



OSIsoft®

REGIONAL SEMINAR

2012

U . S . A

The **Power** of **Data**



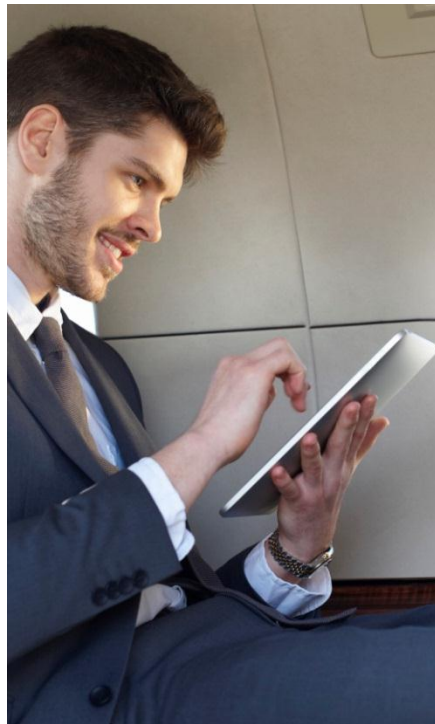
Operational Insight: Using Self-Service Technologies to Do More with the PI System

Presented by **Scott Robertson, OSIsoft**
Center of Excellence Engineer

Overview

- Business Analytics Toolkit
- Example: “Substation Power distribution Profile”
 - Business Context – PI Asset Framework (PI AF)
 - Data Access – PI OLEDB Enterprise
 - Analytic Reporting – PowerPivot for Excel 2010
 - Ad Hoc Analytics and Reporting – Power View
- ***Coming soon!*** Excel 2013
- Additional Resources

The Way People Experience Data



Seamless Transition Across BI Spectrum

Personal BI

Empowered

My Context

BI solution created by user.
Context is only for user & exists
as document.



PowerPivot For Excel

Team BI

Our Context

BI Solution created by power
user. Context is for a small team
& it's managed on a server.



PowerPivot For SharePoint

Organizational BI

Aligned

The Org's Context

BI Solution created by IT,
Established corporate context & is
reusable, scalable and backed up.



Analysis Services

Business Analytics Toolkit



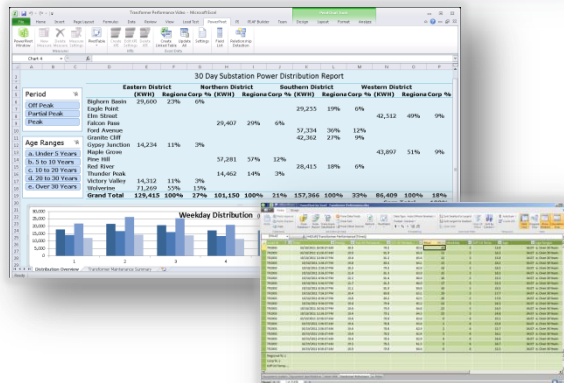
Microsoft

Microsoft®
Excel 2010

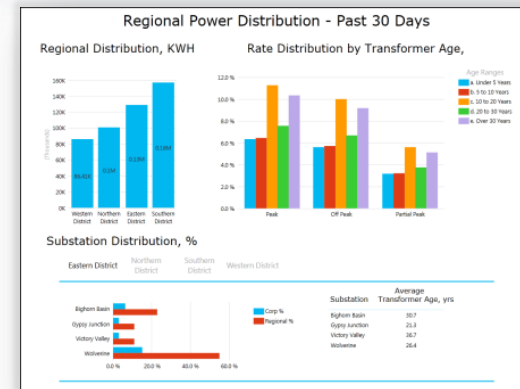
Microsoft®
SQL Server® 2012
Business Intelligence

Microsoft®
SharePoint® 2010
Enterprise

OSIsoft
PI Server
PI OLEDB Enterprise

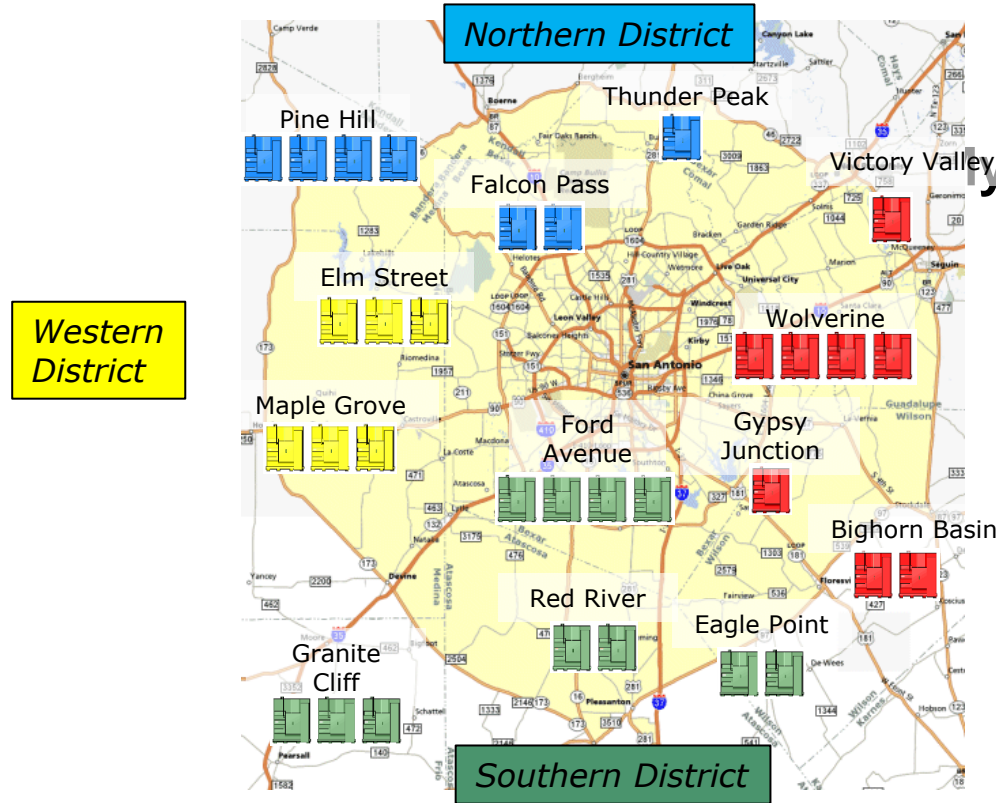


PowerPivot
for Excel 2010



Power View

Example: Substation Power Distribution Profile



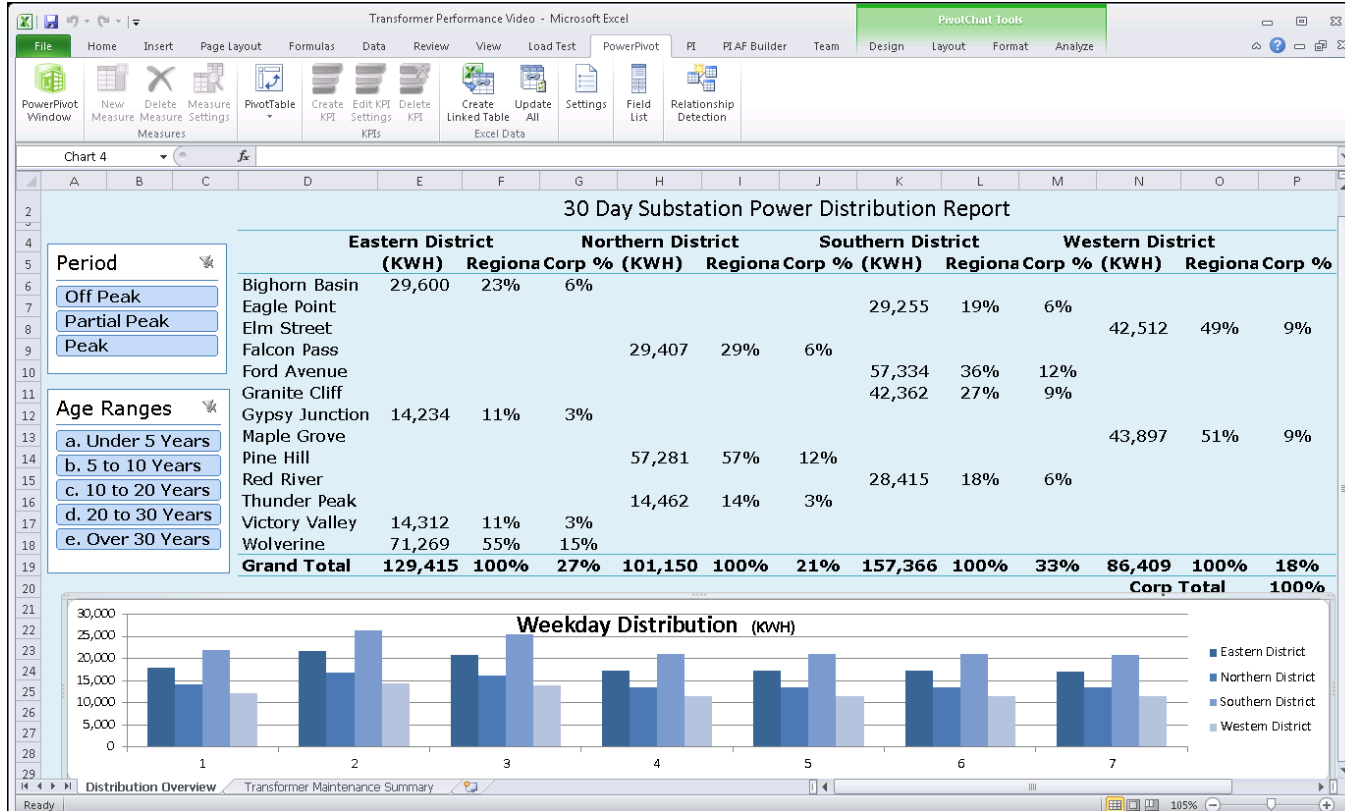
Objectives

Regional and Rate

Aging Asset Risk Assessment

Want to do it myself !

PowerPivot for Excel 2010

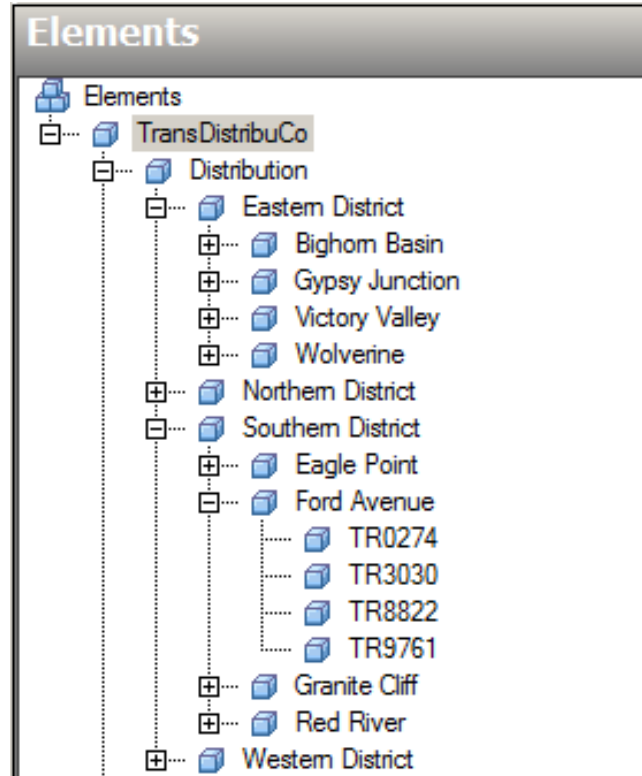


Power Distribution Report

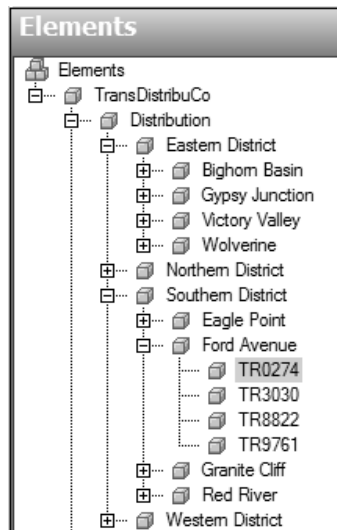
PI Server – *PI Asset Framework (PI AF)*

Asset Hierarchy

- District
- Substation
- Transformer



PI Server – PI Asset Framework (PI AF)



Name	Value
Category: Current DGA Analysis	
Acetylene	4 ppm
Carbon Dioxide	3004 ppm
Carbon Monoxide	123 ppm
Ethane	190 ppm
Ethylene	38 ppm
Hydrogen	294 ppm
Methane	121 ppm
Nitrogen	22698 ppm
Oxygen	2340 ppm
Category: Load Tap Changer	
LTC Oil Temperature	65.0885009765625 °F
LTC Oil Temperature - 1H A...	62.7173211853571 °F
Category: Performance	
Energy	20.6299715201975 MWh
Load	20.1319046020508 MW
Category: Specifications	
Installation Date	6/10/1992 12:00:00 AM
Manufacturer	PowerMaster
Model	PM-56
Category: Tank	
Bottom Oil Temperature	48.3781089782715 °F
Top Oil Temperature	79.2328872680664 °F
Top Oil Temperature - 1H A...	83.2808045109946 °F

Transformer Attributes

- PI System Data
- Equipment Specifications
- DGA analysis

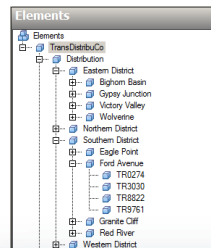
PI OLEDB Enterprise

Important Considerations

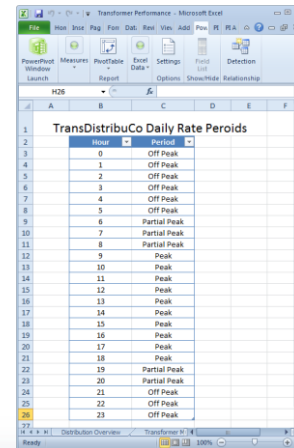
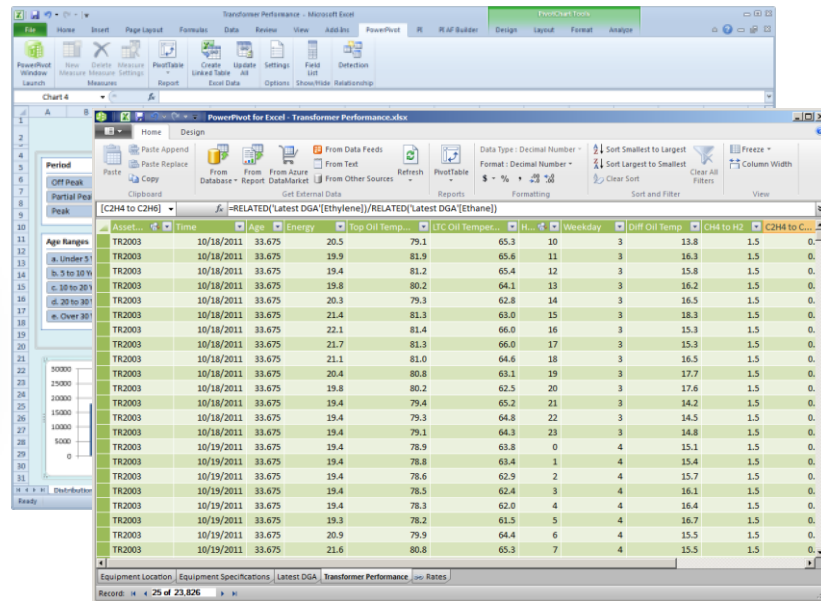
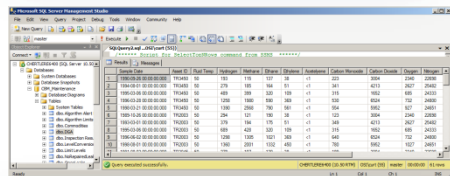
- Leverage structure used throughout your PI System infrastructure
- Ensure accurate aggregation of real-time events
- Scale-up by adding PI AF Structure

Asset ID	Time	Energy	Top Oil Temp	Hour	Weekday	Diff Oil Temp	Age Ranges	CH4 to H2
TR2003	8/14/2011 7:41:30 PM	19.95	80.79	19	1	15.5387221724381	e. Over 30 Years	1.471
TR2003	8/14/2011 8:41:30 PM	19.93	80.74	20	1	15.5219753616169	e. Over 30 Years	1.471
TR2003	8/14/2011 9:41:30 PM	19.90	80.68	21	1	15.5052285507958	e. Over 30 Years	1.471
TR2003	8/14/2011 10:41:30 PM	19.87	80.63	22	1	15.4884817399746	e. Over 30 Years	1.471
TR2003	8/14/2011 11:41:30 PM	19.84	80.58	23	1	15.4717349291535	e. Over 30 Years	1.471
TR2003	8/15/2011 12:41:30 AM	19.82	80.52	0	2	15.4549881183323	e. Over 30 Years	1.471
TR2003	8/15/2011 1:41:30 AM	19.79	80.47	1	2	15.4382413076112	e. Over 30 Years	1.471
TR2003	8/15/2011 2:41:30 AM	19.76	80.41	2	2	15.4214944666901	e. Over 30 Years	1.471
TR2003	8/15/2011 3:41:30 AM	19.73	80.36	3	2	15.4047476858689	e. Over 30 Years	1.471
TR2003	8/15/2011 4:41:30 AM	19.71	80.31	4	2	15.3880008750478	e. Over 30 Years	1.471
TR2003	8/15/2011 5:41:30 AM	19.68	80.25	5	2	15.3712540642266	e. Over 30 Years	1.471
TR2003	8/15/2011 6:41:30 AM	19.65	80.20	6	2	15.3545072534055	e. Over 30 Years	1.471
TR2003	8/15/2011 7:41:30 AM	19.63	80.14	7	2	15.3377604425844	e. Over 30 Years	1.471
TR2003	8/15/2011 8:41:30 AM	19.60	80.09	8	2	15.3210136317632	e. Over 30 Years	1.471
TR2003	8/15/2011 9:41:30 AM	21.09	79.96	9	2	13.2137487314932	e. Over 30 Years	1.471
TR2003	8/15/2011 10:41:30 AM	21.20	81.93	10	2	16.4040075066249	e. Over 30 Years	1.471
TR2003	8/15/2011 11:41:30 AM	21.22	82.68	11	2	17.616716837893	e. Over 30 Years	1.471
TR2003	8/15/2011 12:41:30 PM	21.28	81.50	12	2	17.5523482481639	e. Over 30 Years	1.471
TR2003	8/15/2011 1:41:30 PM	20.93	81.59	13	2	16.5219141244888	e. Over 30 Years	1.471
Regional %: 100.0 %								
Corp %: 100.0 %								
Diff Oil Temp Deviation: 0.0								
CH4 to CH6 Deviation: 0.00								
CH4 to H2 Deviation: 0.00								

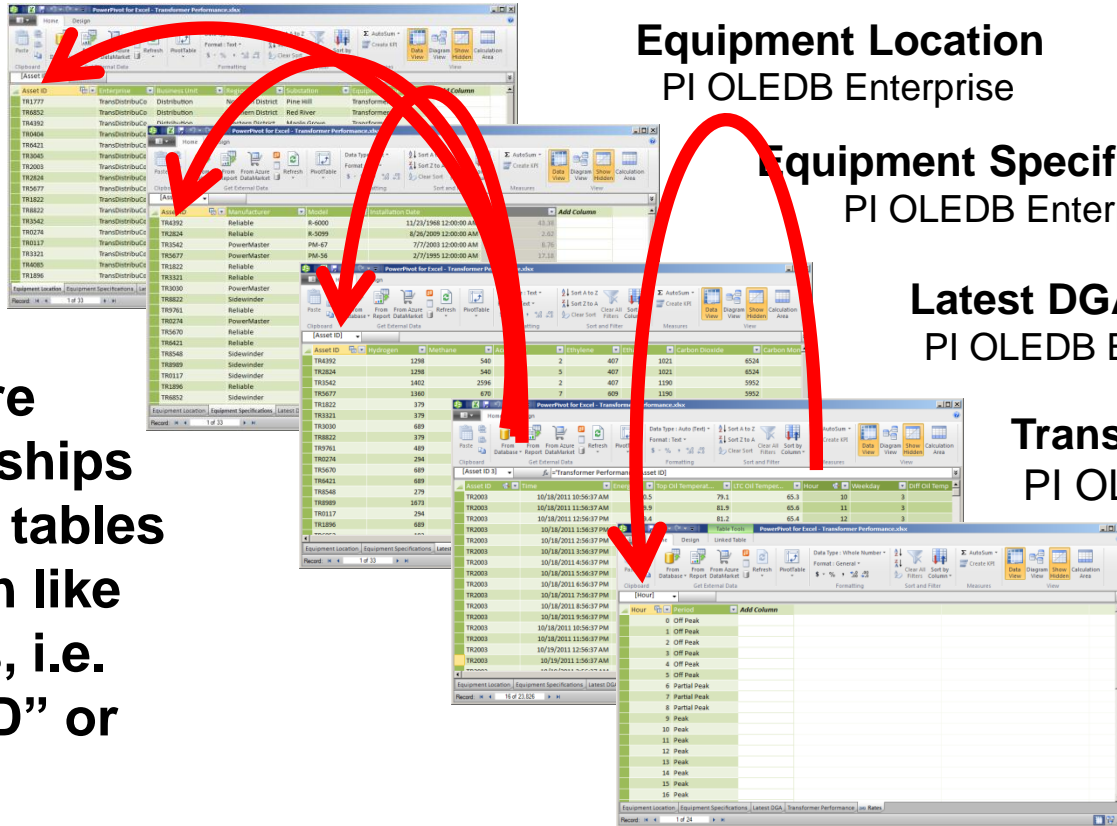
PowerPivot Enables Data Integration



PI Server
PI OLEDB Enterprise



PowerPivot Creates the “Cube”



Configure Relationships between tables based on like columns, i.e. “Asset ID” or “Hour”

Equipment Location
PI OLEDB Enterprise

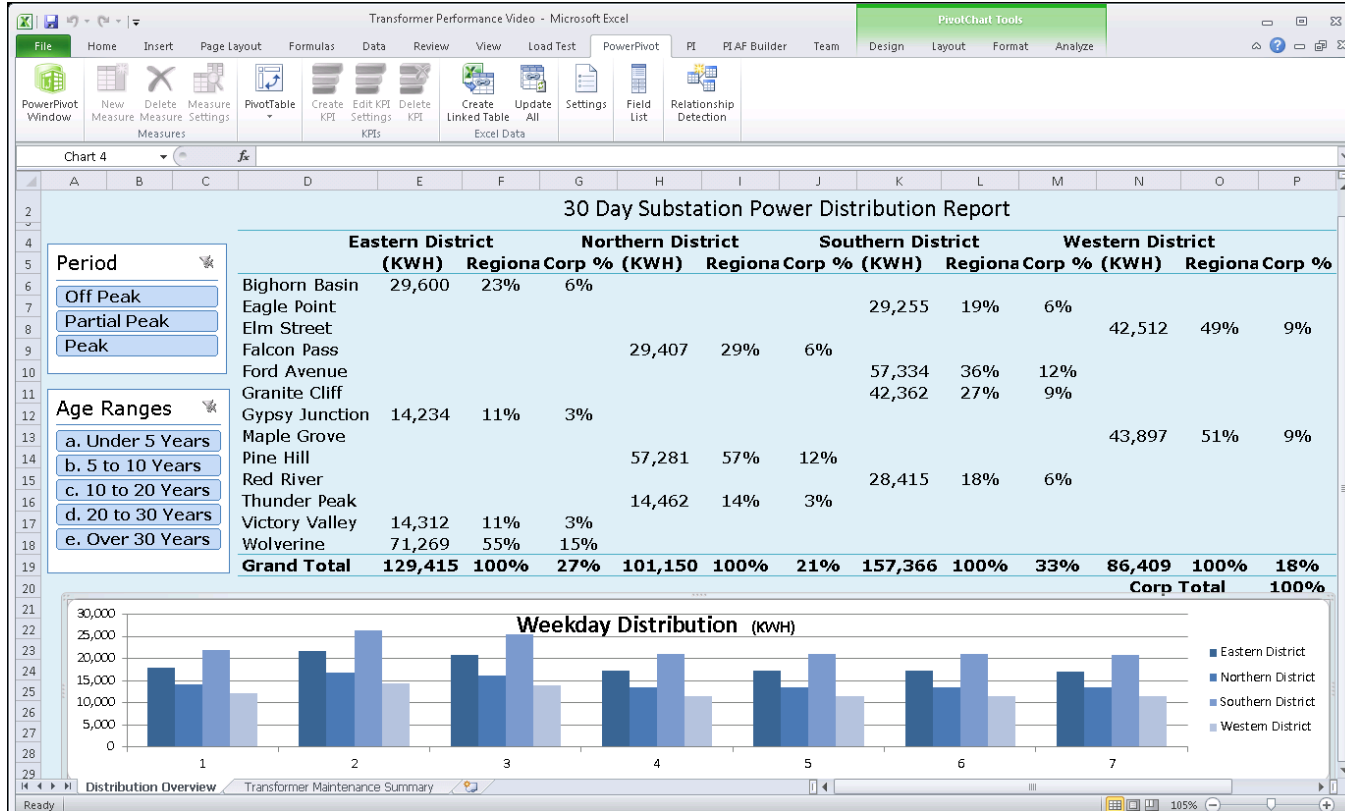
Equipment Specifications
PI OLEDB Enterprise

Latest DGA
PI OLEDB Enterprise

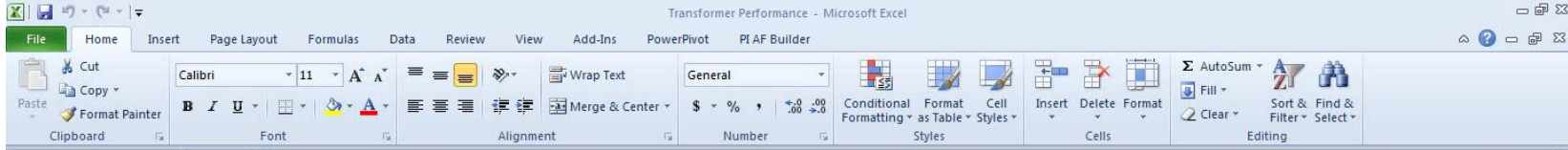
Transformer Performance
PI OLEDB Enterprise

Rates
Excel Linked Table

PowerPivot for Excel 2010



Power Distribution Report



30 Day Substation Power Distribution Report

Period

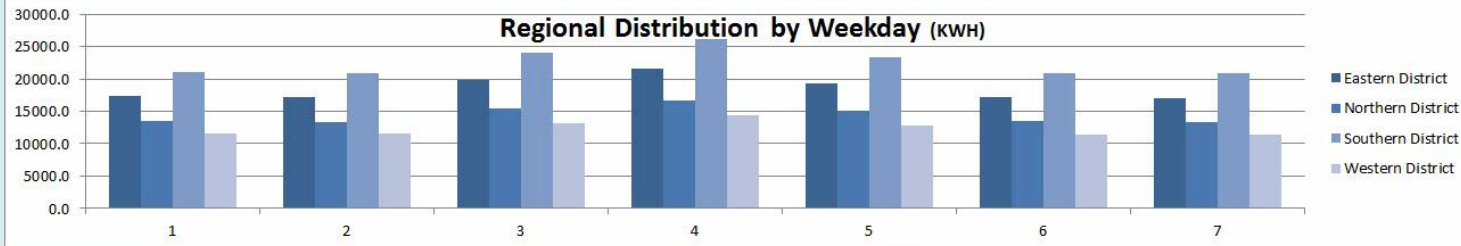
- Off Peak
- Partial Peak
- Peak

Age Ranges

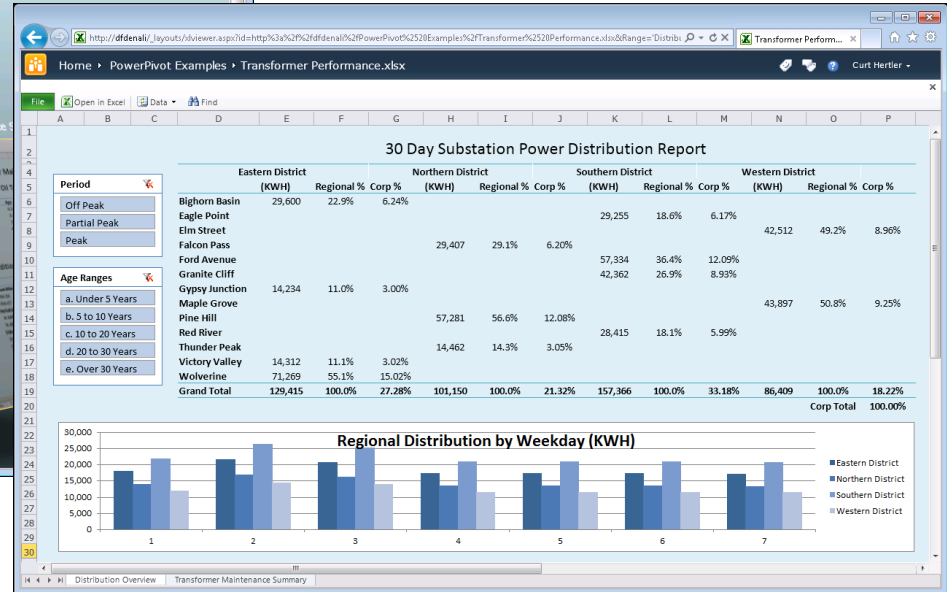
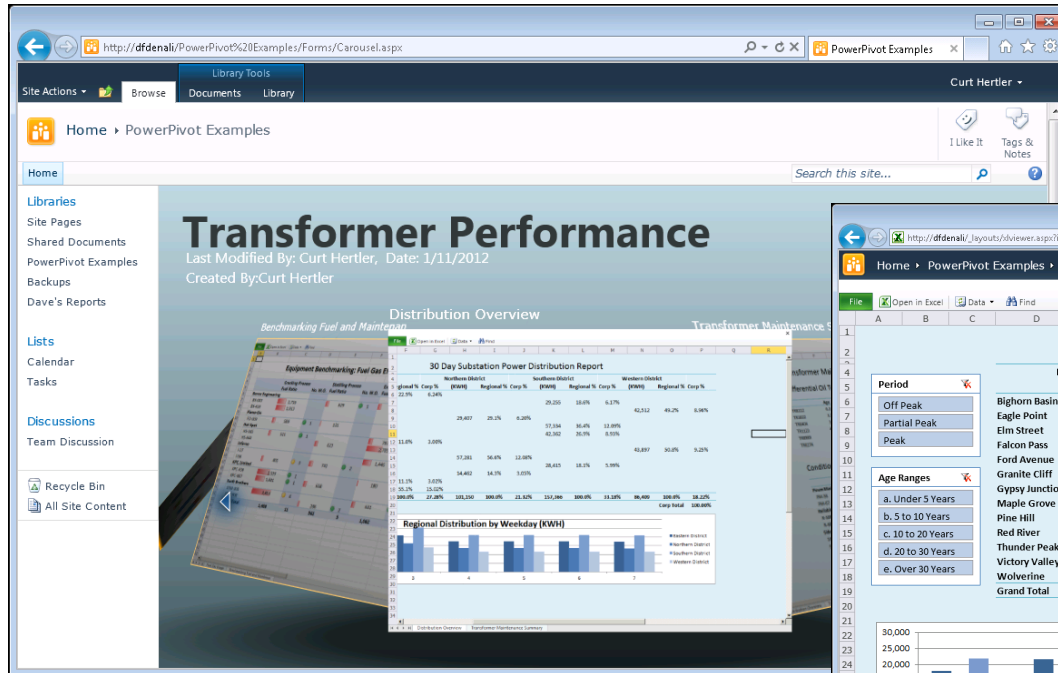
- a. Under 5 Years
- b. 5 to 10 Years
- c. 10 to 20 Years
- d. 20 to 30 Years
- e. Over 30 Years

	Eastern District			Northern District			Southern District			Western District		
	(KWH)	Regional %	Corp %	(KWH)	Regional %	Corp %	(KWH)	Regional %	Corp %	(KWH)	Regional %	Corp %
Bighorn Basin	29,606	22.9%	6.2%									
Eagle Point							29,275	18.6%	6.2%			
Elm Street										42,377	49.2%	8.9%
Falcon Pass				29,263	28.9%	6.2%						
Ford Avenue							57,612	36.5%	12.1%			
Granite Cliff							42,389	26.9%	8.9%			
Gypsy Junction	14,135	10.9%	3.0%									
Maple Grove										43,763	50.8%	9.2%
Pine Hill				57,428	56.8%	12.1%						
Red River							28,365	18.0%	6.0%			
Thunder Peak				14,405	14.2%	3.0%						
Victory Valley	14,417	11.1%	3.0%									
Wolverine	71,315	55.1%	15.0%									
Grand Total	129,473	100.0%	27.3%	101,097	100.0%	21.3%	157,641	100.0%	33.2%	86,140	100.0%	18.2%
										Corp Total	100.0%	

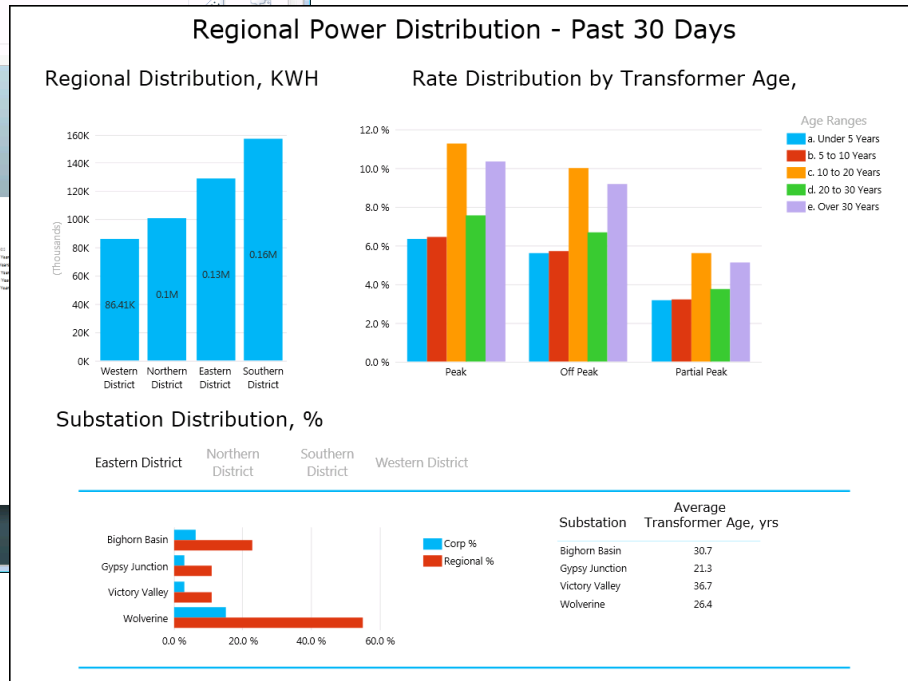
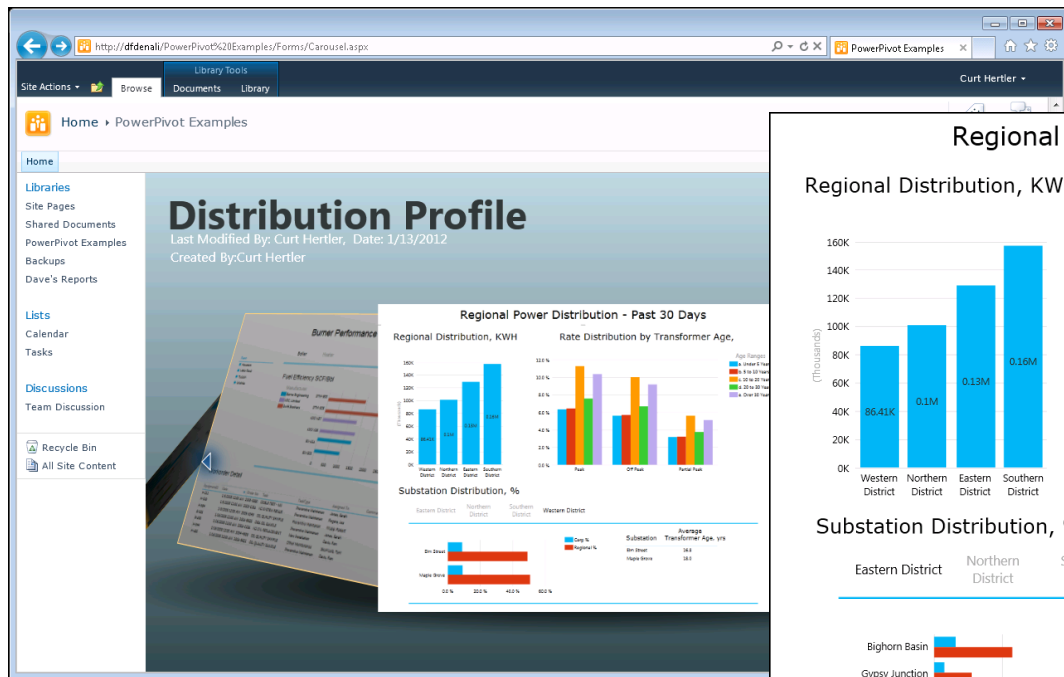
Regional Distribution by Weekday (KWH)



SharePoint 2010 Enterprise – *PowerPivot Gallery*



SharePoint 2010 Enterprise – Power View



PowerPivot Examples - Windows Internet Explorer

http://74.217.101.217/PowerPivot%20Examples/Forms/Carousel.aspx

PowerPivot Examples

Home ▶ PowerPivot Examples

Transformer Performance

Last Modified By: Curt Hertler, Date: 1/11/2012
Created By: Curt Hertler

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- Calendar
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- Team Discussion

Recycle Bin

All Site Content

Transformer Performance

Distribution Overview

Transformer Maintenance Summary

Equipment Benchmarking: Fuel Gas Efficiency

30 Day Substation Power Distribution Report

Regional Distribution by Weekday (KWH)

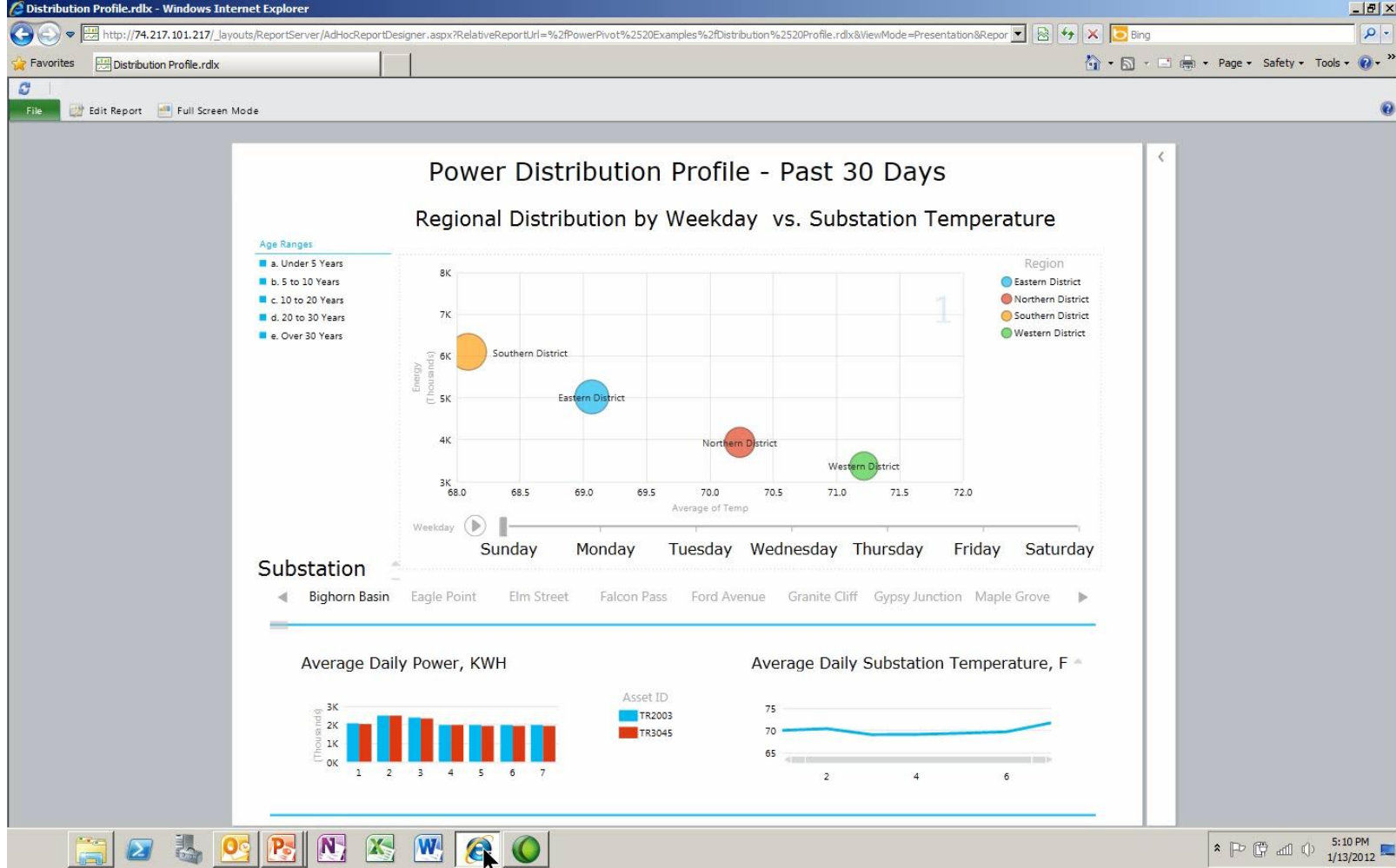
Transformer Maintenance Summary

Conditions by Manufacturer

Done

Trusted sites | Protected Mode: Off

95%

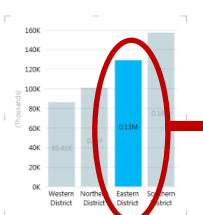


Microsoft SQL 2012 Power View

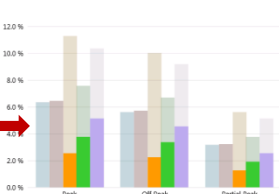
Interactive Analysis

Regional Power Distribution - Past 30 Days

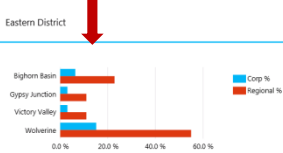
Regional Distribution, KWH



Rate Distribution by Transformer Age,



Substation Distribution, %

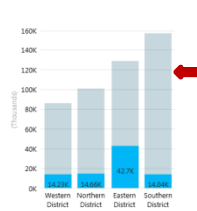


Substation	Average Transformer Age, yrs
Bighorn Basin	30.7
Gypsy Junction	21.3
Victory Valley	36.7
Wolverine	28.4

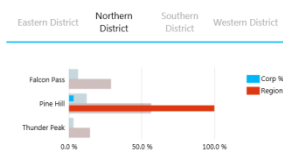
Distribution by District

Regional Power Distribution - Past 30 Days

Regional Distribution, KWH



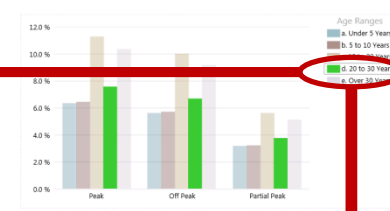
Substation Distribution, %



Substation	Average Transformer Age, yrs
Bighorn Basin	30.7
Gypsy Junction	21.3
Victory Valley	36.7
Wolverine	28.4

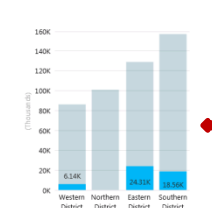
Distribution by Transformer Age

Rate Distribution by Transformer Age,

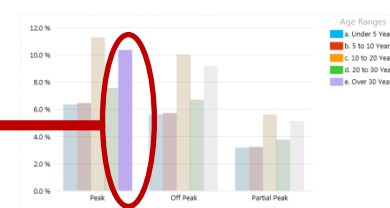


Regional Power Distribution - Past 30 Days

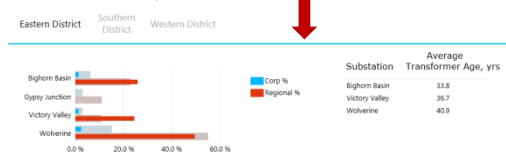
Regional Distribution, KWH



Rate Distribution by Transformer Age,



Substation Distribution, %



Substation	Average Transformer Age, yrs
Bighorn Basin	33.8
Gypsy Junction	36.7
Victory Valley	36.7
Wolverine	40.9

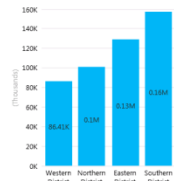
Distribution by Age and Rate

Microsoft SQL 2012 Power View

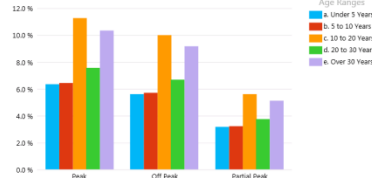
Multiple Views \ Pages

Regional Power Distribution - Past 30 Days

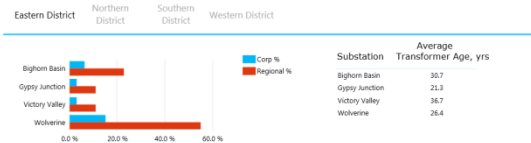
Regional Distribution, KWH



Rate Distribution by Transformer Age,



Substation Distribution, %



Aging Asset Risk Assessment

Power Distribution Profile - Past 30 Days

Regional Distribution by Weekday vs. Substation Temperature



Average Daily Power, KWH

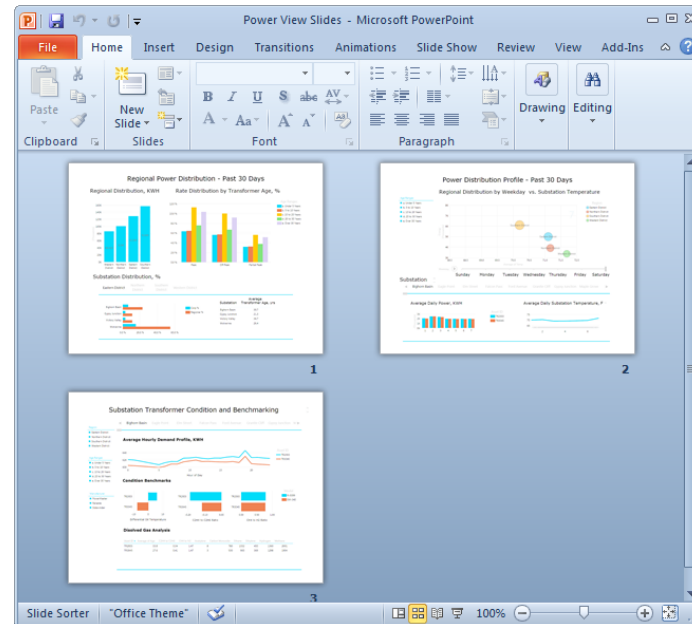
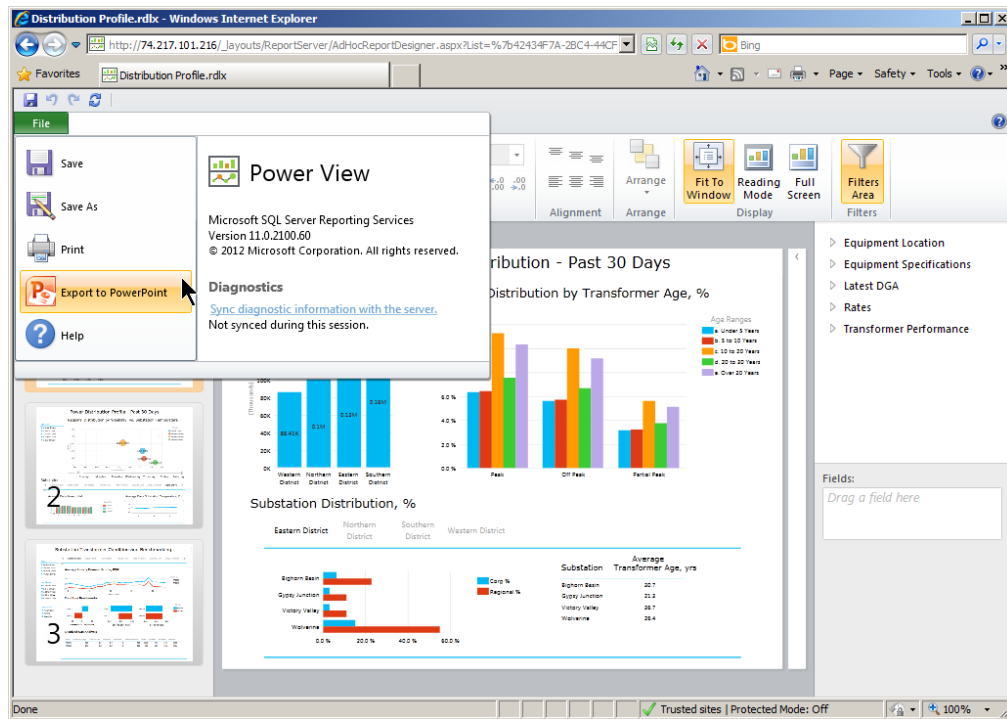


Average Daily Substation Temperature, F



Weekday Distribution Profile

Power View Reports in PowerPoint



Office 2013 for BI



PowerPivot in Excel 2013

- The PowerPivot Add-In ships as an Excel feature
- Fully integrated engine, Data Model and Field List of Excel

Power View in Excel 2013

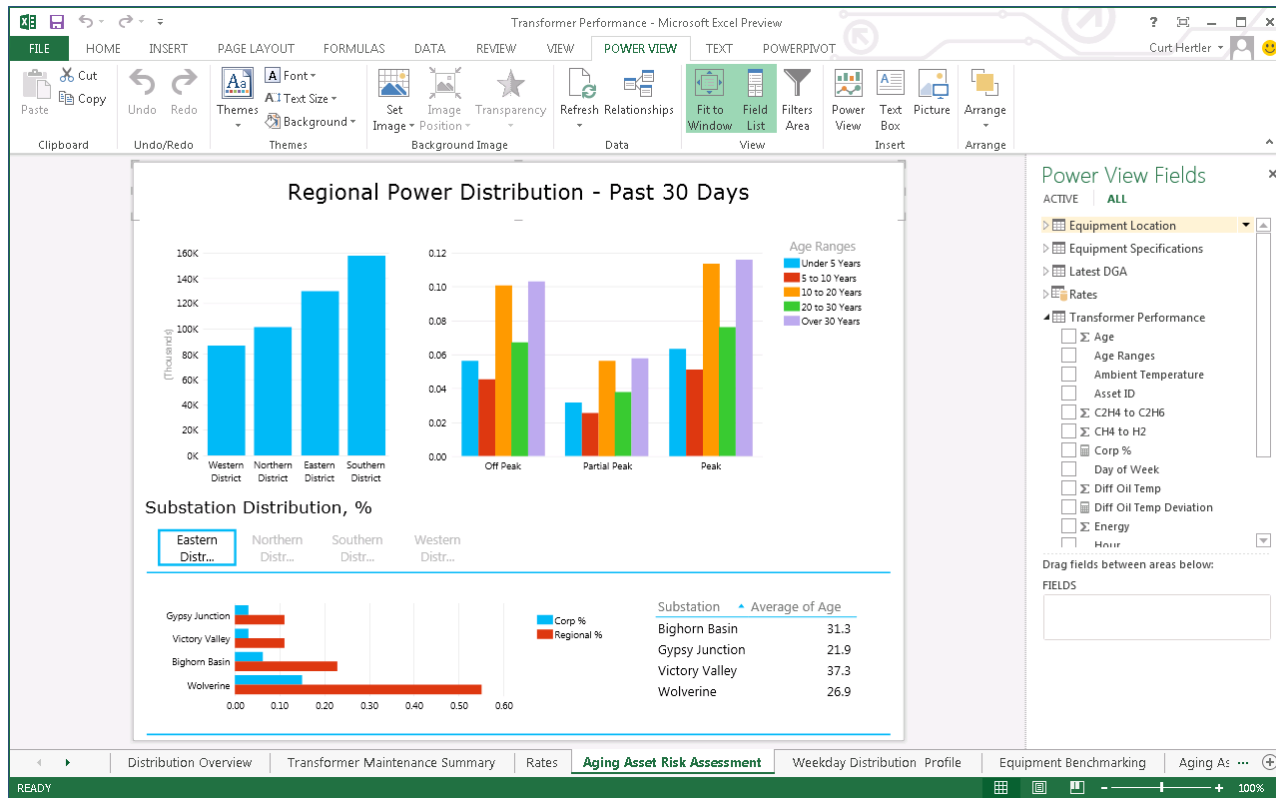
- As Power View in SharePoint 2013
- Interactive data exploration, visualization, and presentation
- Interactive tables, matrices, maps, and a variety of charts

Power View in Excel 2013

Microsoft Power View Included with Excel 2013

Ad hoc analysis of

- PowerPivot
- Excel Tables

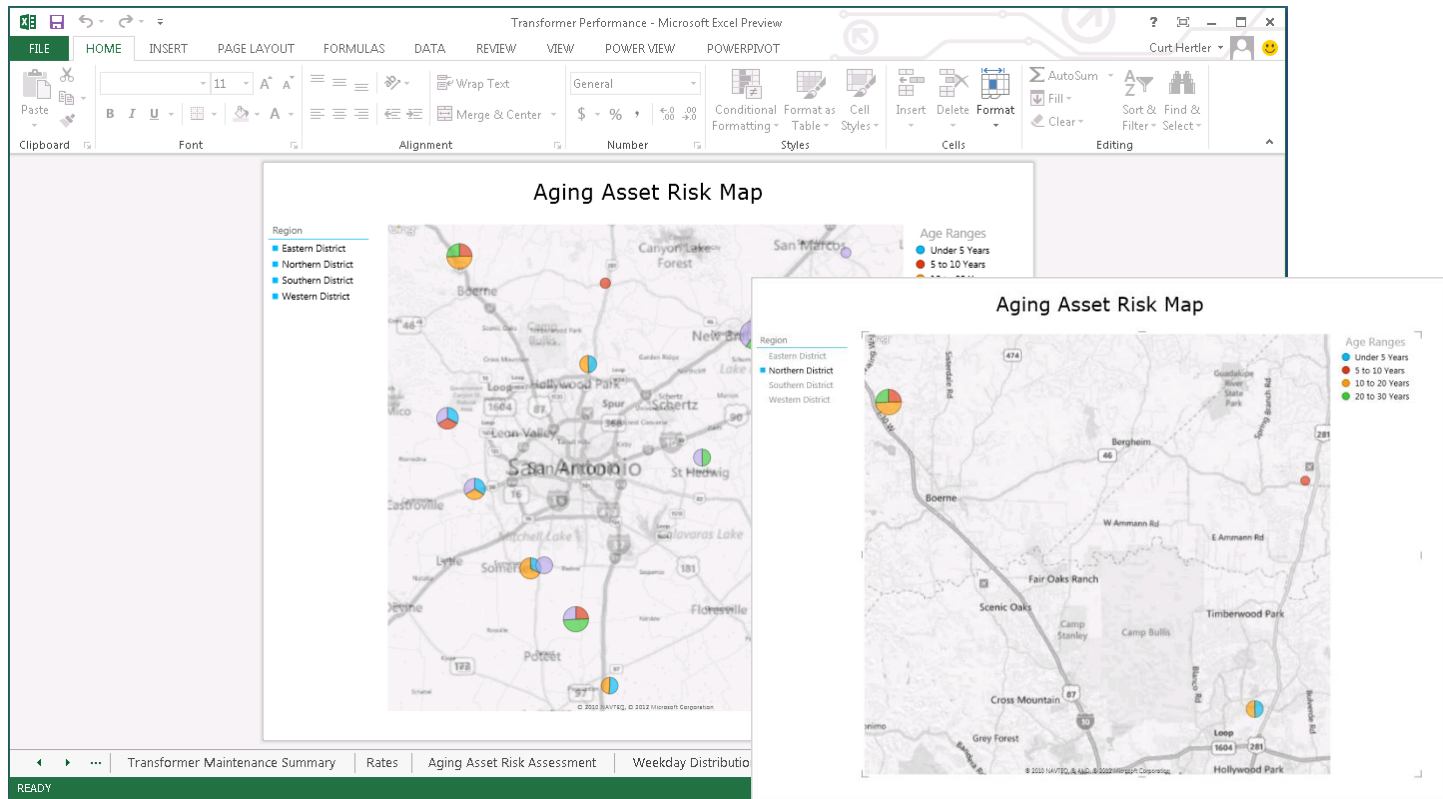


Power View in Excel 2013

Microsoft Power View Included with Excel 2013

Bing Map Integration

- Street Address or Lat – Long
- Filtered Zoom and Pan



Additional Information

OSIsoft Resources

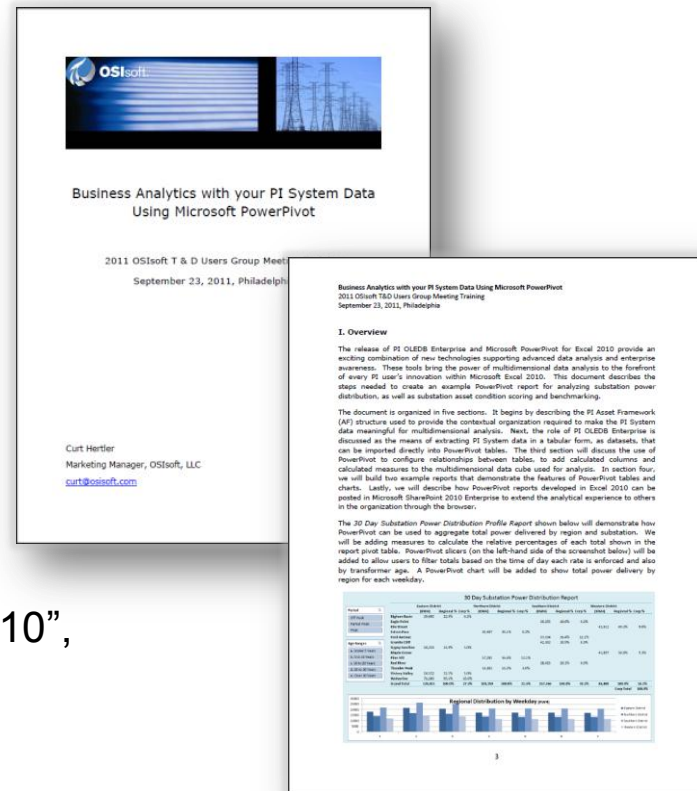
- “Business Analytics with your PI System Data using Microsoft PowerPivot”
- OSIsoft vCampus vcampus.osisoft.com
- For SRP Customers learning.osisoft.com

Microsoft Resources

- www.microsoft.com/en-us/bi/powerpivot.aspx

Helpful Books

- “PowerPivot for the Data Analyst”, Bill Jelen
- “Practical PowerPivot & DAX Formulas for Excel 2010”, Art Tennick





THANK YOU

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