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REGIONAL SEMINAR 2012

EMEA

The Power of Data

Business Analytics with Microsoft SQL Server 2012 and the PI System

Presented by **Yves Gauthier**
Customer Support Engineer
OSIsoft Europe GmbH, Frankfurt / Germany

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
- Power View Integration with PowerPoint
- Additional Resources

Business Analytics Toolkit

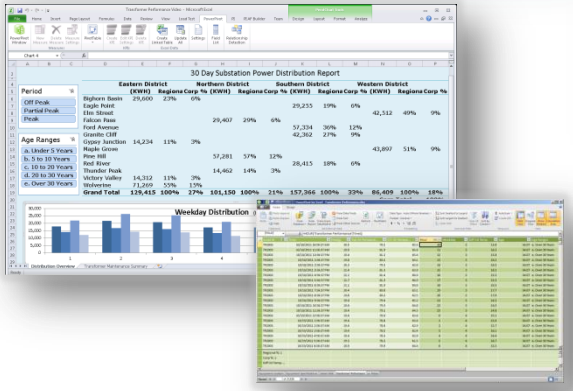
OSIsoft. | Microsoft

Microsoft® Excel® 2010

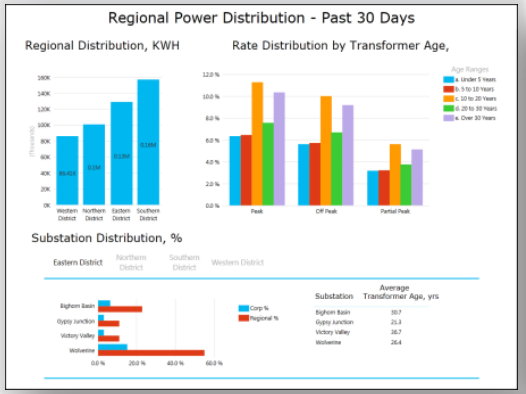
Microsoft® SQL Server® 2012 Business Intelligence

Microsoft® SharePoint® 2010 Enterprise

OSIsoft.
PI Server
PI OLEDB Enterprise

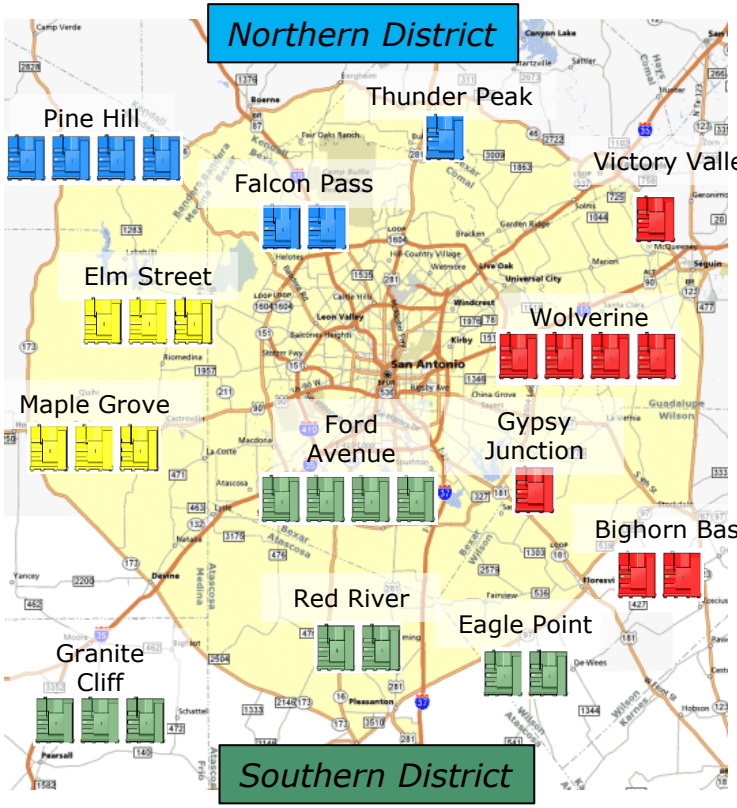


PowerPivot for Excel 2010



Power View

Example: Substation Power Distribution Profile



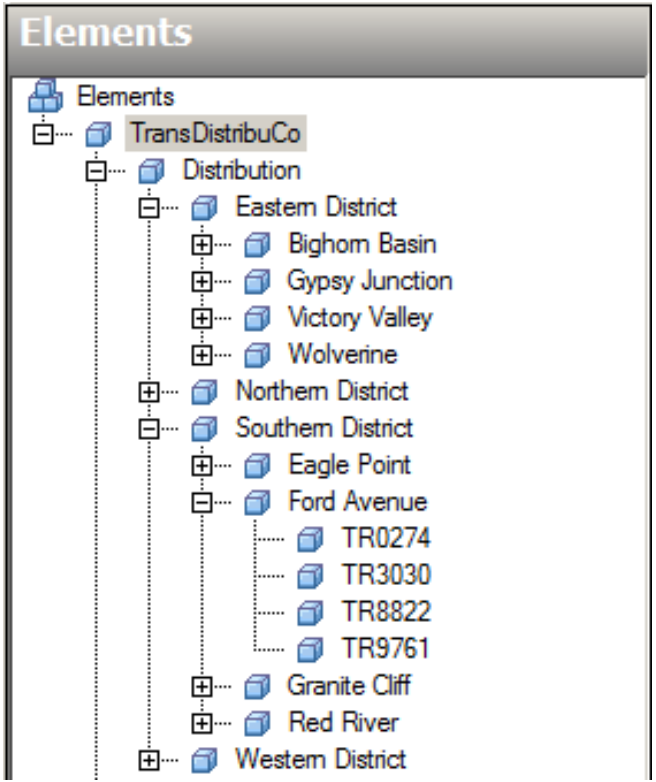
My Objectives

- Regional and Rate Period Power Distribution
- Aging Asset Risk Assessment
- *Want to do it myself !*

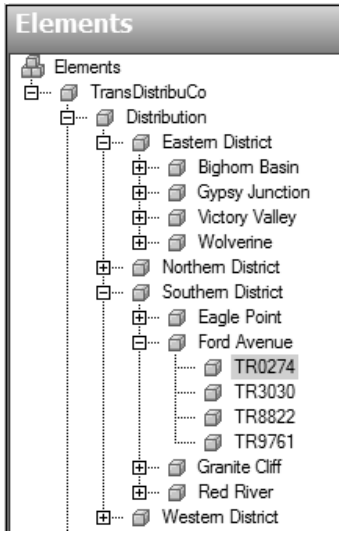
PI Server – *PI Asset Framework (PI AF)*

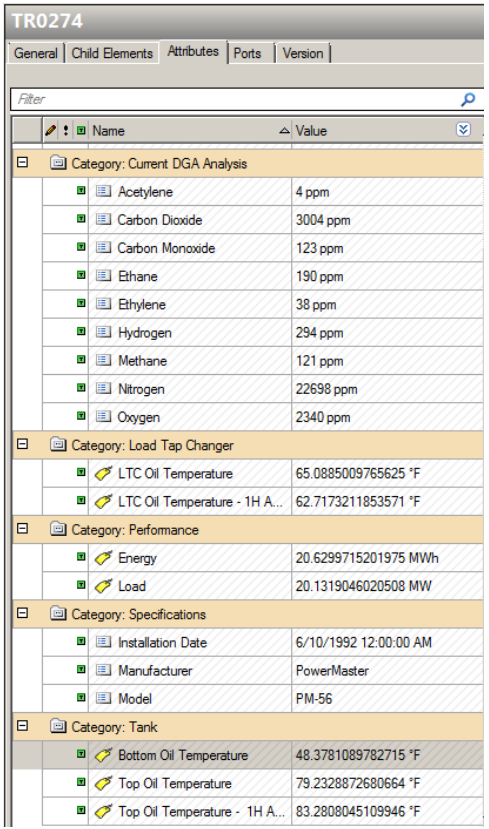
Asset Hierarchy

- District
- Substation
- Transformer



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





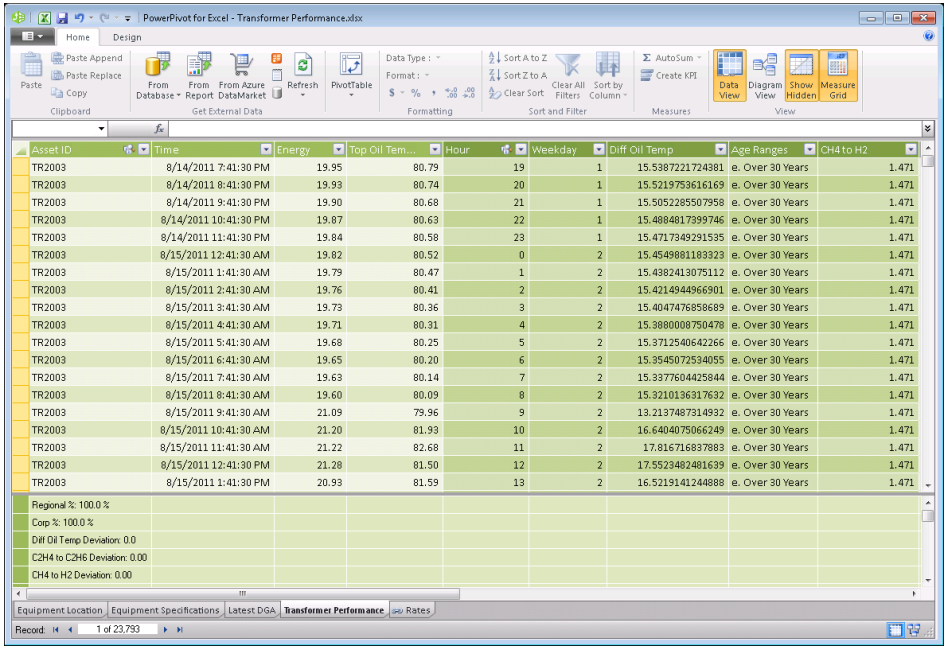
Transformer Attributes

- PI System Data
- Equipment Specifications
- DGA analysis

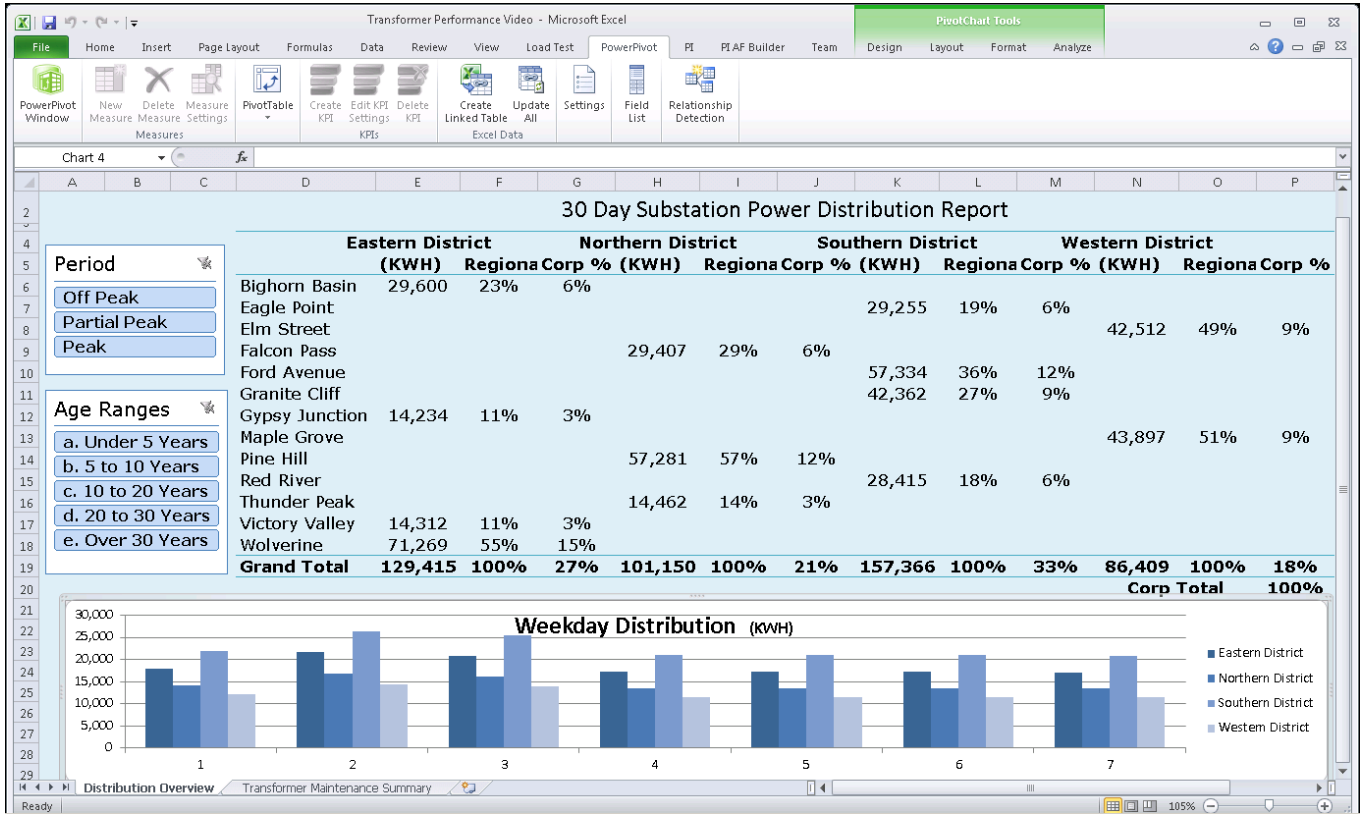
PI OLEDB Enterprise

Important Considerations

- Leverage structure used throughout your PI System infrastructure
- Insure accurate aggregation of real-time events
- Scale-up by adding PI AF Structure
- Access PI Event Frames in next release



PowerPivot for Excel 2010



	Eastern District (KWH)	Regiona	Corp %	Northern District (KWH)	Regiona	Corp %	Southern District (KWH)	Regiona	Corp %	Western District (KWH)	Regiona	Corp %
Bighorn Basin	29,600	23%	6%									
Eagle Point							29,255	19%	6%			
Elm Street										42,512	49%	9%
Falcon Pass				29,407	29%	6%						
Ford Avenue							57,334	36%	12%			
Granite Cliff							42,362	27%	9%			
Gypsy Junction	14,234	11%	3%									
Maple Grove										43,897	51%	9%
Pine Hill				57,281	57%	12%						
Red River							28,415	18%	6%			
Thunder Peak				14,462	14%	3%						
Victory Valley	14,312	11%	3%									
Wolverine	71,269	55%	15%									
Grand Total	**129,415**	**100%**	**27%**	**101,150**	**100%**	**21%**	**157,366**	**100%**	**33%**	**86,409**	**100%**	**18%**
											Corp Total	**100%**

Power Distribution Report

Transformer Performance - Microsoft Excel

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Add-Ins | PowerPivot | PI AF Builder

Cut | Copy | Format Painter | Paste | Clipboard

Calibri | 11 | Font

Wrap Text | Merge & Center | Alignment

General | Number

Conditional Formatting | Format as Table | Cell Styles | Styles

Insert | Delete | Format | Cells

AutoSum | Fill | Clear | Sort & Filter | Find & Select | Editing

A1

30 Day Substation Power Distribution Report

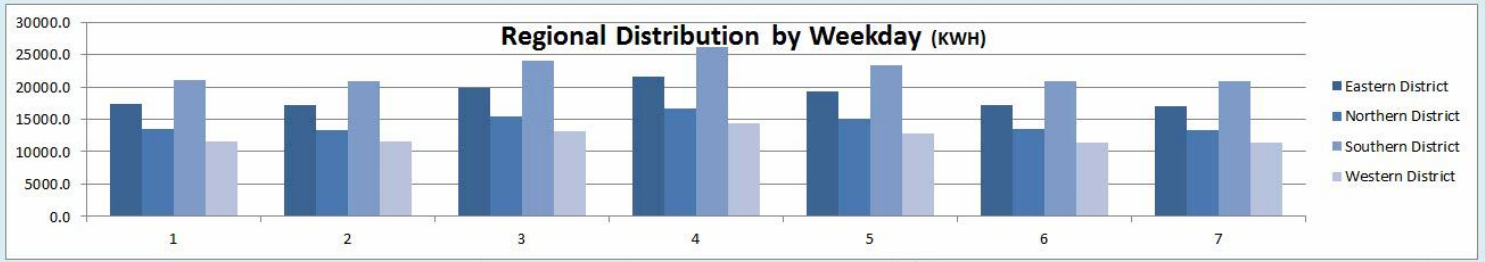
Period

- 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

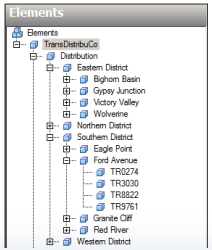
	Eastern District			Northern District			Southern District			Western District		
	(KWH)	Regional %	Corp %	(KWH)	Regional %	Corp %	(KWH)	Regional %	Corp %	(KWH)	Regional %	Corp %
Bighorn Basin	29,606	22.9%	6.2%									
Eagle Point							29,275	18.6%	6.2%			
Elm Street										42,377	49.2%	8.9%
Falcon Pass				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%**

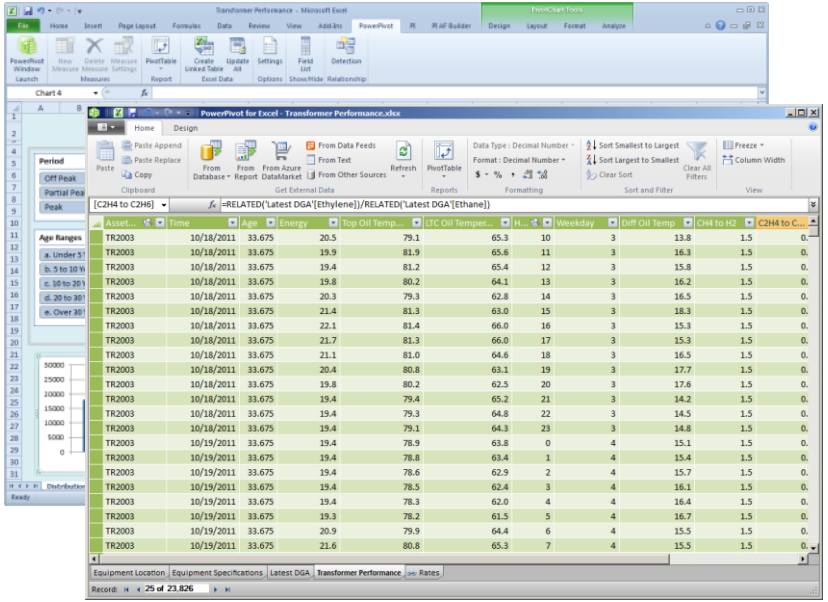


Distribution Overview | Rates | Transformer Maintenance Summary | Measures Illustration | Data for Distribution Overvi | Sheet2

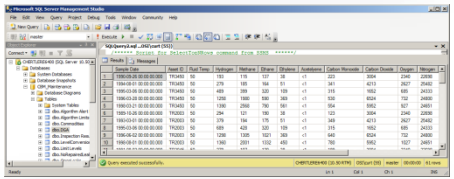
Ready | 110%

PowerPivot Enables Data Integration



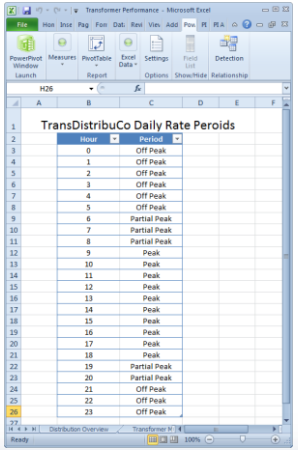


OSIsoft
PI Server
PI OLEDB Enterprise



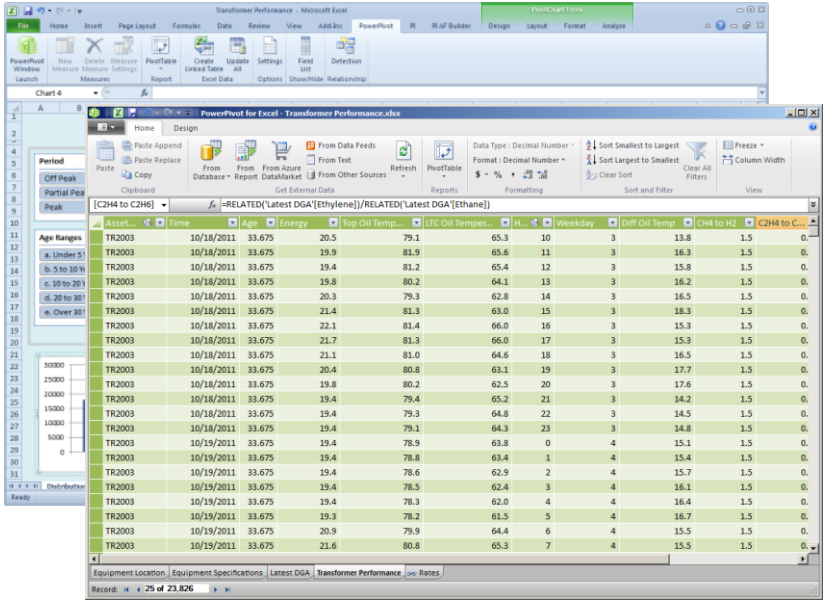
Microsoft SQL Server 2012
Business Intelligence

Windows Azure Marketplace



Microsoft Excel 2010

PowerPivot Enables Data Integration

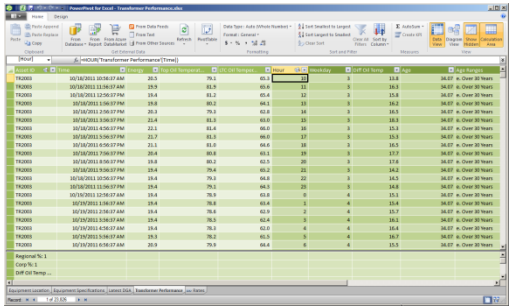


Can I use DataLink?

- Manual refresh step required to copy and paste values
- Limited to ~1 million rows
- No support for upsizing to SQL Analysis Services 2012

Microsoft® Excel® 2010

PowerPivot Enables Extended Analysis



DAX – Data Analysis Expression Language

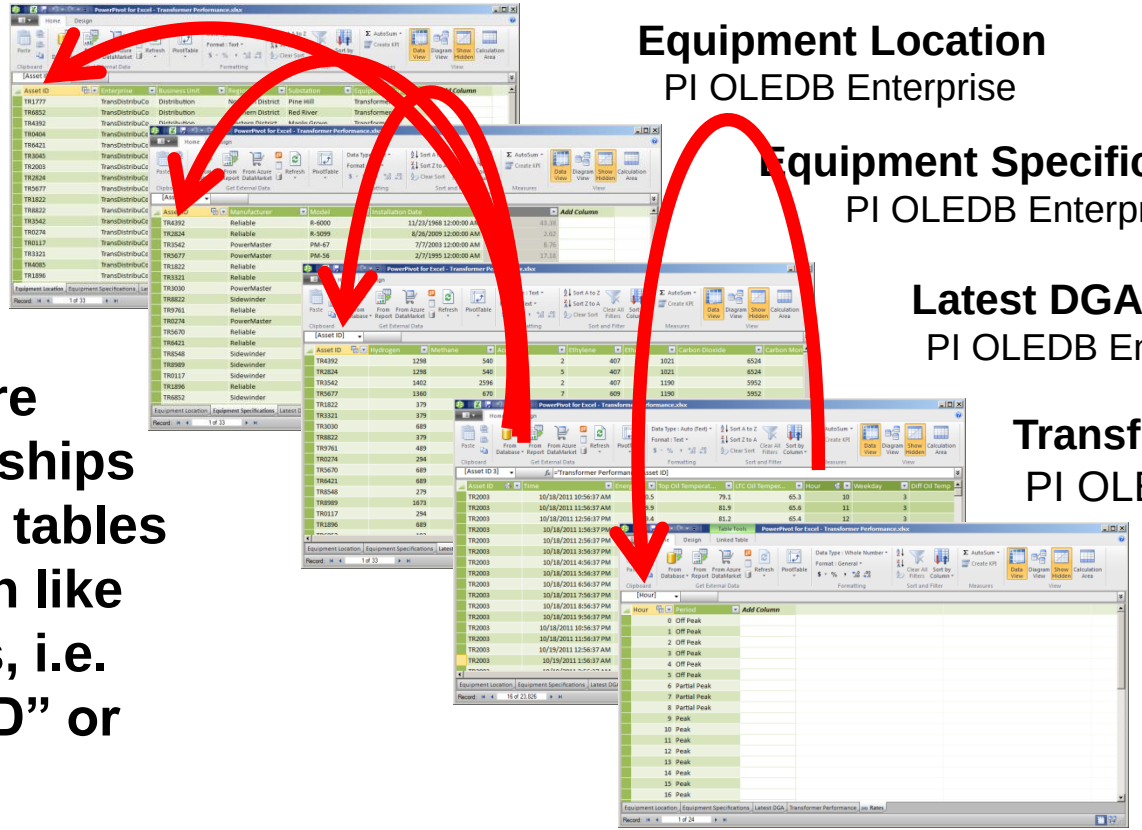
Transformer Age Column

=YEARFRAC('Equipment Specifications'[Installation Date],NOW())

Transformer Age Ranges Column

=IF('Transformer Performance'[Age]>30,"e. Over 30 Years", IF('Transformer Performance'[Age]>20,"d. 20 to 30 Years",IF('Transformer Performance'[Age]>10,"c. 10 to 20 Years",IF('Transformer Performance'[Age]>5,"b. 5 to 10 Years","a. Under 5 Years"))))

PowerPivot Creates the “Cube”



Equipment Location
PI OLEDB Enterprise

Equipment Specifications
PI OLEDB Enterprise

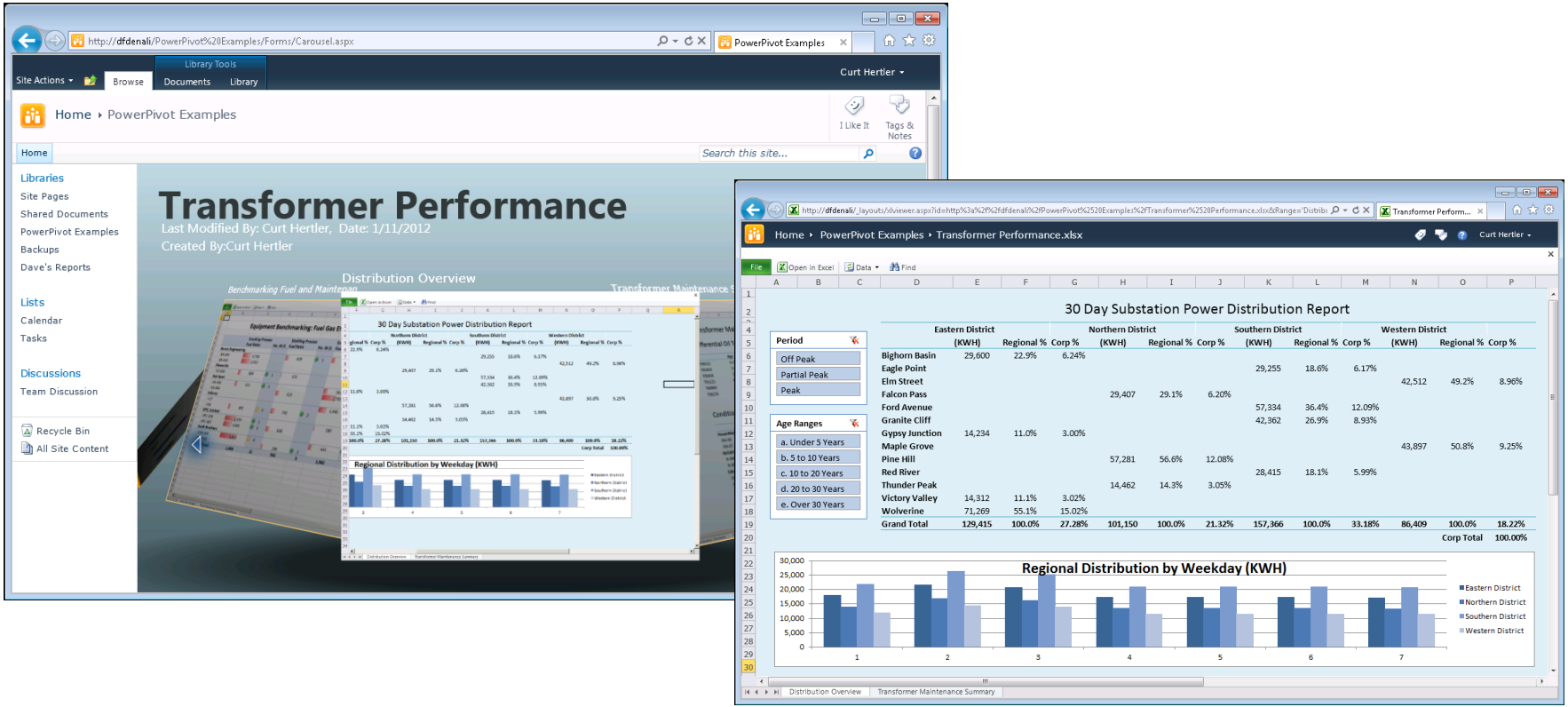
Latest DGA
PI OLEDB Enterprise

Transformer Performance
PI OLEDB Enterprise

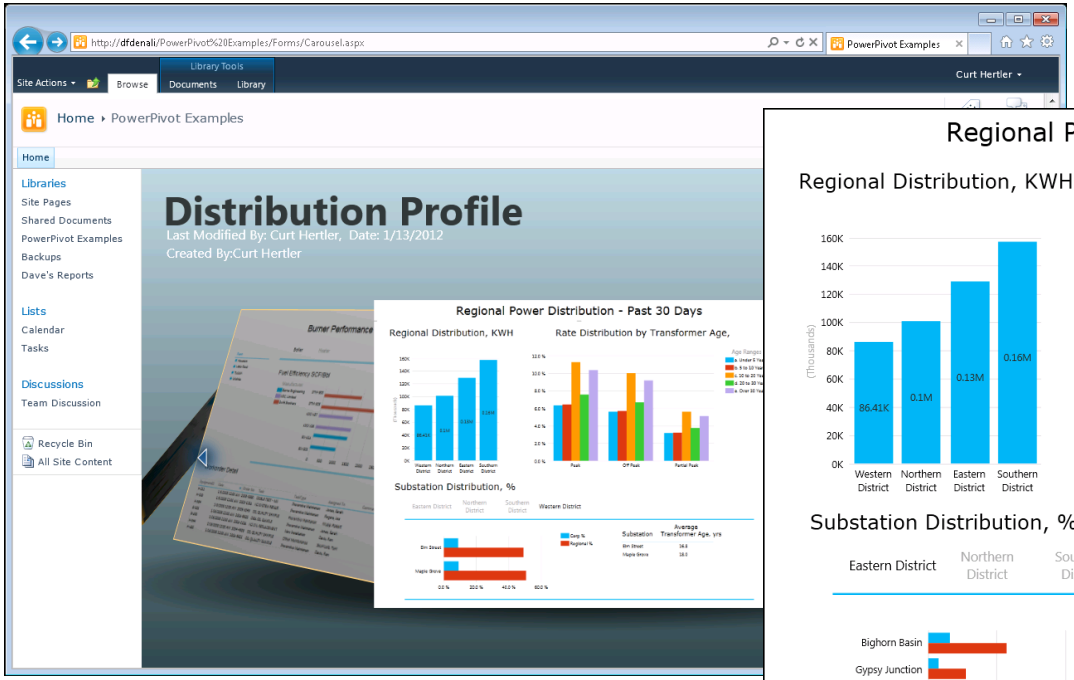
Rates
Excel Linked Table

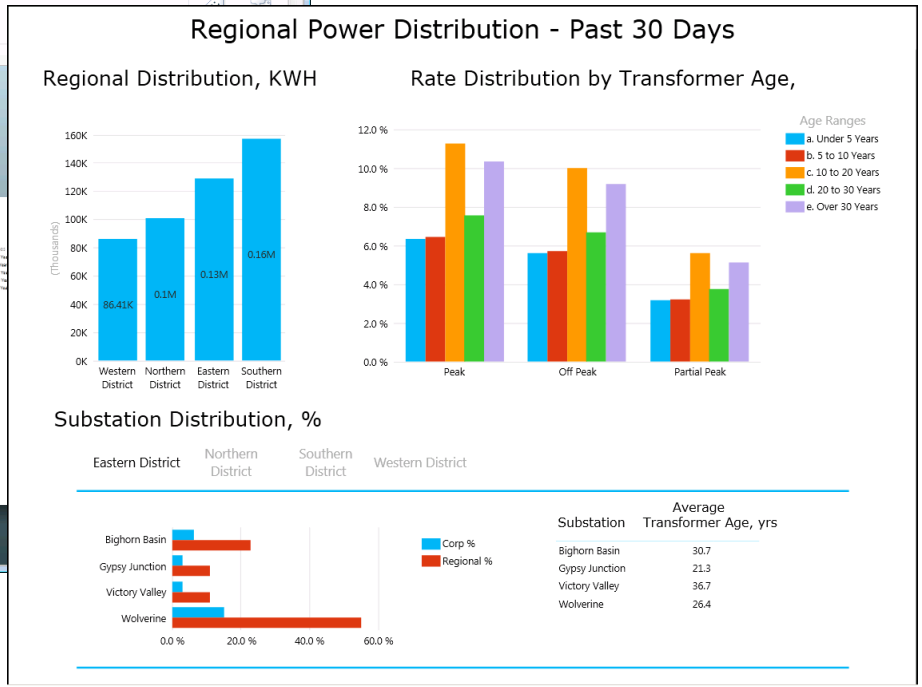
Configure Relationships between tables based on like columns, i.e. “Asset ID” or “Hour”

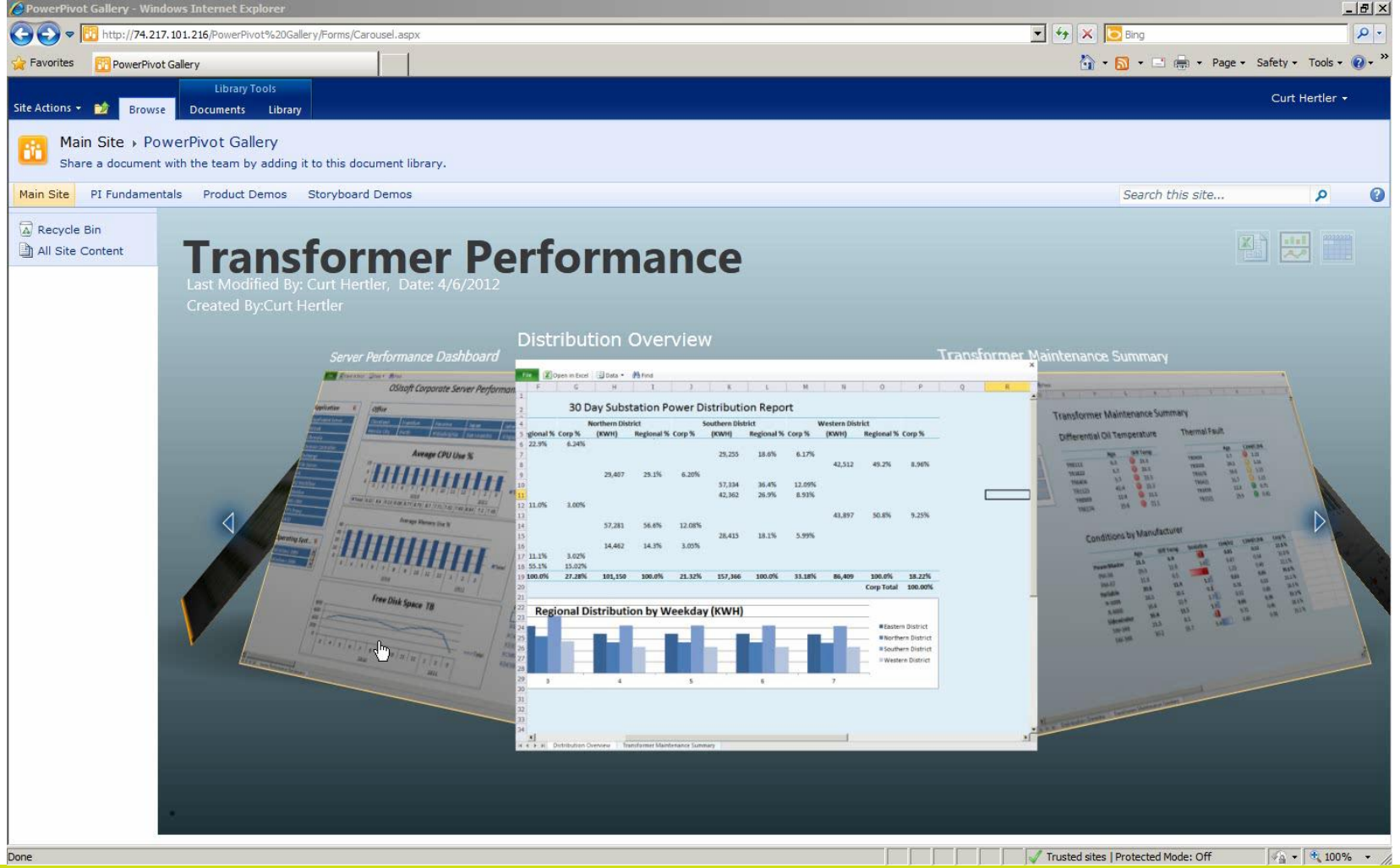
SharePoint 2010 Enterprise – *PowerPivot Gallery*

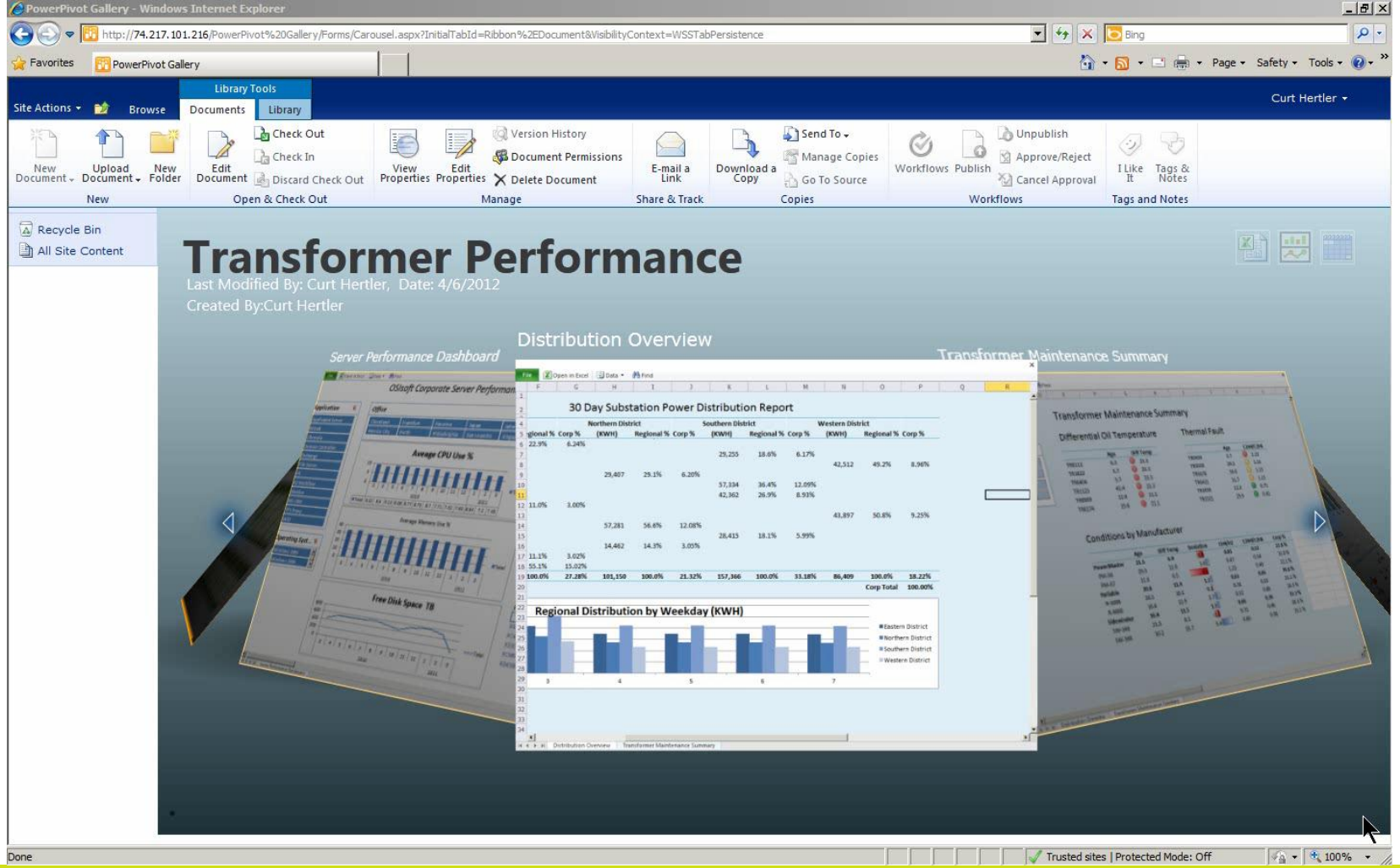


SharePoint 2010 Enterprise – *Power View*



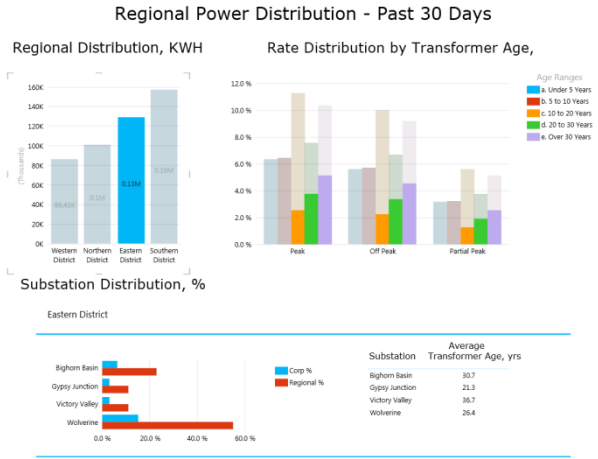


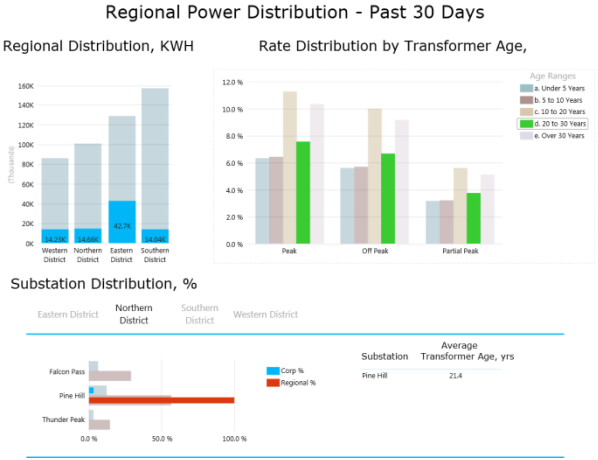


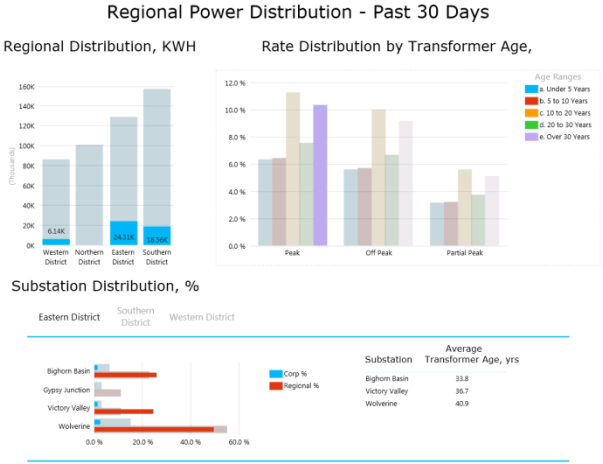


Microsoft SQL 2012 Power View

Interactive Analysis







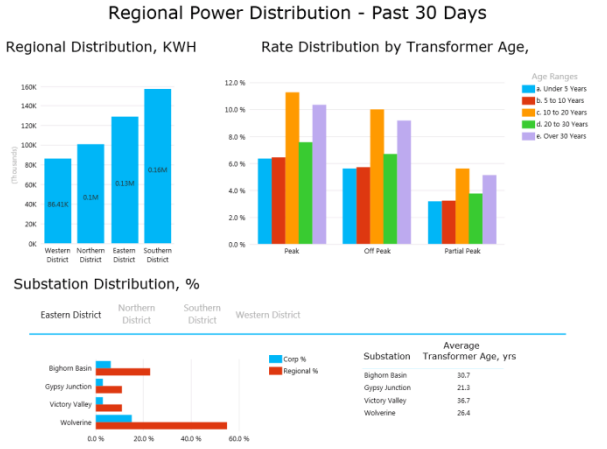
Distribution by District

Distribution by Transformer Age

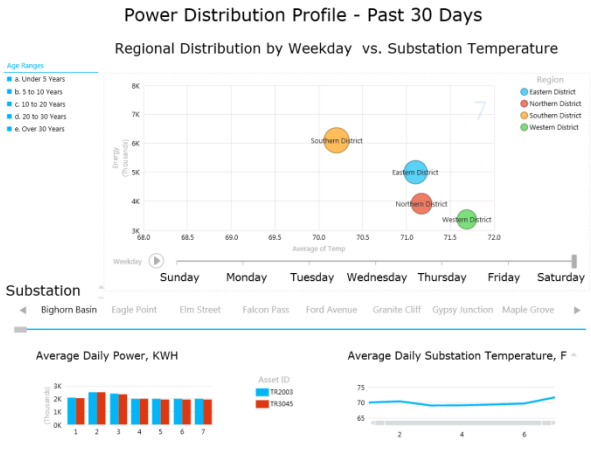
Distribution by Age and Rate

Microsoft SQL 2012 Power View

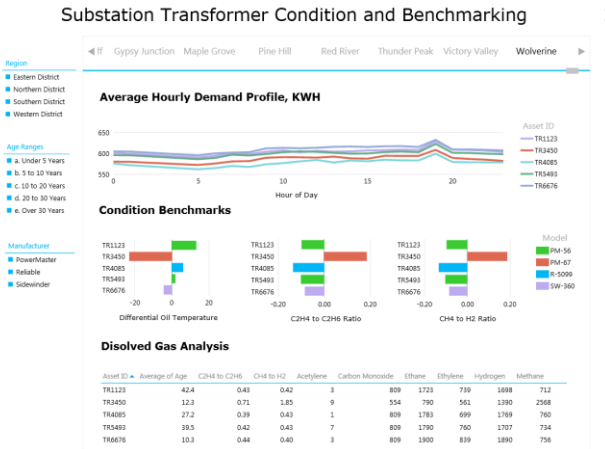
Multiple Views \ Pages



Aging Asset Risk Assessment

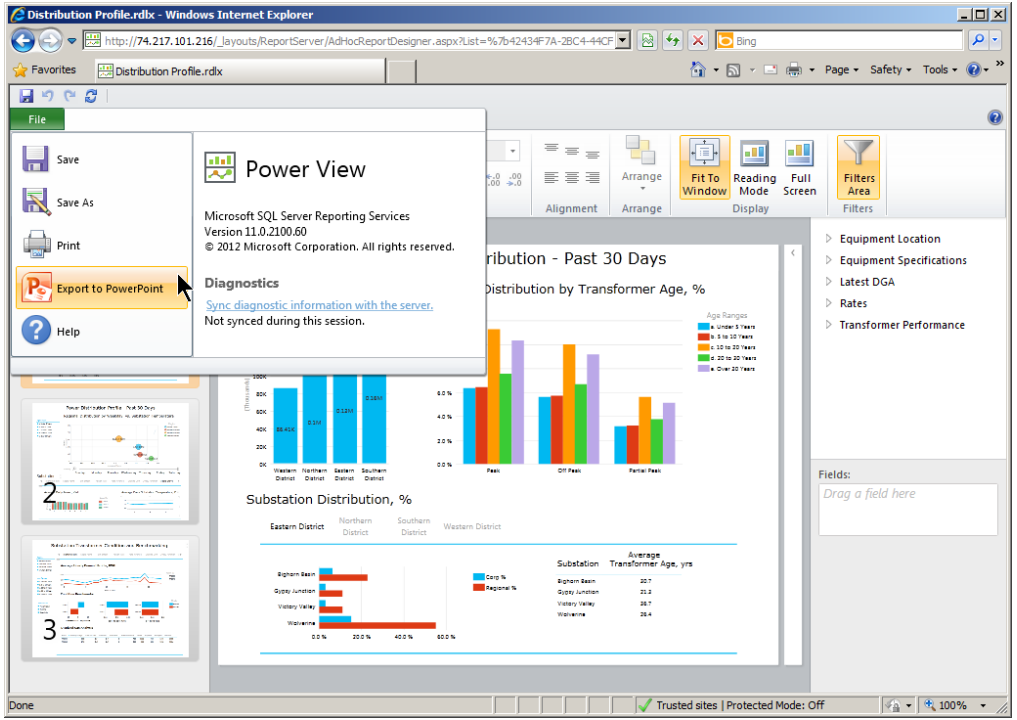


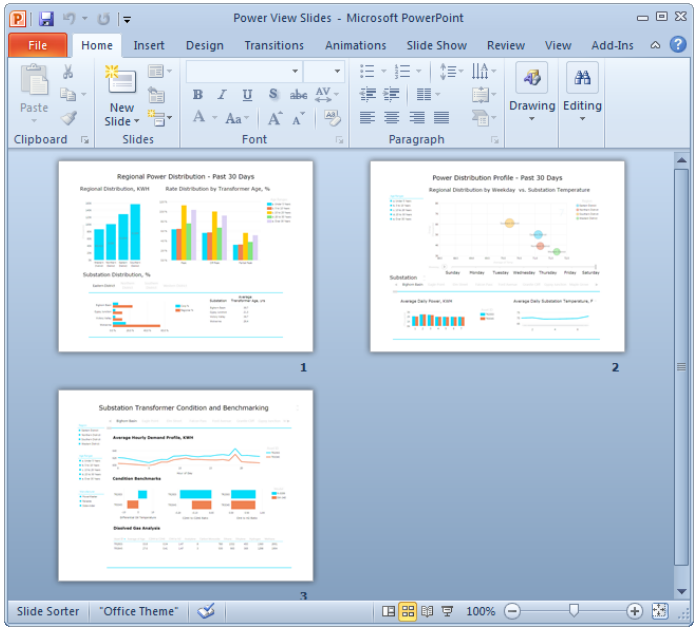
Weekday Distribution Profile



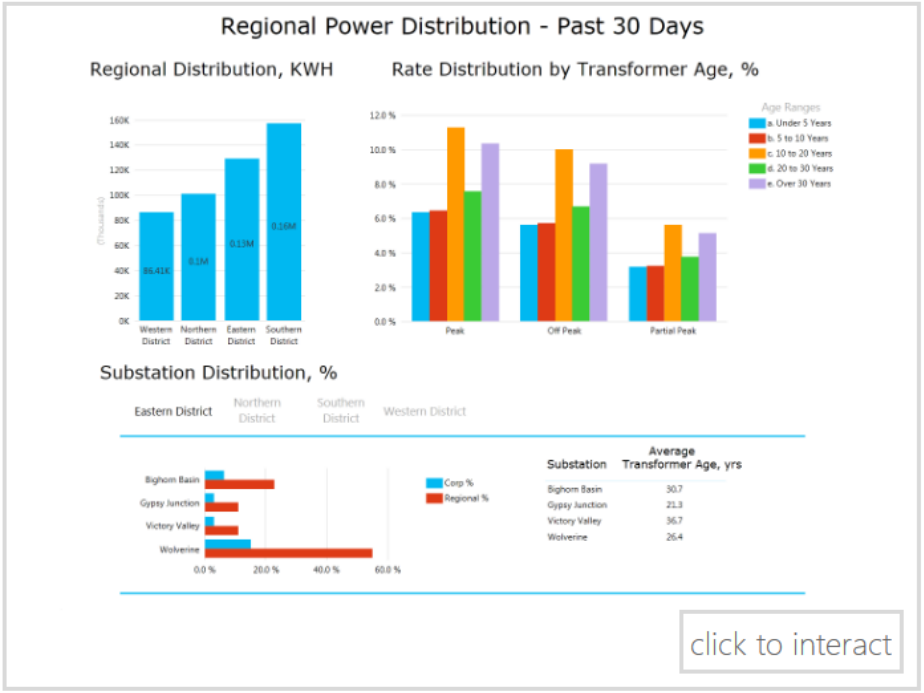
Equipment Condition Benchmarking

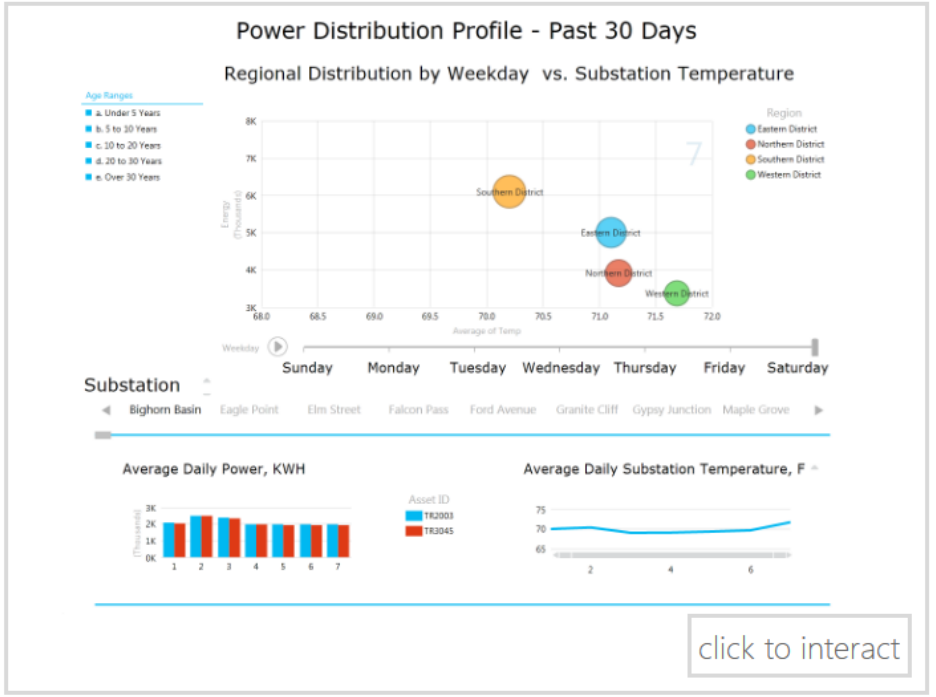
Power View Reports in *PowerPoint*





Power View Reports in *PowerPoint*





Additional Information

Coming up next !

- "Insightful Reporting with the PI System", Todd Brown and Chris Nelson

OSIsoft Resources

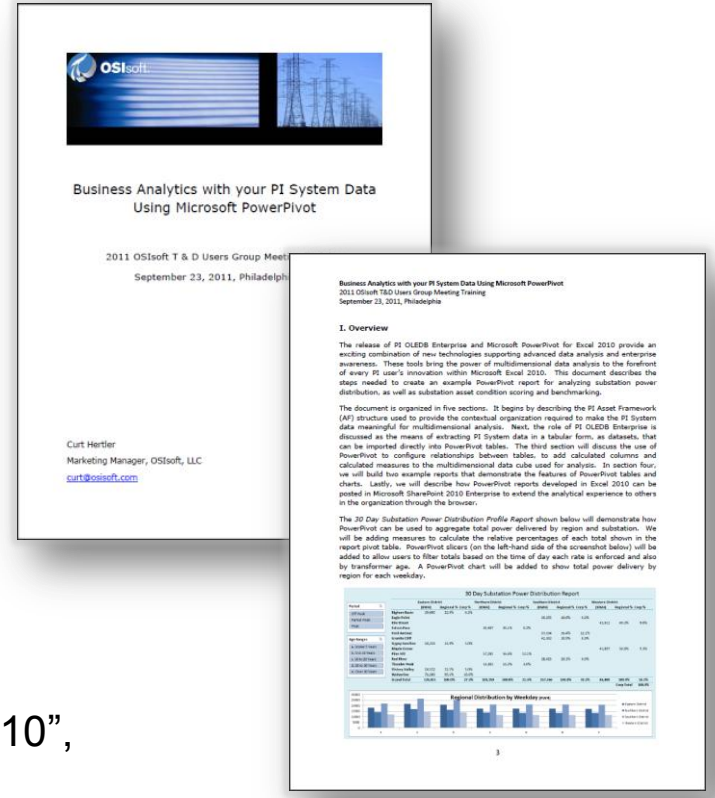
- "Business Analytics with your PI System Data using Microsoft PowerPivot"
- PI T&D Users Group Site extranet.osisoft.com
- OSIsoft vCampus vcampus.osisoft.com

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



OSIsoft Virtual Campus (vCampus)

- **Online, community-oriented** program
  - Software + Resources + Collaboration
  - Focus on development and integration
  - Partners, customers and OSIsoft
  - Exclusive contents (CTPs, Betas, technical papers)

- Personal **development PI System**
  - Development licenses for PI Data Access products (for developers and integrators)

http://vCampus.osisoft.com
vCampus@osisoft.com

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