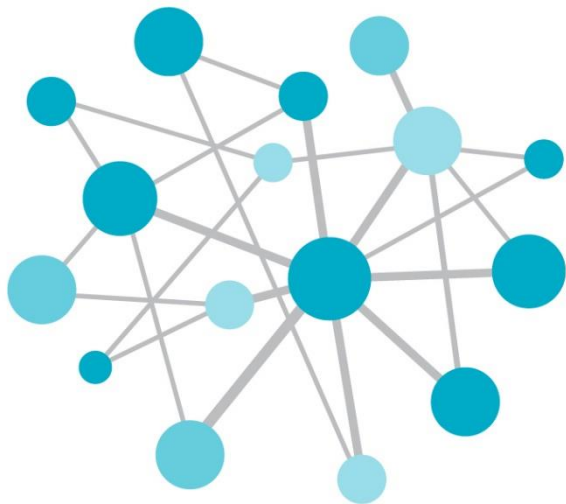


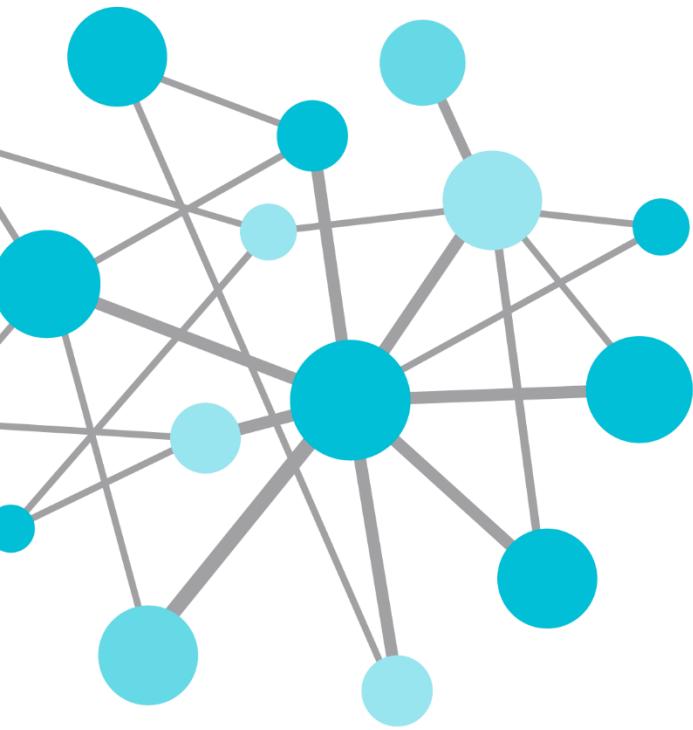


OSIsoft®

FEDERAL WORKSHOP 2014

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

DECISION READY IN REAL-TIME



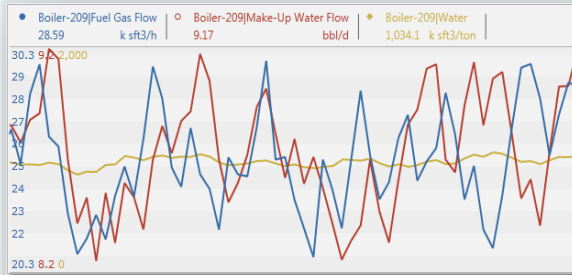
Making Data Decision-Ready for the Intelligent Enterprise

Presented by **Curt Hertler**
Partner Solutions Architect, OSIsoft

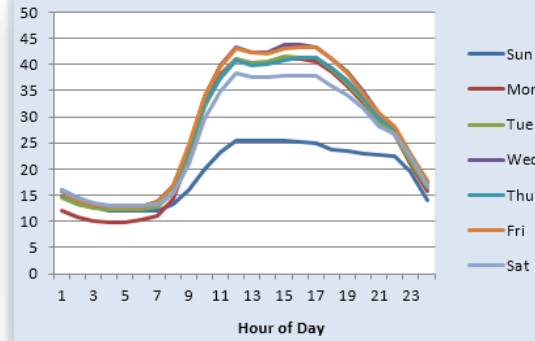


Visual Contexts for PI System Data

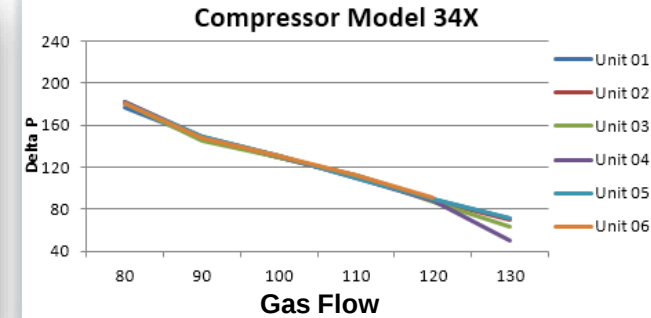
Time and Events



Profile



Behavioral



Performance Scorecard

	Bahrain			Kuwait		
	KPI Value	Plan Target	Dev %	KPI Value	Plan Target	Dev %
Crude Unit						
Light Naphtha 90 Pct. Pt.	179.9	180	-0.1 %	177.2	175	1.3 %
FCCU						
Conversion	63.4	64	-0.9 %	67.8	69	-1.7 %
FCC Gasoline (R+M)/2	86.2	86	0.2 %	85.2	86	-0.9 %
FCC Gasoline RVP	12.3	13	-1.6 %	11.8	12	0.0 %
FCCU 2						
Conversion				60.2	62	-3.0 %
FCC Gasoline (R+M)/2				87.0	86	1.8 %
FCC Gasoline RVP				13.1	12	9.2 %

Ad Hoc



Geospatial



From Data to “Decision Ready” Data

Power BI for
Office 365

Power Query
Excel

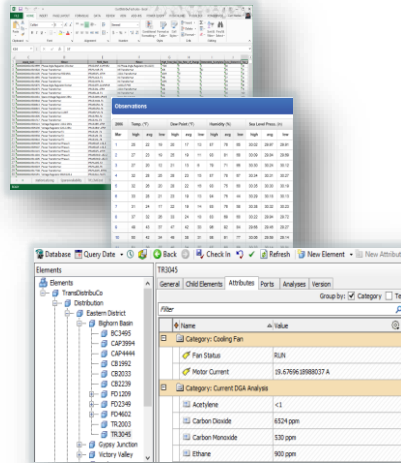
PI OData Service
OSIsoft™

Always up-to-date.

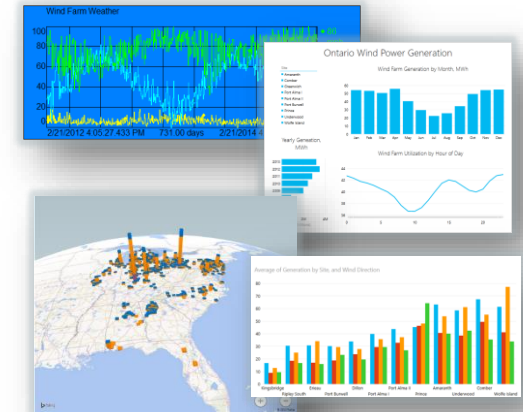
Analyze data anywhere.

Converse with your data to get answers.

Easier, more direct access to organizational data in Excel.



Data



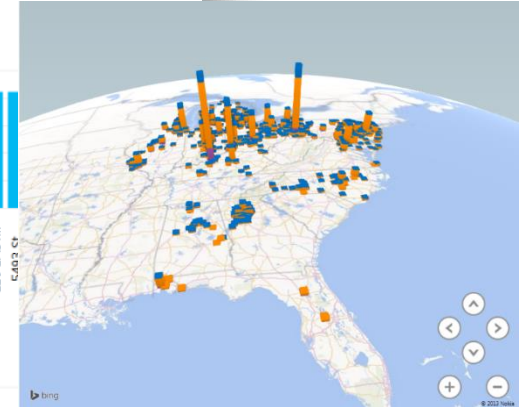
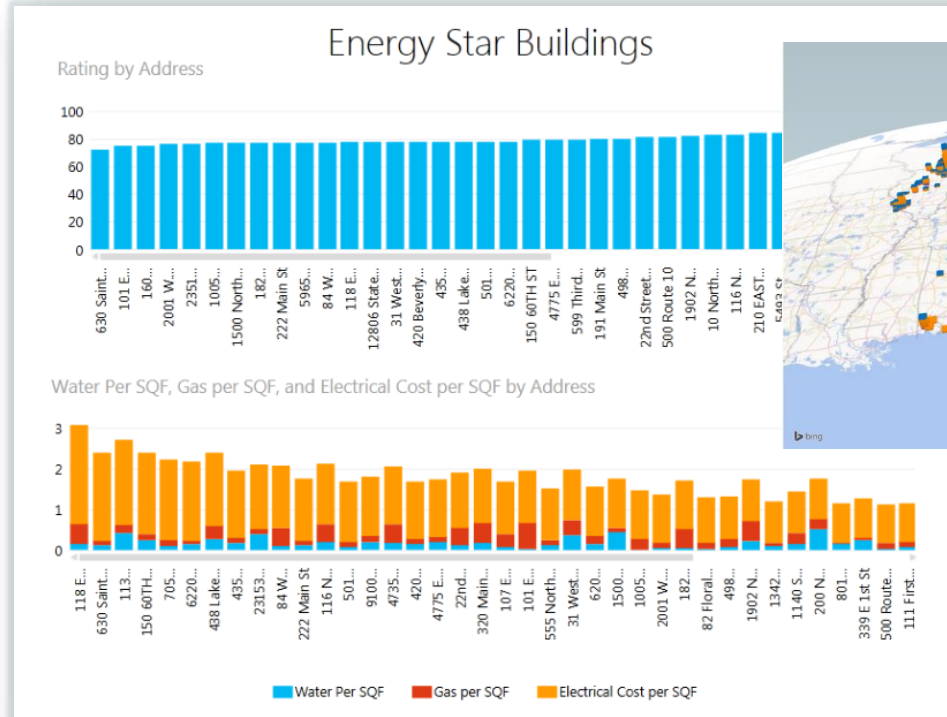
“Decision Ready” Data

Less time to “Decision Ready”

Carnegie Mellon University – School of Architecture

Asset Management

- Utility usage and costs for 1600 branch offices.
- Rapid delivery of analytical reporting.
- Increased the value of the data.

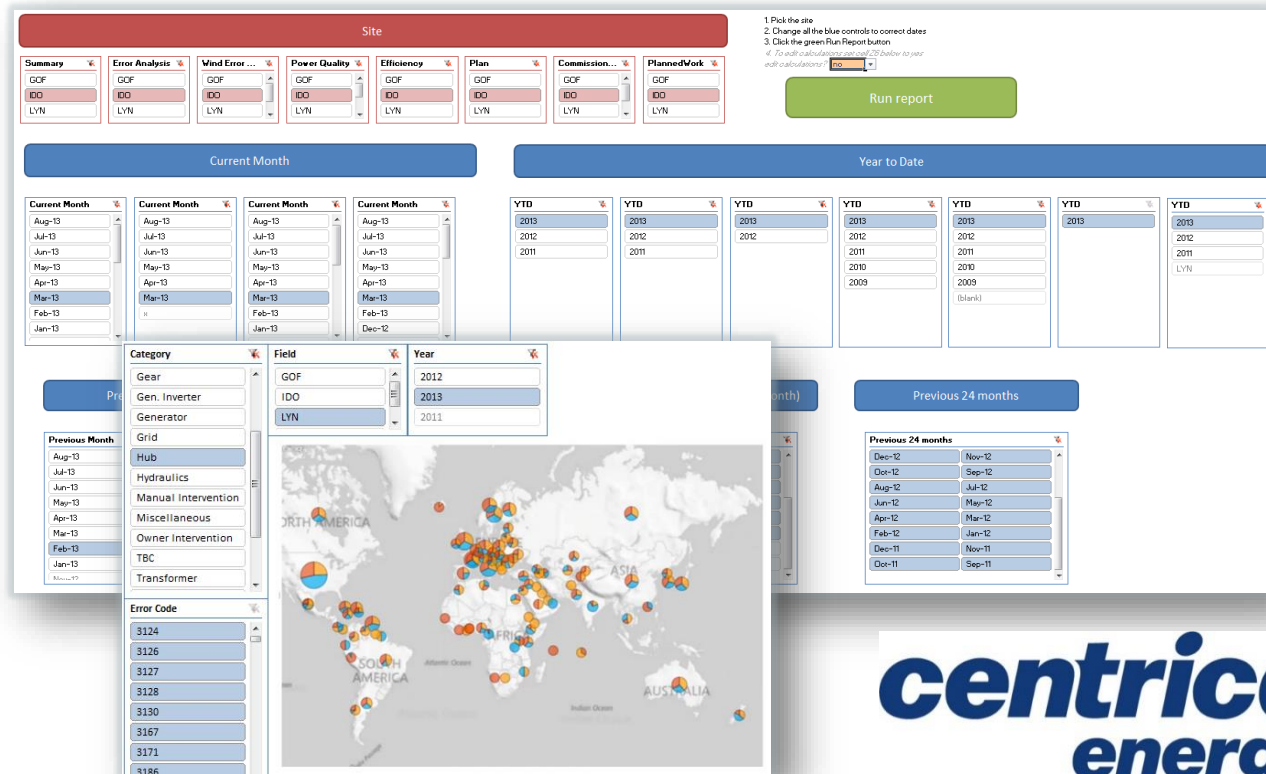


Sustainable “Decision Ready” Reporting

Centrica Energy

Asset Performance

- Expanding wind business by 10 fold.
- Configured concise, scalable reports based on PI AF using PowerPivot for Excel.
- Eliminated 199,000 custom calculations in Excel.



centrica
energy

Making “Decision Ready” Accessible

PSE&G

Asset Risk Assessment

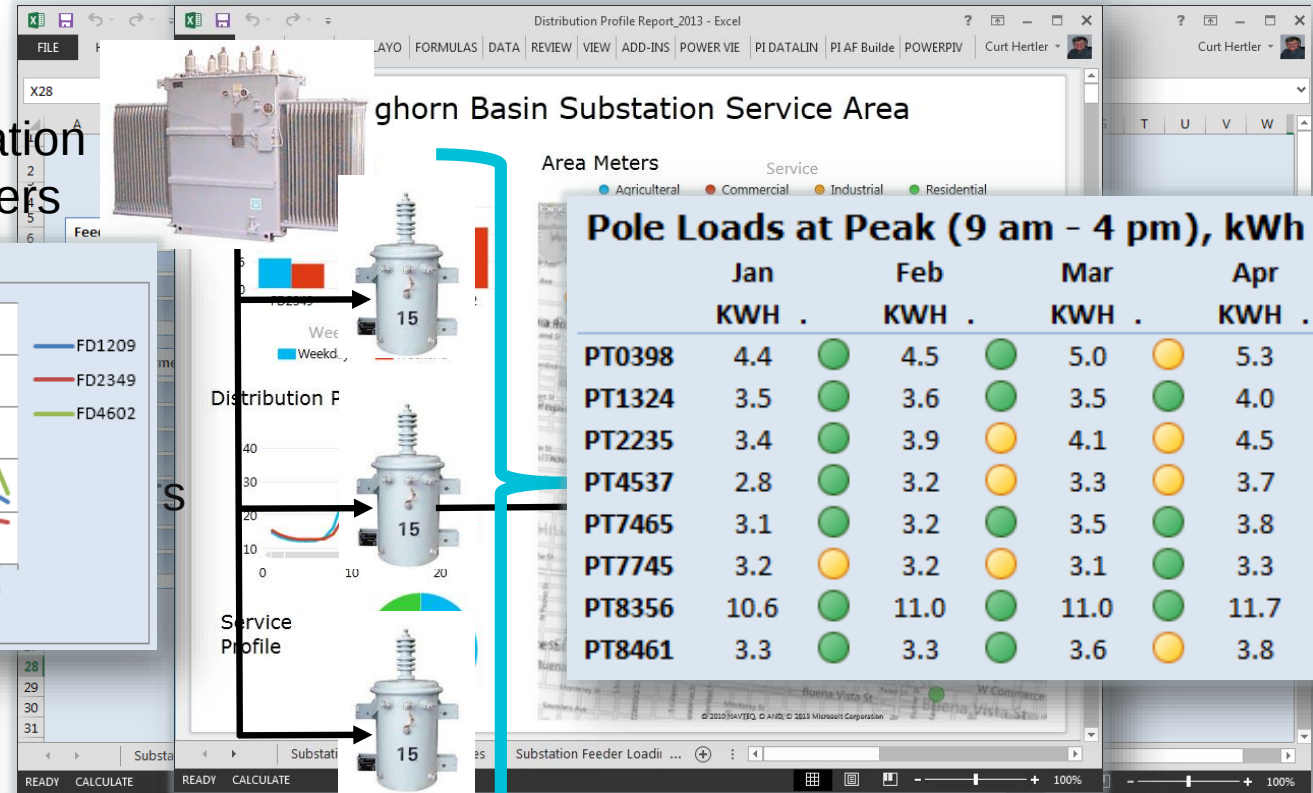
- Collaborative effort to demonstrate value to organization.
- Leveraged Power BI for Office 365 tenant.
- Support for mobile devices



Demand Profile and Network Analysis

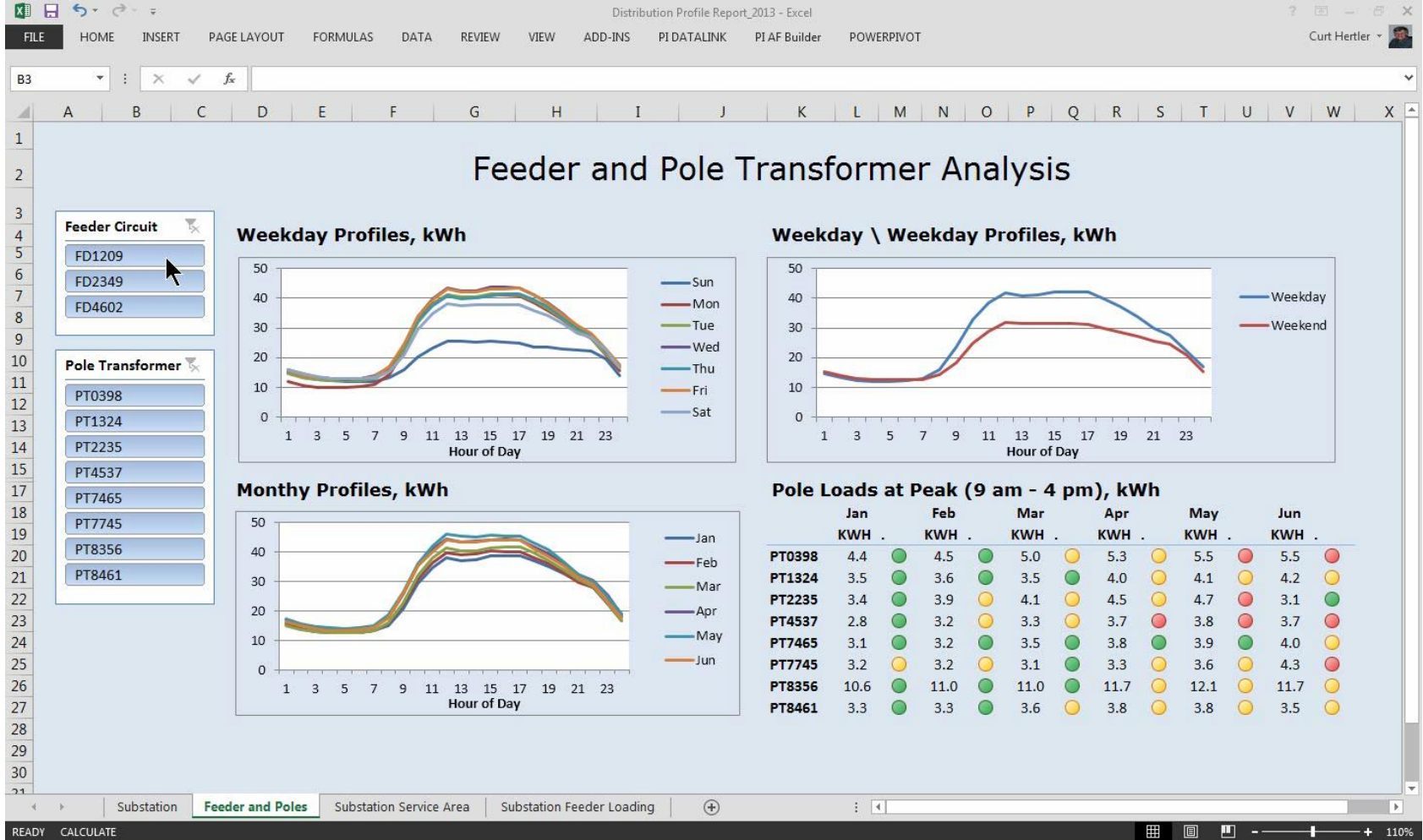


Substation
Feeders





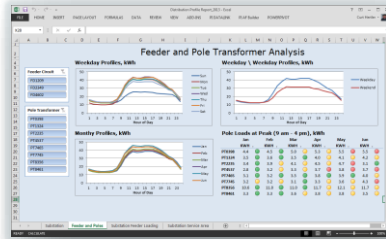
DEMO



Excel 2013 Anatomy

Worksheets

Pivot
Tables &
Charts



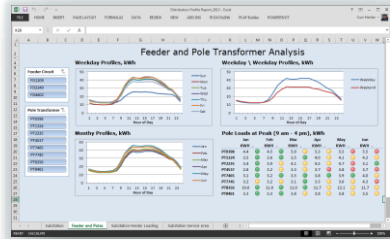
Pivot
Tables
Reports

Location	Opponent	Game Time	Start Time	Attendance
Home	Athletics	Night	4/13/12 7:00 PM	46,036
Home	Athletics	Night	4/14/12 6:00 PM	21,071
Home	Athletics	Day	4/15/12 1:00 PM	19,690
Home	Indians	Night	4/17/12 7:00 PM	12,461
Home	Indians	Night	4/18/12 7:00 PM	11,343
Home	Indians	Night	4/19/12 7:00 PM	12,342
Home	White Sox	Night	4/20/12 7:00 PM	19,947
Home	White Sox	Day	4/21/12 1:00 PM	22,472
Home	White Sox	Day	4/22/12 1:00 PM	19,575
Home	Dodgers	Day	4/5/12 4:00 PM	42,942
Home	Dodgers	Night	4/6/12 7:00 PM	22,490
Home	Dodgers	Night	4/7/12 5:30 PM	31,909
Home	Dodgers	Day	4/8/12 1:00 PM	19,021
Home	Diamondbacks	Night	4/10/12 7:00 PM	18,652
Home	Diamondbacks	Day	4/11/12 3:30 PM	16,091
Home	Diamondbacks	Night	4/12/12 7:00 PM	20,858

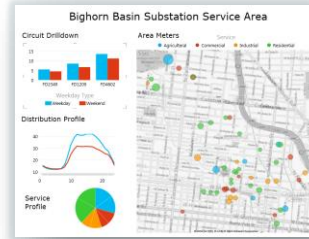
Excel 2013 Anatomy

Worksheets

Pivot
Tables &
Charts



Power
View
Reports



Excel
Tables

Location	Opponent	Game Time	Start Time	Attendance
Home	Athletics	Night	4/13/12 7:00 PM	46,026
Home	Athletics	Night	4/14/12 6:00 PM	21,071
Home	Athletics	Day	4/15/12 1:00 PM	19,650
Home	Indians	Night	4/17/12 7:00 PM	12,461
Home	Indians	Night	4/18/12 7:00 PM	11,341
Home	Indians	Night	4/19/12 7:00 PM	12,942
Home	White Sox	Night	4/20/12 7:00 PM	19,947
Home	White Sox	Day	4/21/12 1:00 PM	22,472
Home	White Sox	Day	4/22/12 1:00 PM	19,975
Home	Dodgers	Day	4/25/12 4:00 PM	62,942
Home	Dodgers	Night	4/26/12 7:00 PM	12,490
Home	Dodgers	Night	4/27/12 3:30 PM	31,909
Home	Dodgers	Day	4/28/12 1:00 PM	19,021
Home	Diamondbacks	Night	4/30/12 7:00 PM	18,652
Home	Diamondbacks	Day	4/11/12 3:30 PM	16,091
Home	Diamondbacks	Night	4/12/12 7:00 PM	20,858

Data Model

PowerPivot
Tables

Data Sources



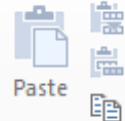
PI AF



Relational Data



Azure
Marketplace

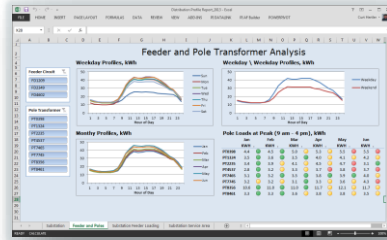


Paste

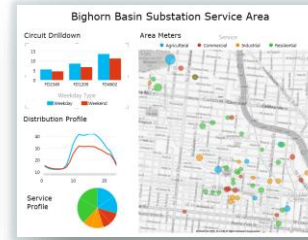
Clipboard

Excel 2013 Anatomy

Worksheets
Pivot
Tables &
Charts



Power
View
Reports



Excel
Tables

Location	Opponent	Game Time	Start Time	Attendance
Home	Athletics	Night	4/13/12 7:00 PM	46,026
Home	Athletics	Night	4/14/12 6:00 PM	21,071
Home	Athletics	Day	4/15/12 1:00 PM	19,650
Home	Indians	Night	4/17/12 7:00 PM	12,461
Home	Indians	Night	4/18/12 7:00 PM	11,343
Home	Indians	Night	4/19/12 7:00 PM	12,942
Home	White Sox	Night	4/20/12 7:00 PM	19,947
Home	White Sox	Day	4/21/12 1:00 PM	22,472
Home	White Sox	Day	4/22/12 1:00 PM	15,975
Home	Dodgers	Day	4/25/12 4:00 PM	62,942
Home	Dodgers	Night	4/26/12 7:00 PM	12,490
Home	Dodgers	Night	4/27/12 3:30 PM	11,909
Home	Dodgers	Day	4/28/12 1:00 PM	19,021
Home	Diamondbacks	Night	4/30/12 7:00 PM	18,652
Home	Diamondbacks	Day	4/11/12 3:30 PM	16,091
Home	Diamondbacks	Night	4/12/12 7:00 PM	20,858

Data Model
PowerPivot
Tables



Excel

Distribution Network – PI Asset Framework

Network Hierarchy

- Feeder
- Pole Transformer
- Meter

The screenshot displays the PI Asset Framework interface. On the left, the 'Elements' tree shows a hierarchy starting with 'Bighorn Basin', followed by various feeders (BC3495, CAP3994, CAP4444, CB1992, CB2033, CB2239, FD1209), and then pole transformers (PT2235, PT4537, PT8461, FD2349, PT1324, PT7465). The selected element is PT2235, which is expanded to show its associated meters: 10149651, 10223417, 10250142, 10250147, 5444448, 5444812, and 9525719.

On the right, the detailed view for element 10149651 is shown. It includes tabs for 'General', 'Child Elements', 'Attributes', 'Ports', and 'Version'. The 'Attributes' tab is active, displaying a table of attributes categorized into Location, Meter Readings, and Specifications.

Filter	
Name	Value
Category: Location	
Address	470 Beso Ln, San Antonio,...
Entity	Cindy Bear
Latitude	29.431031
Longitude	-98.521563
Category: Meter Readings	
KVAH	-0.021651281043887138
KVARH	0.0071160625666379929
KWH	-0.015789896249771118
Category: Specifications	
Manufacturer	L&T
Service	Residential

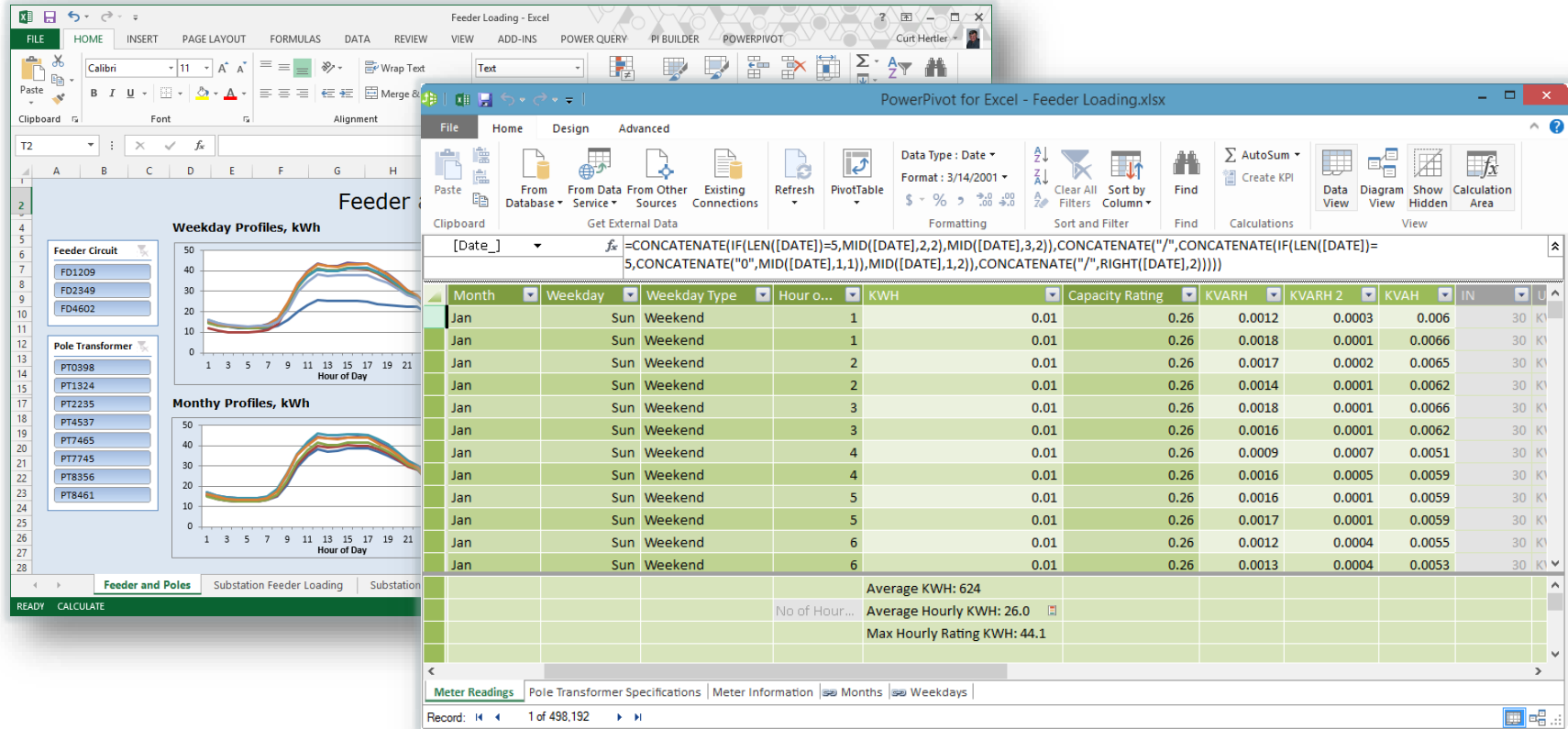
Pole Transformer Attributes

- Location
- Capacity rating

Meter Attributes

- Meter reads (PI System Data)
- Location and manufacturer
- Service and responsible entity

Excel 2013 with Power Pivot



Ad Hoc Analysis

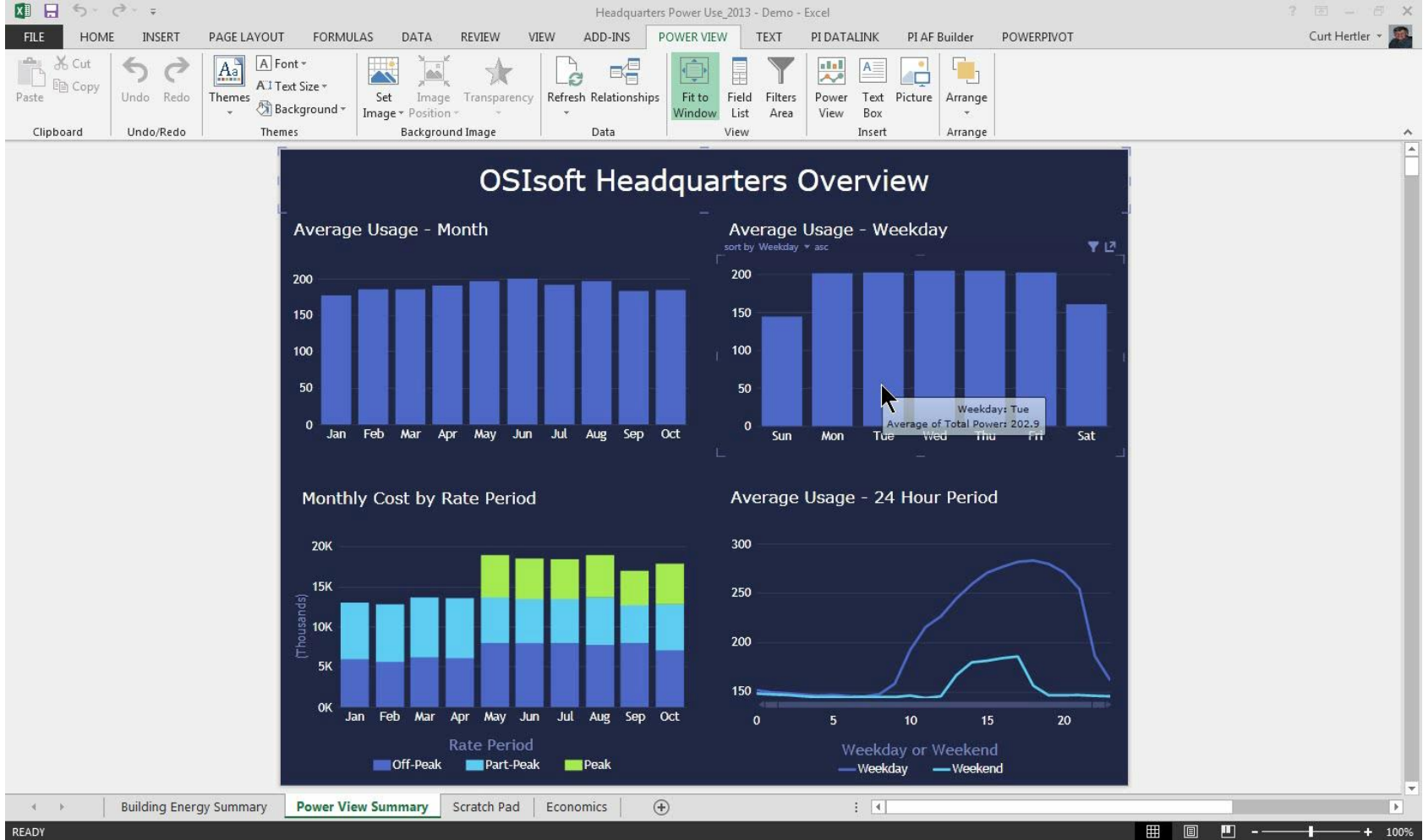


Power Use at OSISOFT Headquarters

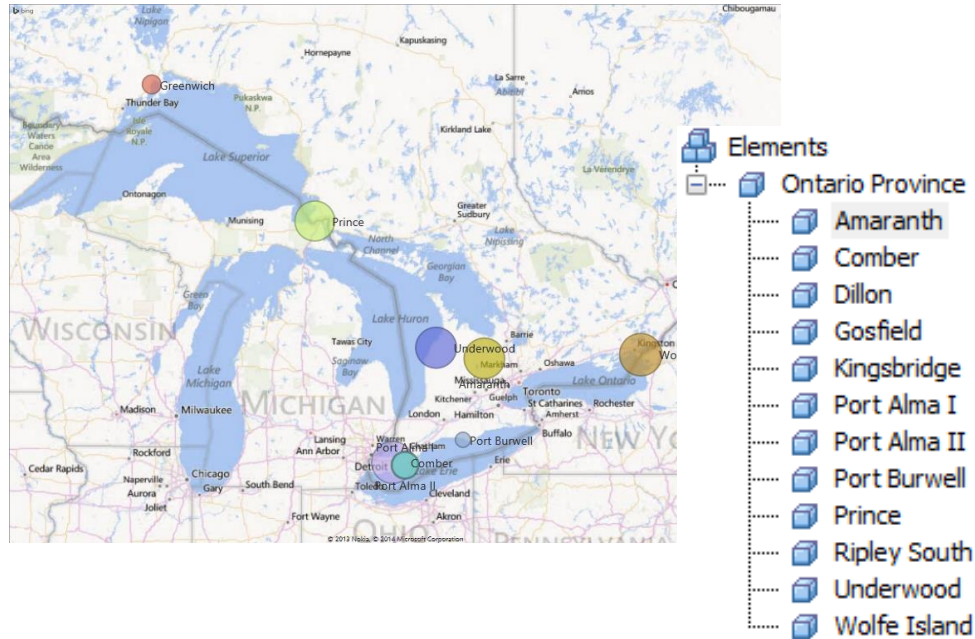




DEMO



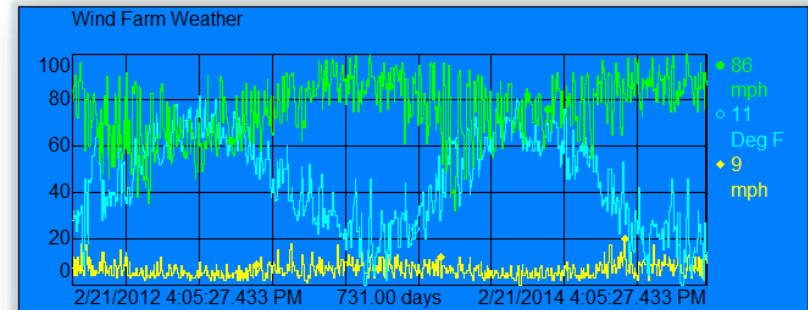
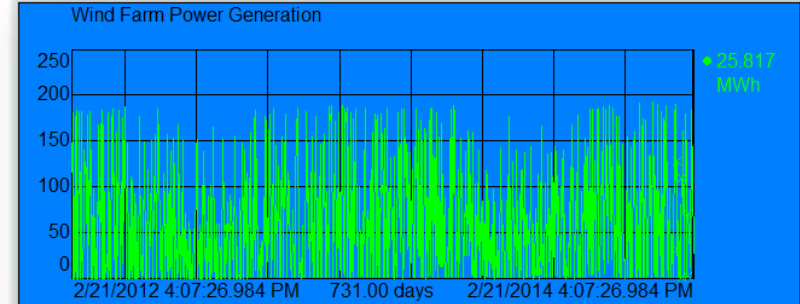
Example - “Ontario Wind Generation”



Data Sources:

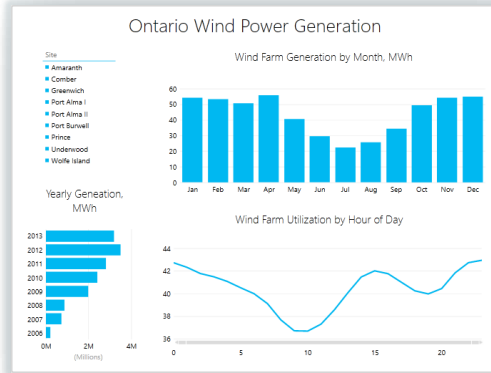
Ontario Power Generation: www.ieso.ca

Weather Underground: www.wunderground.com

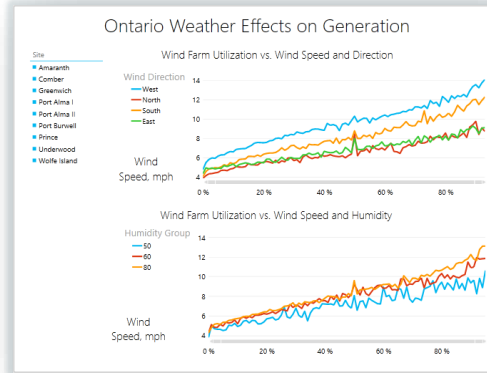


Power View in Excel 2013

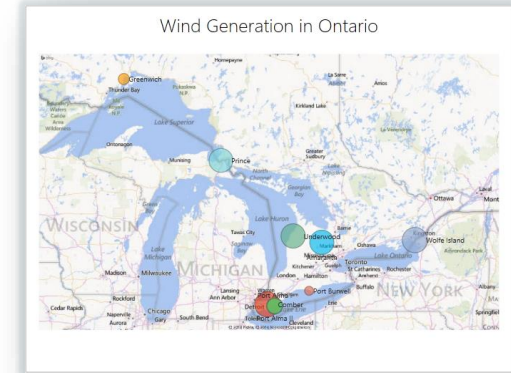
Overview



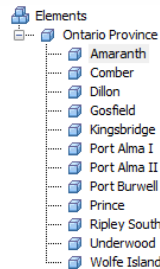
Weather Effects



Geographical

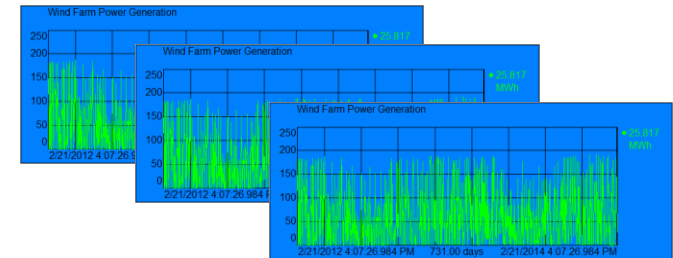


PI Data Access



Category: PI System Data

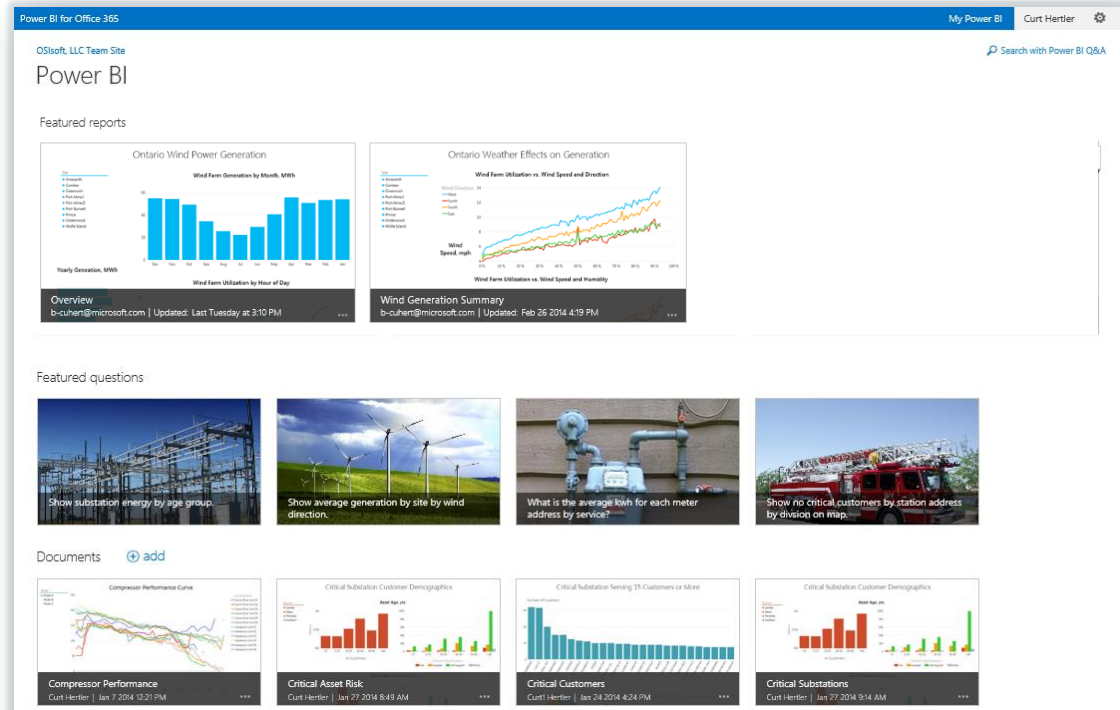
Generation	80.3254002826611 MWh
Generation Prediction	17.9026126861572 MWh
Humidity	61 %
Temperature	41 °F
Wind Degrees	171
Wind Direction	South
Wind Speed	7 m/h



Power BI for Office 365

BI functionality for Office 365

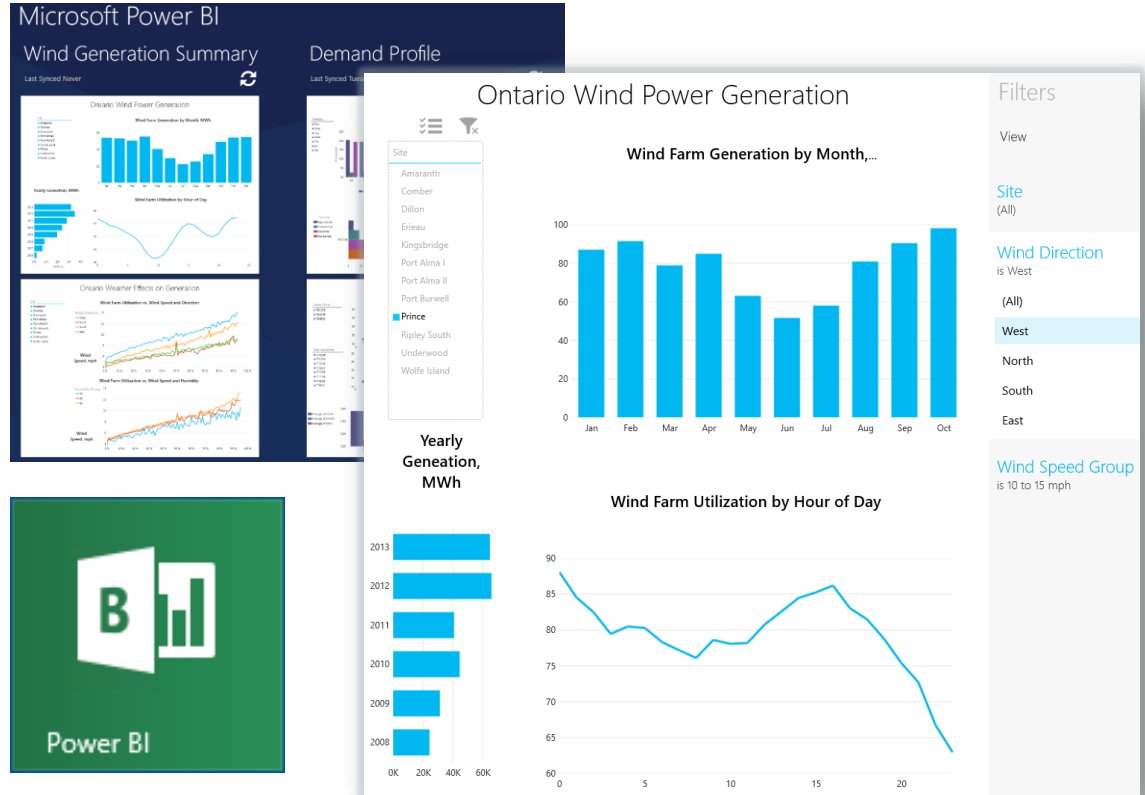
- Analysis Anywhere
Power BI App
- Ask and Answer
Power BI Q&A
- Easier Data Access
Power Query for Excel 2013
PI Web API – OData Feature
- Scheduled data refresh



Power BI App – Windows 8

Analysis Anywhere

- Free app on Windows Store
- Displays Power View reports posted in SharePoint for Office 365
- Supports most Power View visuals
- Exposes view filters for additional analysis

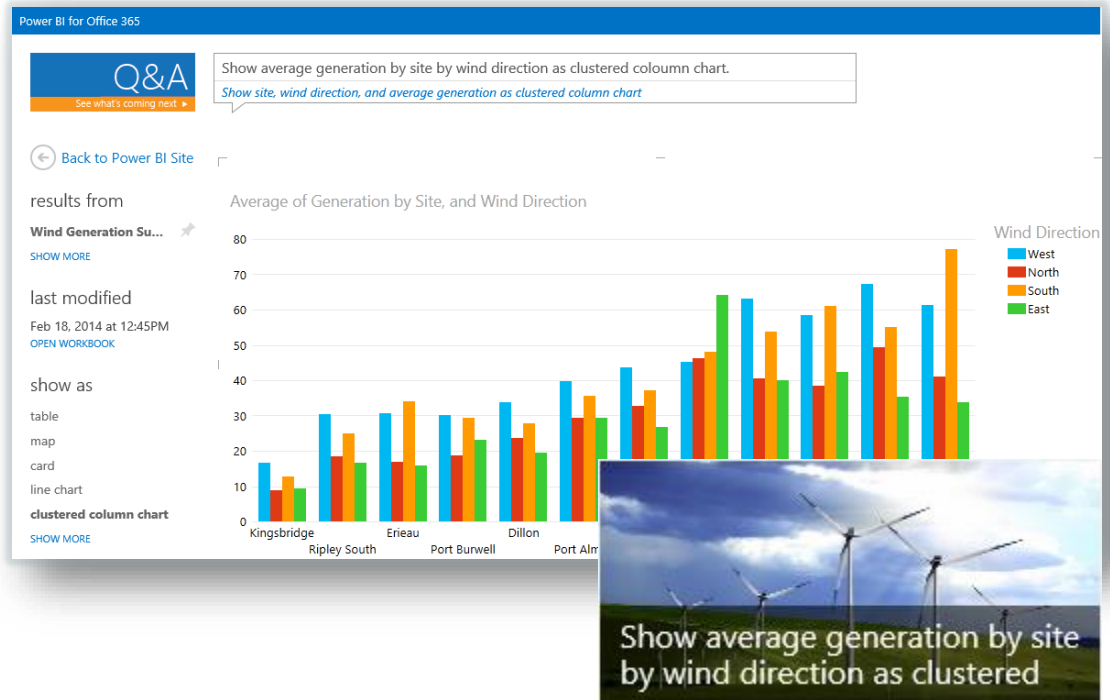


Power BI Q&A

Ask and Answer

- Ask ad hoc questions using natural language
- Answers returned with Power View visuals
- Access to all Power BI data
- Additional visuals and analysis supported from the browser

“Show generation by site by wind direction as column chart.”



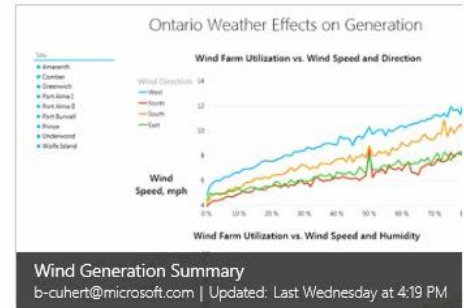
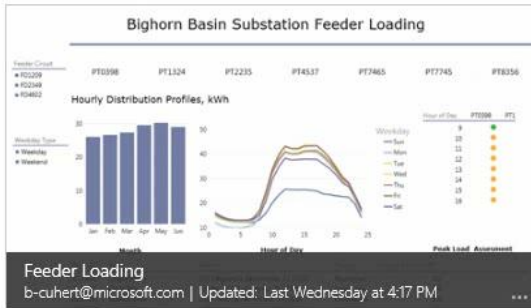
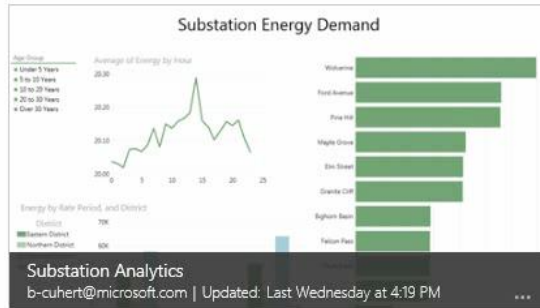


DEMO

b-cuhert@microsoft.com

Power BI

Featured reports

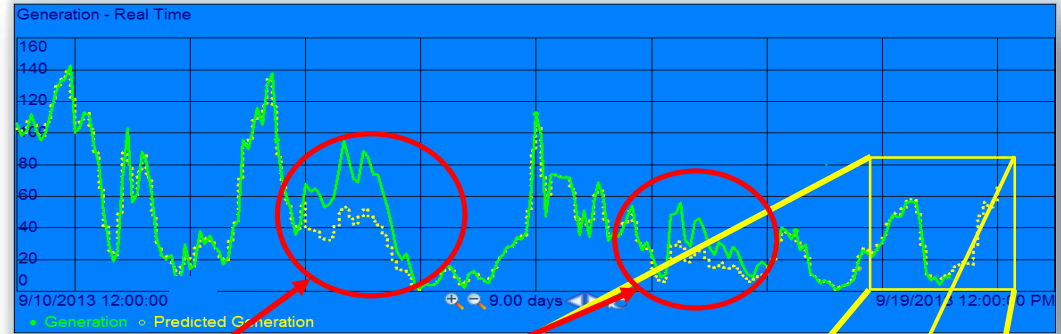
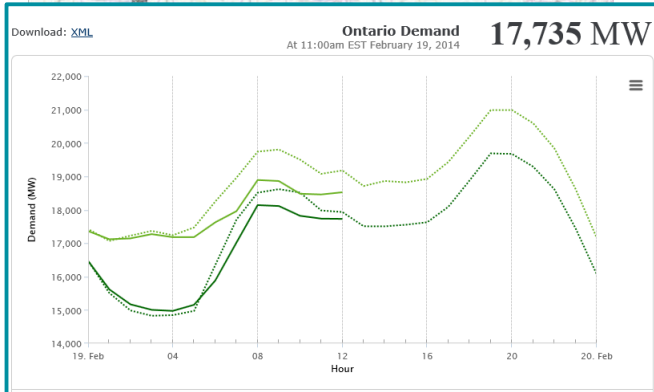


Featured questions



Example - “Improving Predicted Generation”

Future Data coming in PI Data Archive 2014

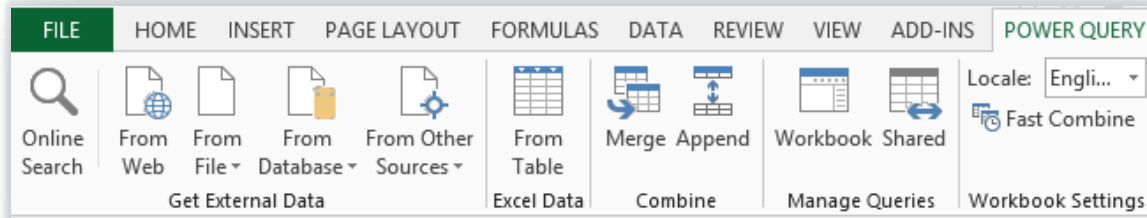


Prediction
Errors

Weather Effects ?

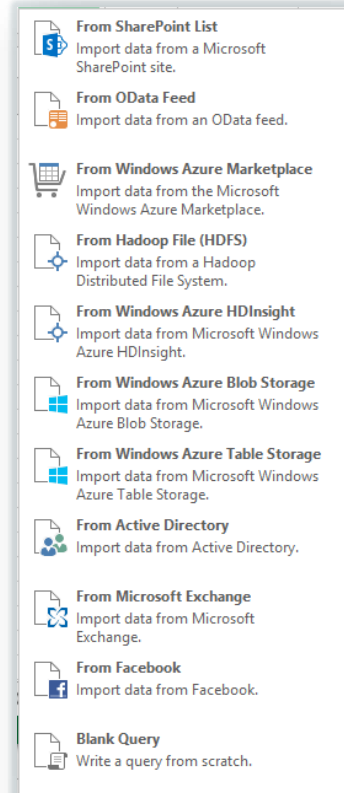
Predicted Wind speed – turbine velocity
Wind direction - geography
Temperature - mechanical
Humidity - air density

Power Query for Excel 2013

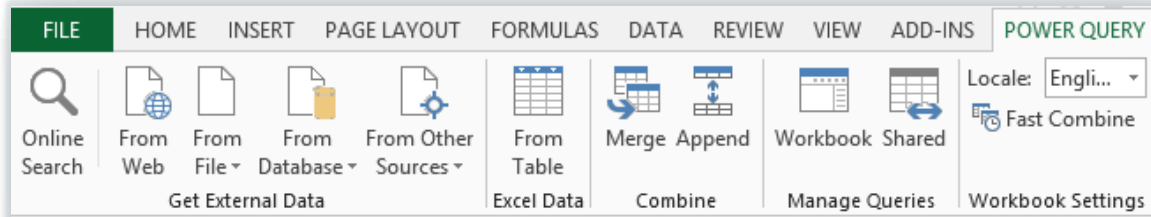


Free Add-In for Excel 2010 or 2013

- Access to useful data sources
 - Popular relational databases
 - Hadoop, Microsoft Exchange, Facebook, etc.
 - OData Feeds, like the PI OData feature of the PI Web API

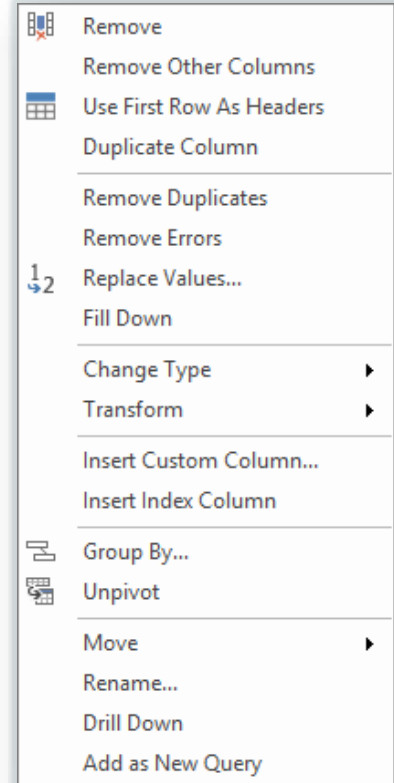


Power Query for Excel 2013



Free Add-In for Excel 2010 or 2013

- Shape datasets for Power View analysis
 - Remove columns and filter rows
 - Insert calculated columns
 - Reformat text and numeric data
 - Append and merge
- Author and share of scripted queries in Power BI for Office 365



PI Web API's OData Feature

CTP available on vCampus

- Connect to PI AF by URL
- Easy navigation to AF attribute data by element template
- Dataset types
 - Snapshot
 - Archive
 - Interpolated
 - Summaries

<http://localhost/PIOData/WindFarms/T>

The screenshot displays the PI Web API OData interface. A table titled "SiteInterpolations" is shown, containing data for various time intervals. The table has four columns: Time, GenerationPrediction, Generation, and Humidity. The data is for the date 2/23/2014, ranging from 12:00:00 AM to 8:00:00 AM. Below the table, a list of columns is displayed, including StartTime, EndTime, TimeStep, SiteID, SiteName, Time, GenerationPrediction, Generation, Humidity, Latitude, Longitude, Temperature, WindDegrees, WindSpeed, WindDirection, Capacity, and Site. On the right side, a "Navigator" sidebar is visible, showing a tree view of the data structure. The "SiteInterpolations" item is highlighted in green. The URL "http://localhost/piodata/windfarms/t" is shown in the address bar.

Time	GenerationPrediction	Generation	Humidity
2/23/2014 12:00:00 AM	93.036072	14.408216	92
2/23/2014 1:00:00 AM	90.036072	14.143168	92
2/23/2014 2:00:00 AM	74.036072	13.878119	92
2/23/2014 3:00:00 AM	55.536076	13.613071	92
2/23/2014 4:00:00 AM	39.036076	13.348023	92
2/23/2014 5:00:00 AM	26.036074	13.082975	94
2/23/2014 6:00:00 AM	13.022457	12.817926	94
2/23/2014 7:00:00 AM	8.022457	12.552878	94
2/23/2014 8:00:00 AM	9.522457	12.28783	94

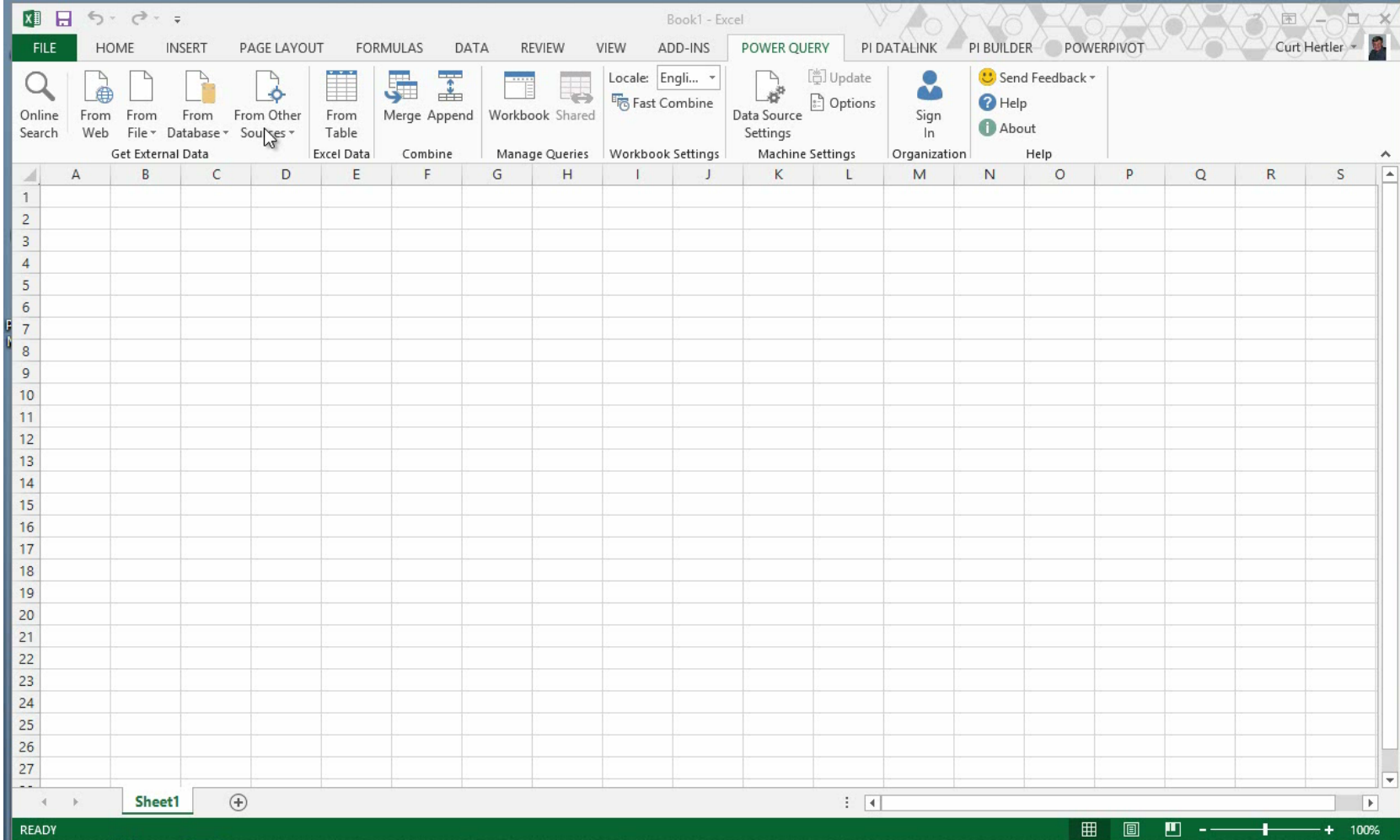
Columns [17]
StartTime, EndTime, TimeStep, SiteID, SiteName, Time, GenerationPrediction, Generation, Humidity, Latitude, Longitude, Temperature, WindDegrees, WindSpeed, WindDirection, Capacity, Site

Navigator

- ☐ Select multiple items
- http://localhost/piodata/windfarms/t
 - RegionArchive
 - RegionInterpolations
 - Regions
 - RegionSnapshots
 - RegionSummaries
 - SiteArchive
 - SiteInterpolations**
 - Sites
 - SiteSnapshots
 - SiteSummaries



DEMO

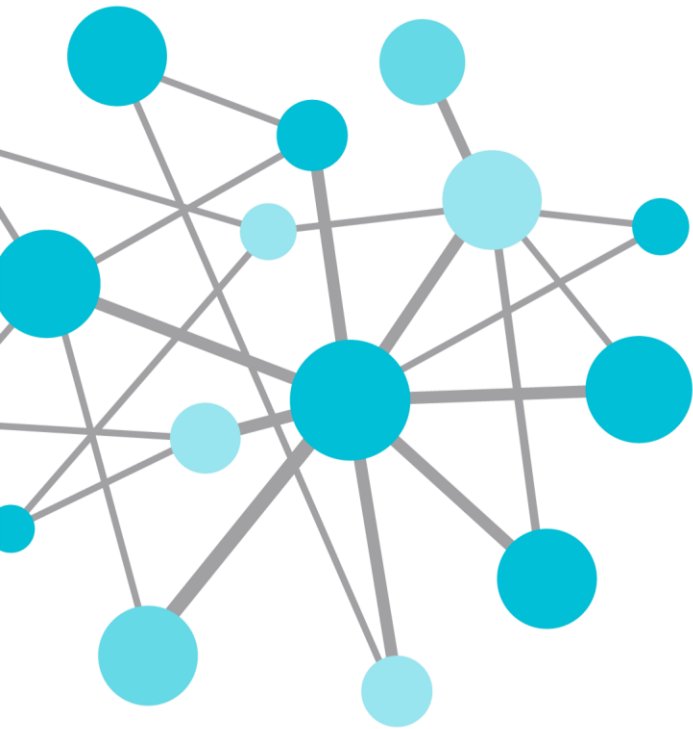


Curt Hertler

curt@osisoft.com

Partner Solutions Architect

OSIsoft, LLC



THANK
YOU

Brought to you by  **OSI**soft.

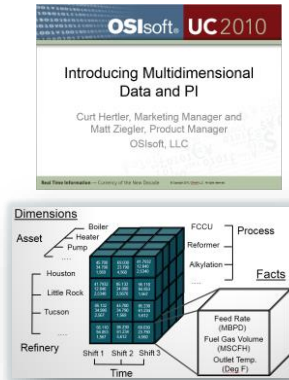


Overview

- From Data to “Decision Ready” Data
- Evolution of Microsoft Self-Service BI Tools
- Success Stories
- Example: *“Ontario Wind Generation”*
 - Power BI for Office 365
- Example: *“Improving Predicted Generation”*
 - Power Query for Excel
 - PI OData Service

Evolution of Microsoft Self-Service BI

2010



Excel

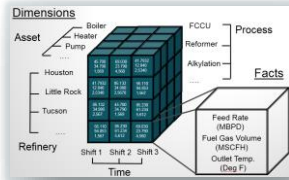
PowerPivot



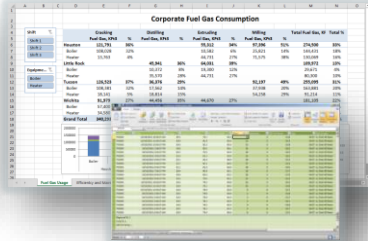
PI OLEDB Enterprise

Evolution of Microsoft Self-Service BI

2010



2011



PowerPivot Gallery



PowerPivot



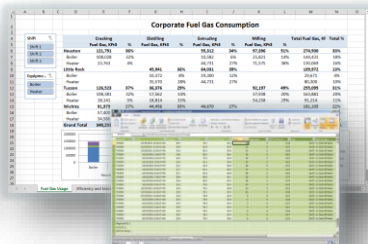
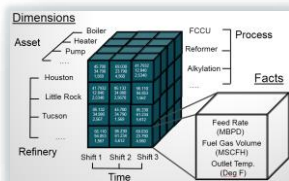
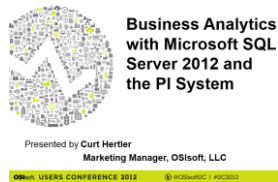
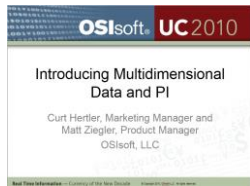
PI OLEDB Enterprise

Evolution of Microsoft Self-Service BI

2010

2011

2012



PowerPivot Gallery

Power View



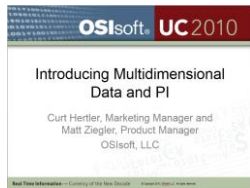
PowerPivot



PI OLEDB Enterprise

Evolution of Microsoft Self-Service BI

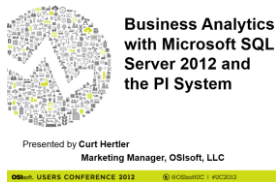
2010



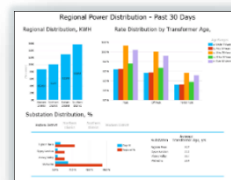
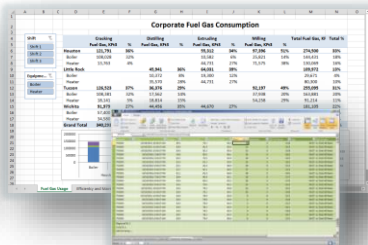
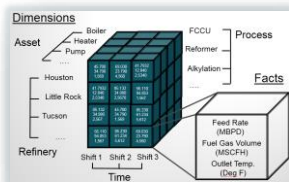
2011



2012



2013



PowerPivot Gallery

Power View



Excel

PowerPivot

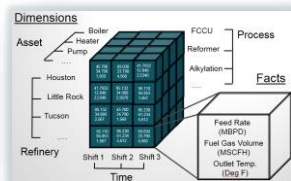
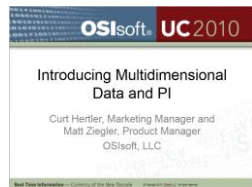
Power View



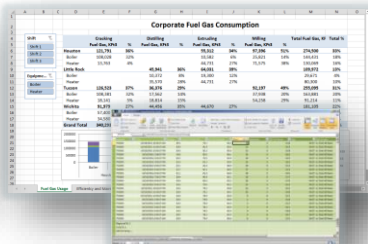
PI OLEDB Enterprise

Evolution of Microsoft Self-Service BI

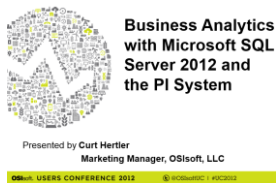
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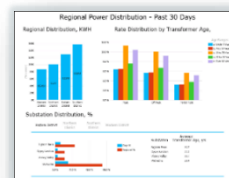
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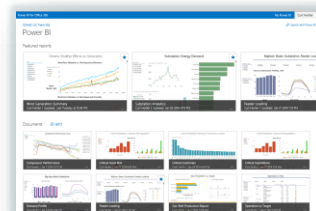
2012



2013



2014



Power BI



PowerPivot Gallery

Power View



PowerPivot

Power View

Power Query

PI OData Service



PI OLEDB Enterprise