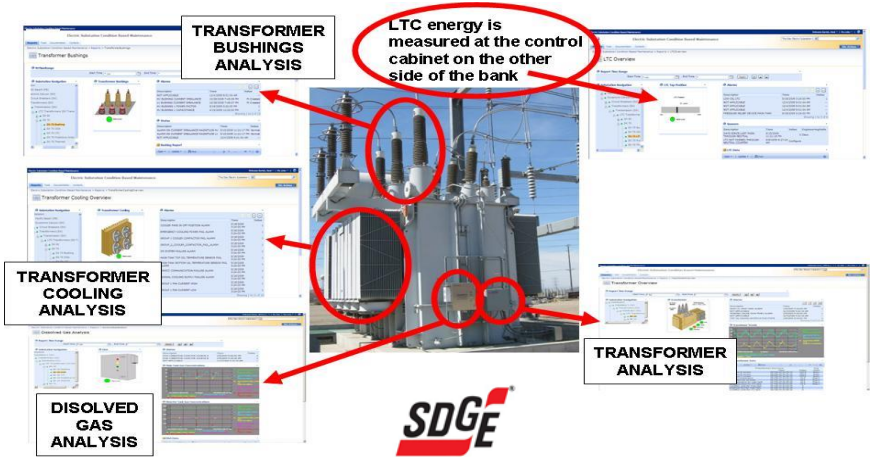
T&D Showcases

- **Asset Management**
  - **CBM (Condition Base Maintenance)**



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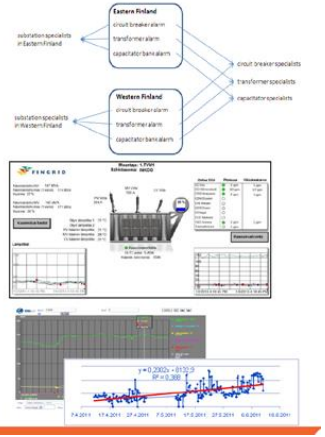
Our vision for the CMS

automatic alarms	• notifications and alarms based on trigger rules • generate tasks to our asset management system in the future
smart data visualization	• different kind of displays • traffic lights based on alarm values • gauges, embedded trend windows • drill-down user interference
easy analysis tools	• maximum, minimum, averages • ratios (e.g. gas ratios) • trend curves, slopes • health indices



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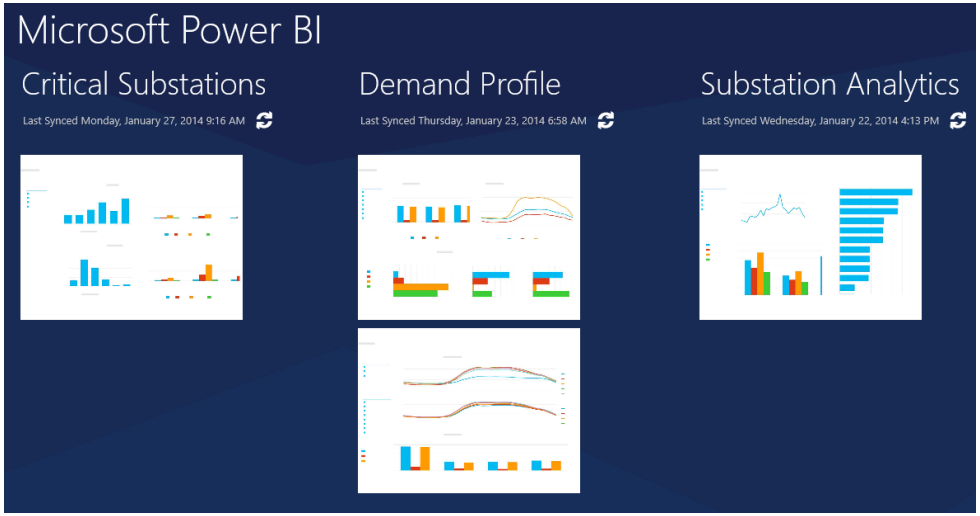
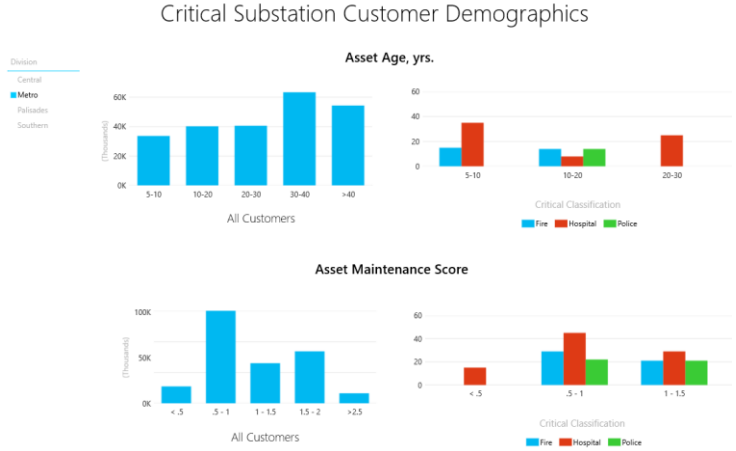
T&D Showcases

- **Asset Management**
  - **Capacity Planning**





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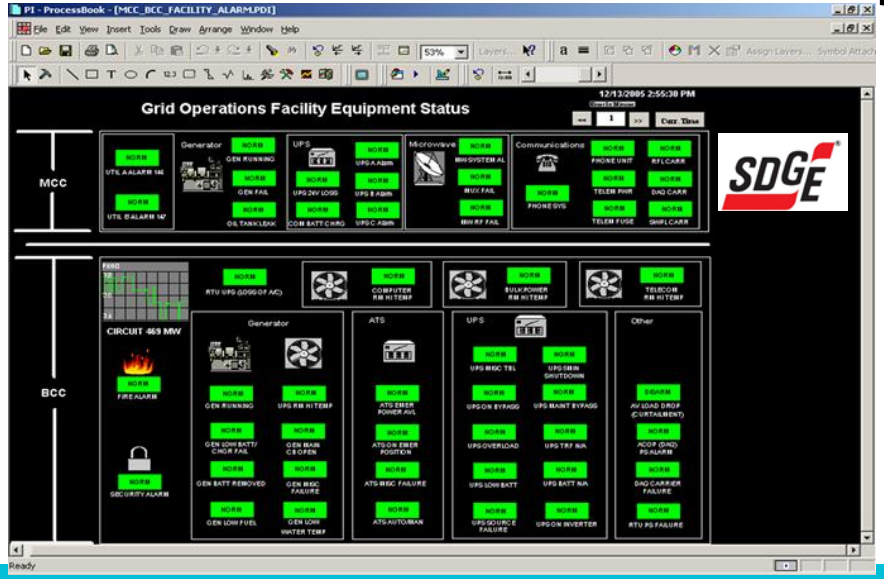
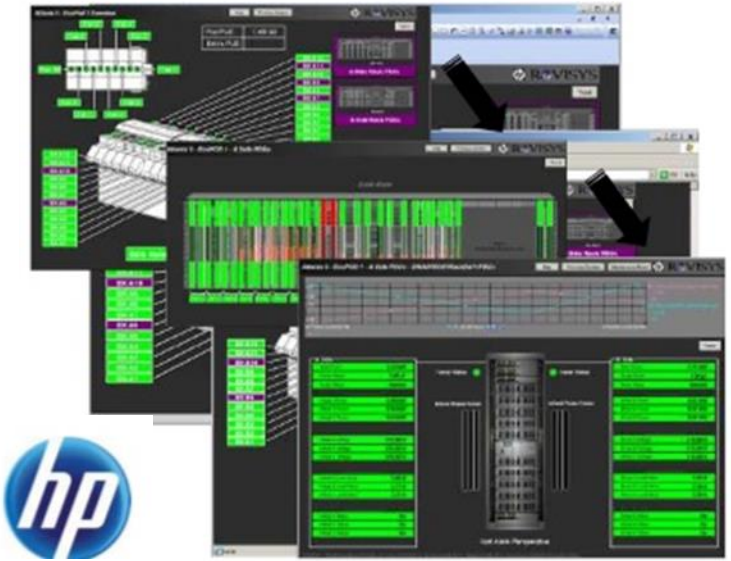
T&D Showcases

- **IT/OT Operations**
  - **Data centers / Facility Equipment**





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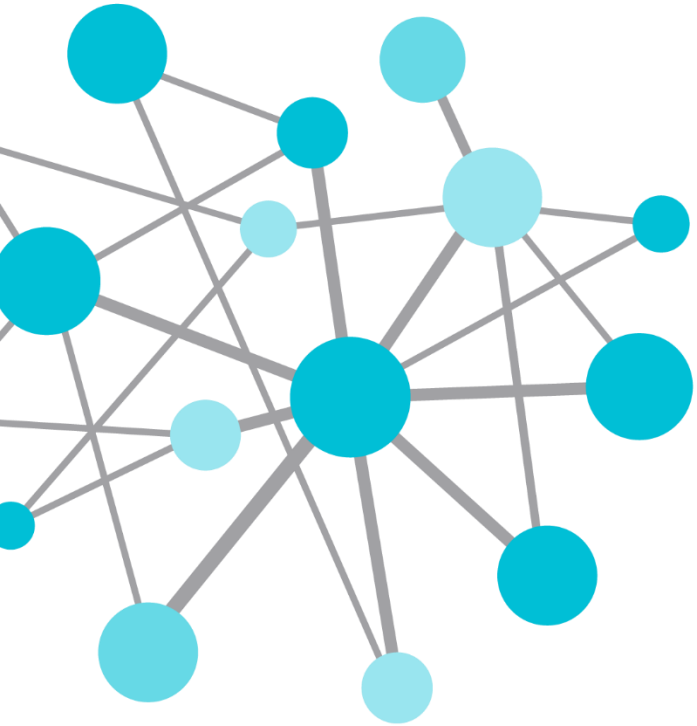

5.

PI & Smart Grid

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PI & Smart Grid

PI for Xcel Energy's SmartGridCity™

- PI OSIsoft Operational Data Management System (PI-ODMS):
  - Blend of meter and operations on one system
    - Probably first time in history
  - 1 Million Points with 2-second to 15-minute scan/updates
    - Represents 4 substations, 25K customers & 20 feeders
    - CommOps PI Data (Generation stats)
    - Operational & Non-Operational Substation Data
    - Grid State Data Feeder
    - Residential and C&I Metering + Validated data
    - Roll-up Calculations to support real and historical queries and validation
      - Distributed Energy Resources
  - End-to-end Seamless View of the system
    - Situational Awareness
    - System of Record for Time-series Data End-to-End
- AMI- Add-in
  - New meters are auto-created
  - Meters are automatically Validated
    - Checks: Clock Drift, Zero Value and Spikes
    - Validation is configurable
      - **Very easy to do on a time-series database**

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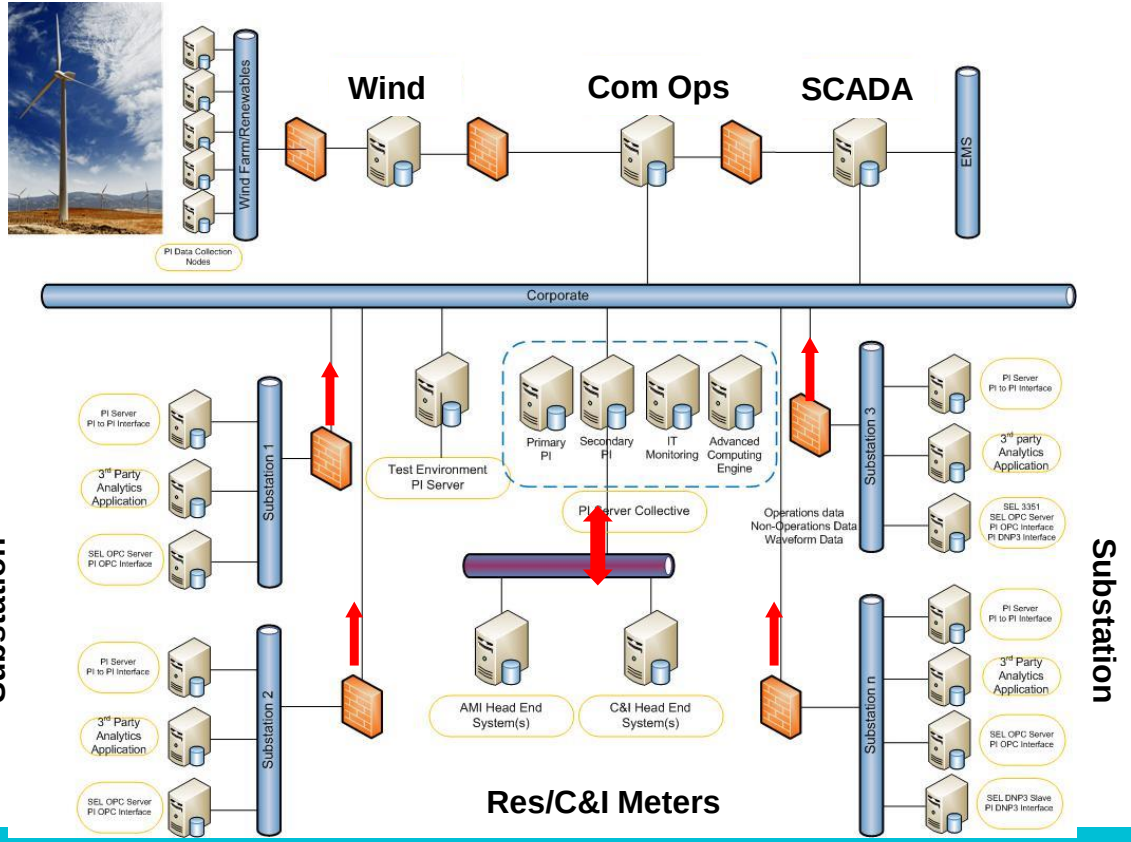
PI & Smart Grid

PI for Xcel Energy's SmartGridCity™



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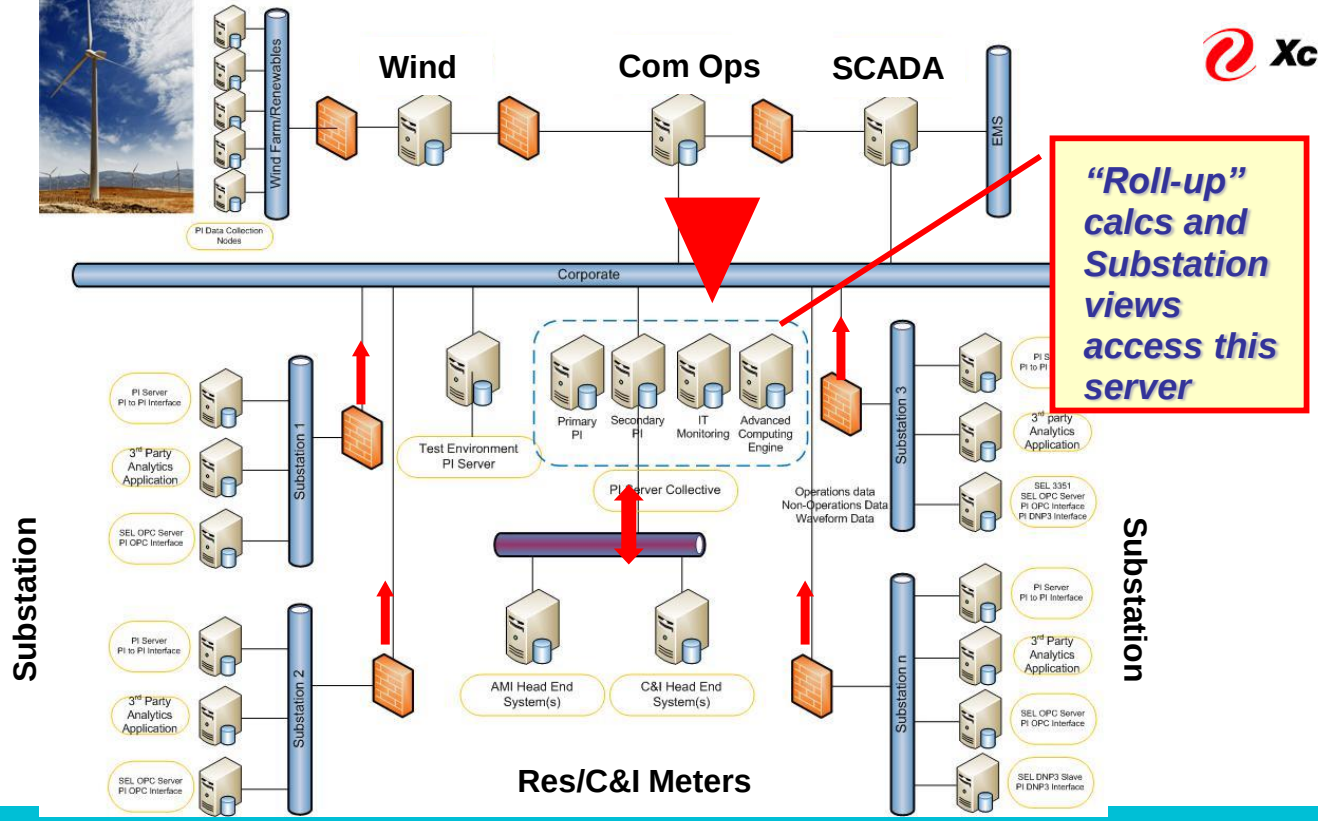
PI & Smart Grid

PI for Xcel Energy's SmartGridCity™



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PI & Smart Grid

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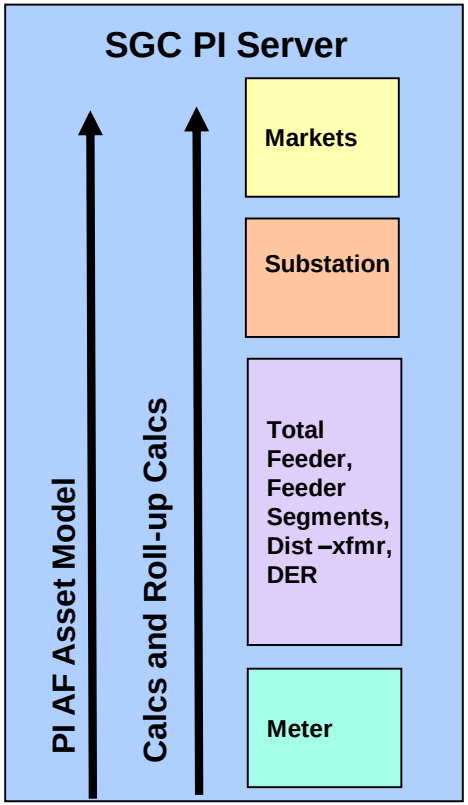

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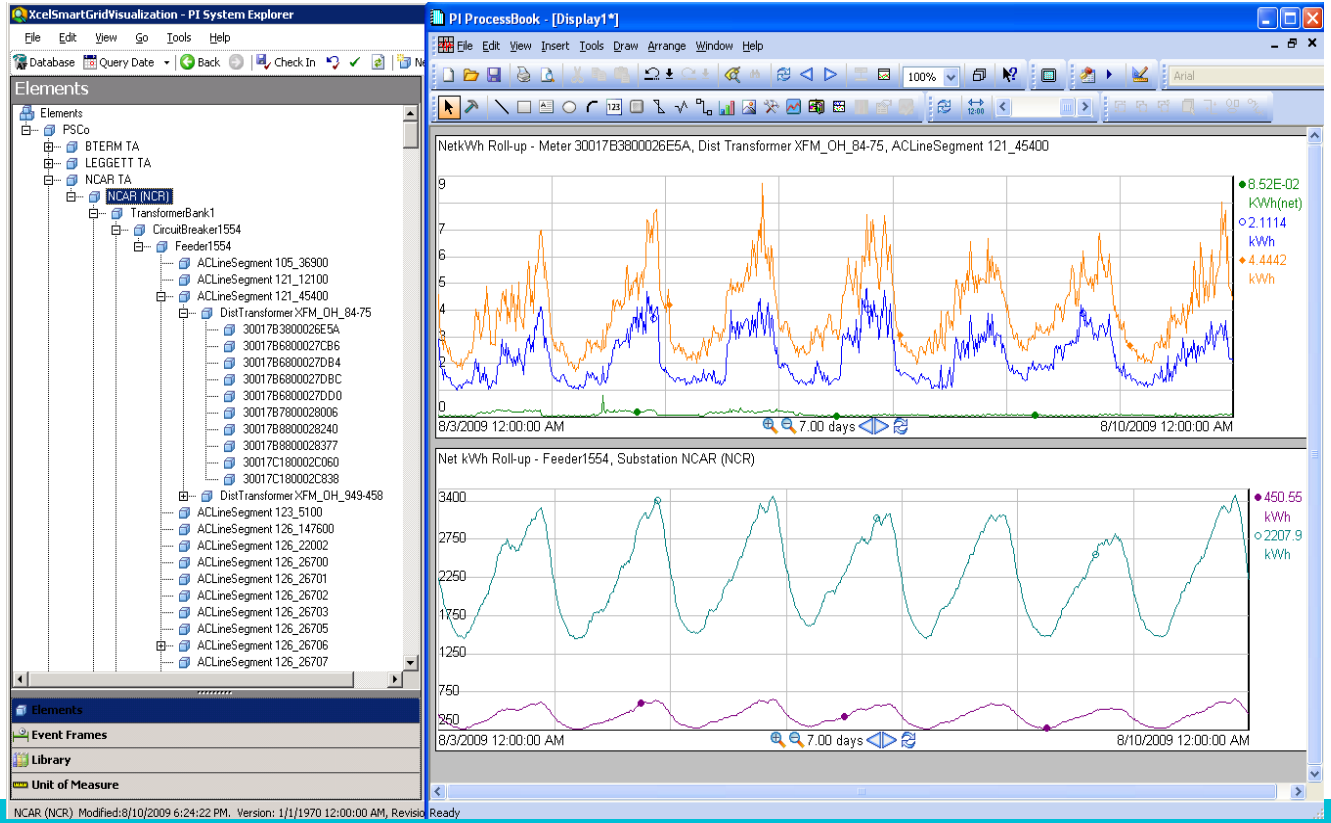

Roll-up" Mechanism: Net KWh Roll-Up

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PI & Smart Grid

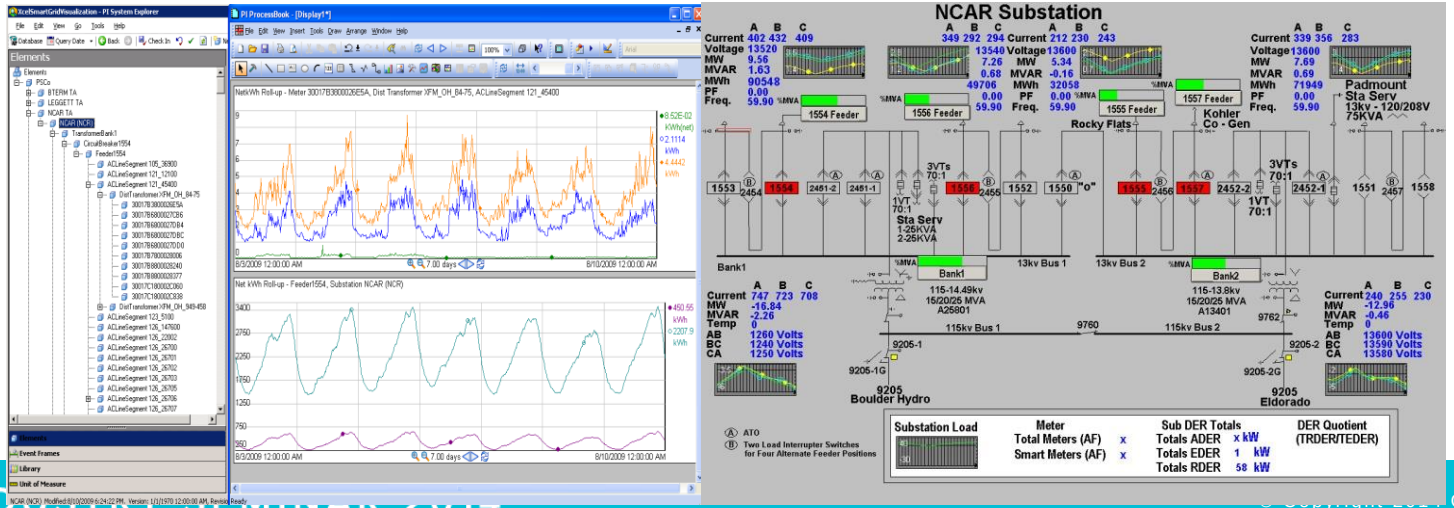
PI for Xcel Energy's SmartGridCity™

•Key Points:

- Each trend shown is aggregated load (kWh) up to the next higher trend from an individual meter, transformer, line segment, breaker, and sub.
- If you overlay the Distribution SCADA load (from PI), the difference would be losses or leakage
- The physical model is in AF (CIM) allowing the aggregation and roll-up of individual loads
- End to End visibility – Basic PI integrating meter and distribution system(s) operational data

Xcel Energy®

End to End Visibility



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PI & Smart Grid Billing Support

- Meter Maintenance Programs and activities are often driven by a Utilities' Customer Information System or its Billing System.
- These systems are designed to identify problems through billing exceptions.
- Many billing exceptions are a result of metering issues or data problems. Many tests are too generic to identify emerging issues.
- Analyzing meter reading data as it is received, can avoid many billing exceptions and improve Billing Departments effectiveness.
- A good data management system can pre-process the raw data to sort out the various issues before the account is billed and the customer is impacted

PECO
An Exelon Company

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PI & Smart Grid

Revenue Protection Programs

- During tough economic times, the incidence rate of tampering and theft have been observed to increase
  - Tampering with meters and electric services is unsafe and dangerous!
- PECO is developing tools and automated processes to identify tampering patterns in the Meter Data to speed to identification of tampering and to more effective dispatch technicians to probable tampered meters

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PI & Smart Grid

Revenue Protection Programs

Potlatch Switch

Drill Hole/Disc Tamper

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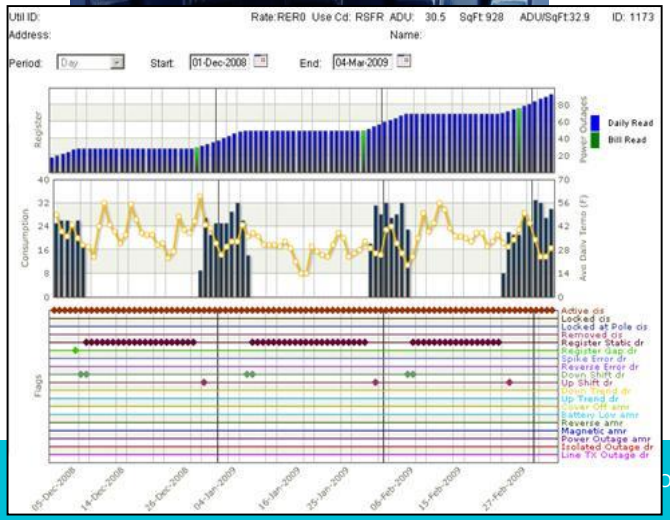

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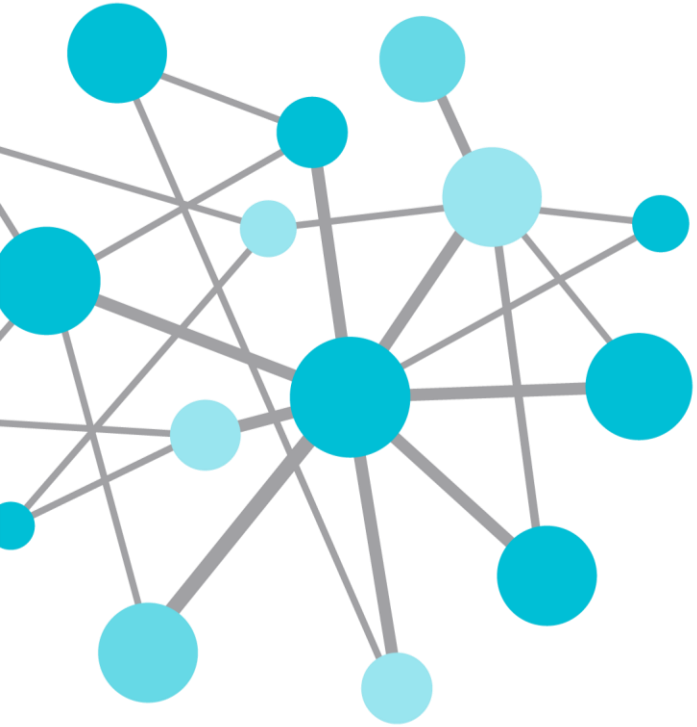

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