

OSIsoft®

USERS²⁰¹¹ CONFERENCE



Turning **insight** into **action**.



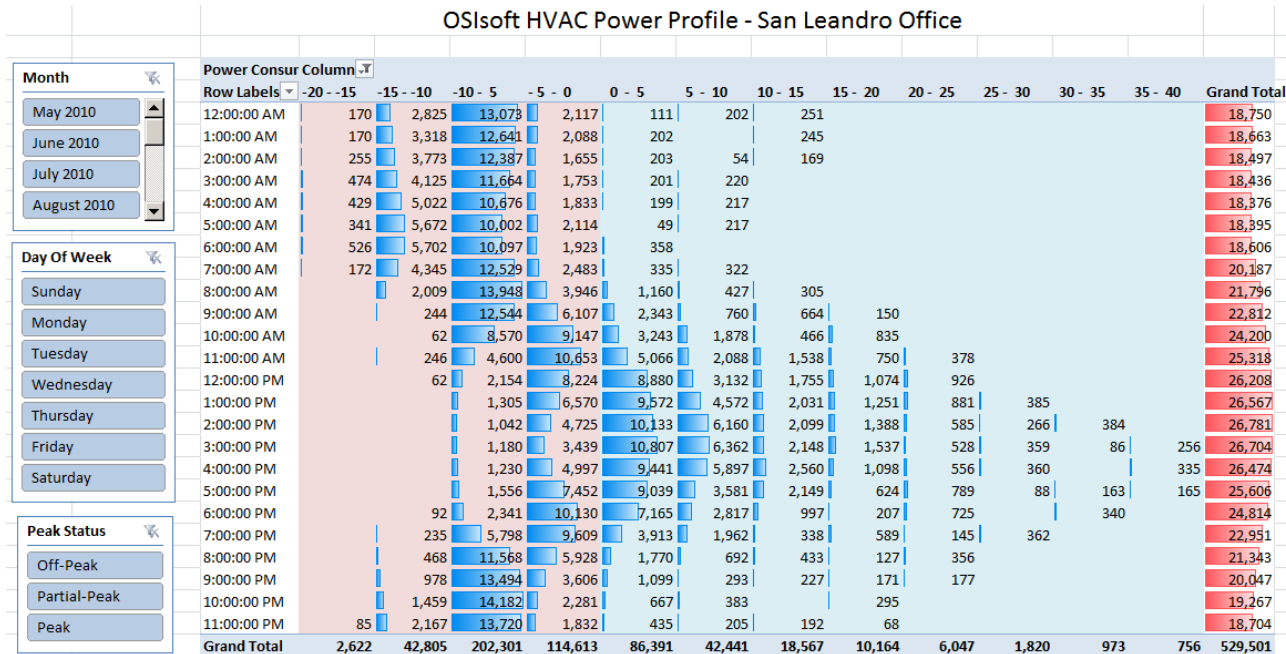
Gaining Advanced Insight from PI System Data Using PowerPivot for Excel 2010

Presented by Curt Hertler, Marketing Manager, OSIsoft

Agenda

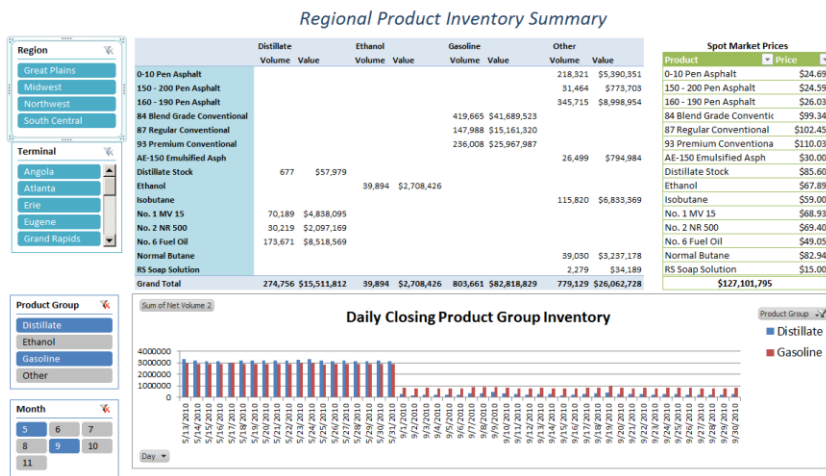
- Business Intelligence (BI) Technologies
 - Multidimensional Data Analysis
 - Manufacturing Intelligence
- Introduction to “Self-service BI”
 - PI AF
 - PI OLEDB Enterprise 2010
 - Microsoft PowerPivot for Excel 2010
 - Microsoft SharePoint 2010 Enterprise
- Example Walk Through
- Additional Examples and Information

Business Intelligence (BI) Technologies



Multidimensional Data Analysis

Quick, ad-hoc, aggregation of large amounts of interesting data (facts), based on user-selected criteria (dimensions), to identify opportunities for improvement.



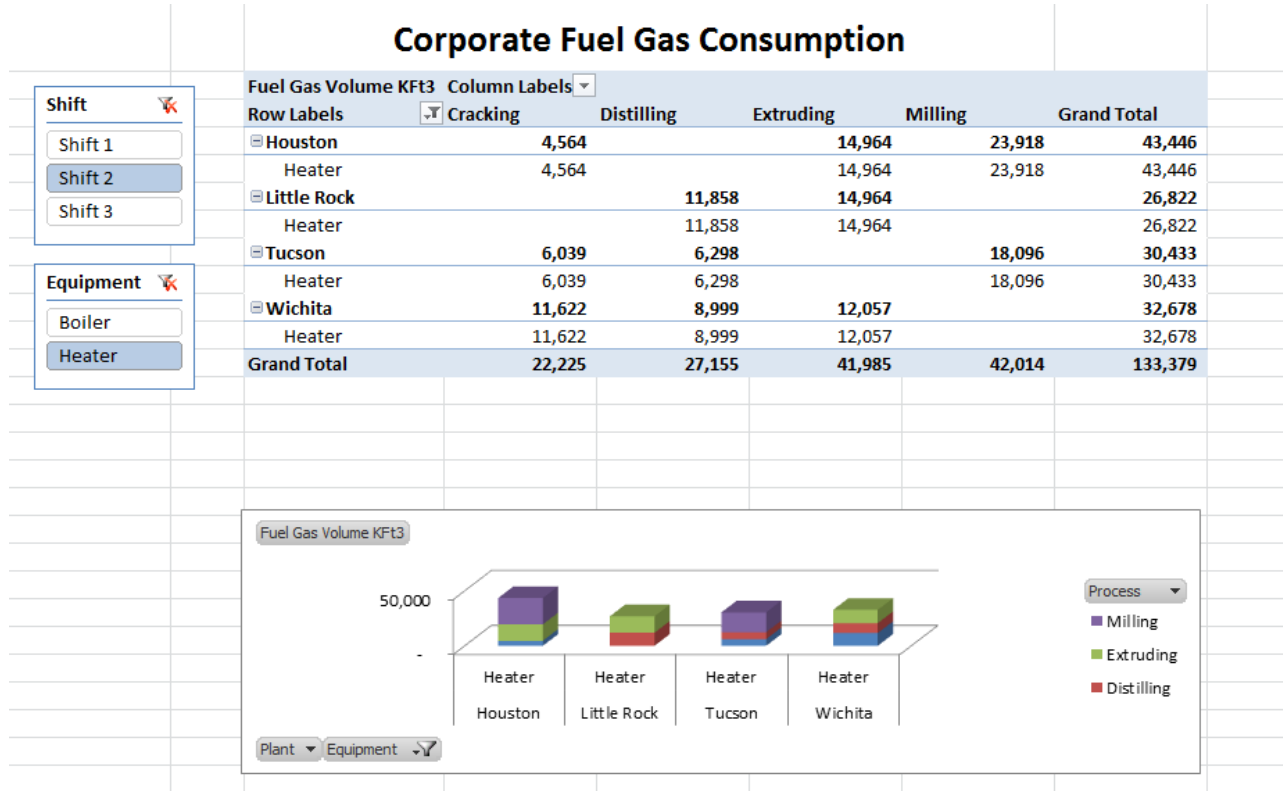
Critical HX Monitoring

Exchanger	Water Velocity Feet/Sec	Skin Temp Deg. F	CW Flow GPM	U-Value BTU/(hr/ft2/deg F)	Heat Load MMBTU	Heat Flux BTU/hr/ft2
E-163-A	3.70	77	2237	45.5	5.1	352.1
E-163-C	3.80	78	2298	48.0	5.8	401.1
E-191-A	2.31	101	4360	62.8	36.6	2782.4
E-191-B	3.08	80	4360	52.1	13.7	1027.2
E-256-B	2.46	97	1726	117.8	6.4	1082.2
E-256-B	2.47	89	1732	130.8	5.4	911.8
E-256-C	2.46	84	1728	141.9	8.0	1362.3
E-271	4.43	132	1930	153.3	40.9	9922.5
E-343	1.79	97	249	63.3	2.6	2443.0
E-38-A	1.81	105	3752	50.9	34.2	2378.9
E-38-B	1.95	82	3731	48.6	13.1	980.1
E-77-A	2.23	105	4204	61.8	36.4	2768.5
E-77-B	2.16	84	4246	57.1	19.0	1391.1
E-98-A	1.58	108	2986	47.3	29.3	2227.0
E-98-B	1.54	86	3013	45.3	15.6	1141.8

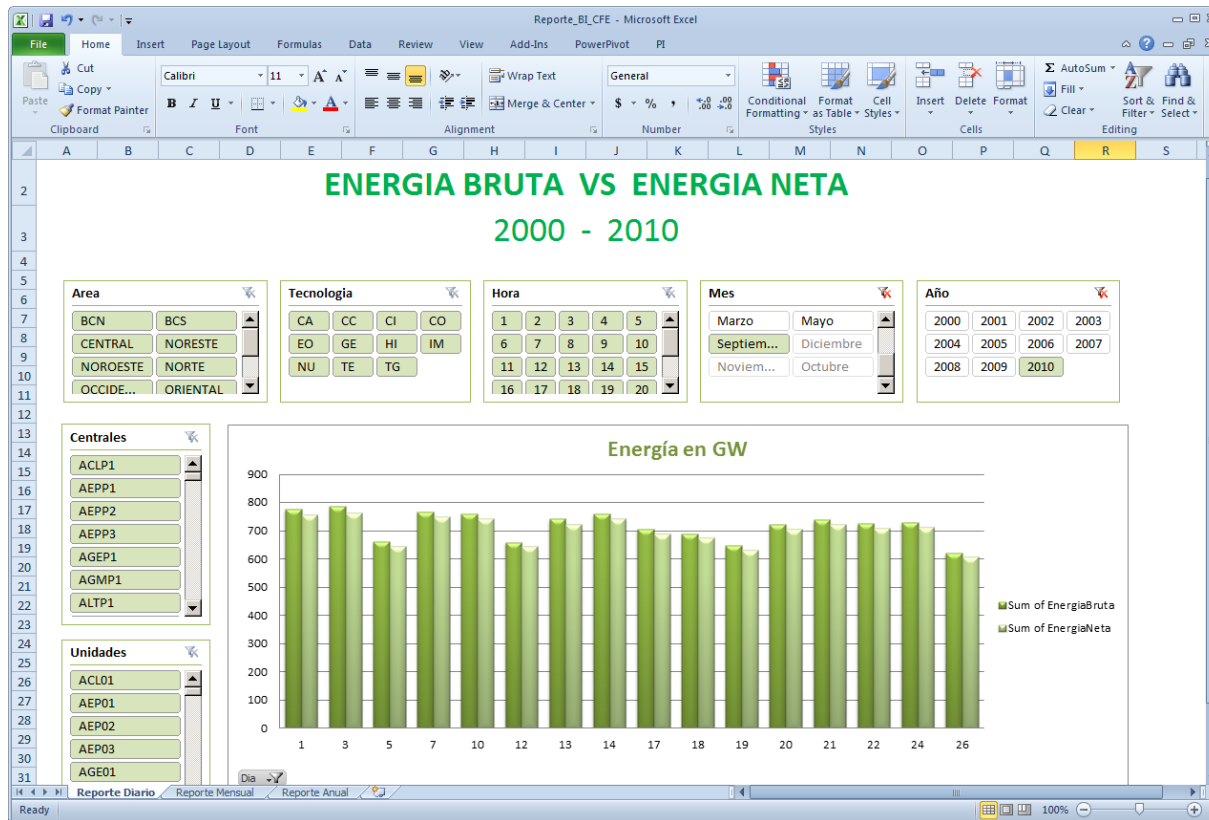
Multidimensional Data Analysis

- Optimized, memory-resident data “cubes”
- Scorecards, pivot tables, and charts
- Traditionally, a server-based, IT project
- Now, self-service BI for the Information Worker
- Enables Manufacturing Intelligence

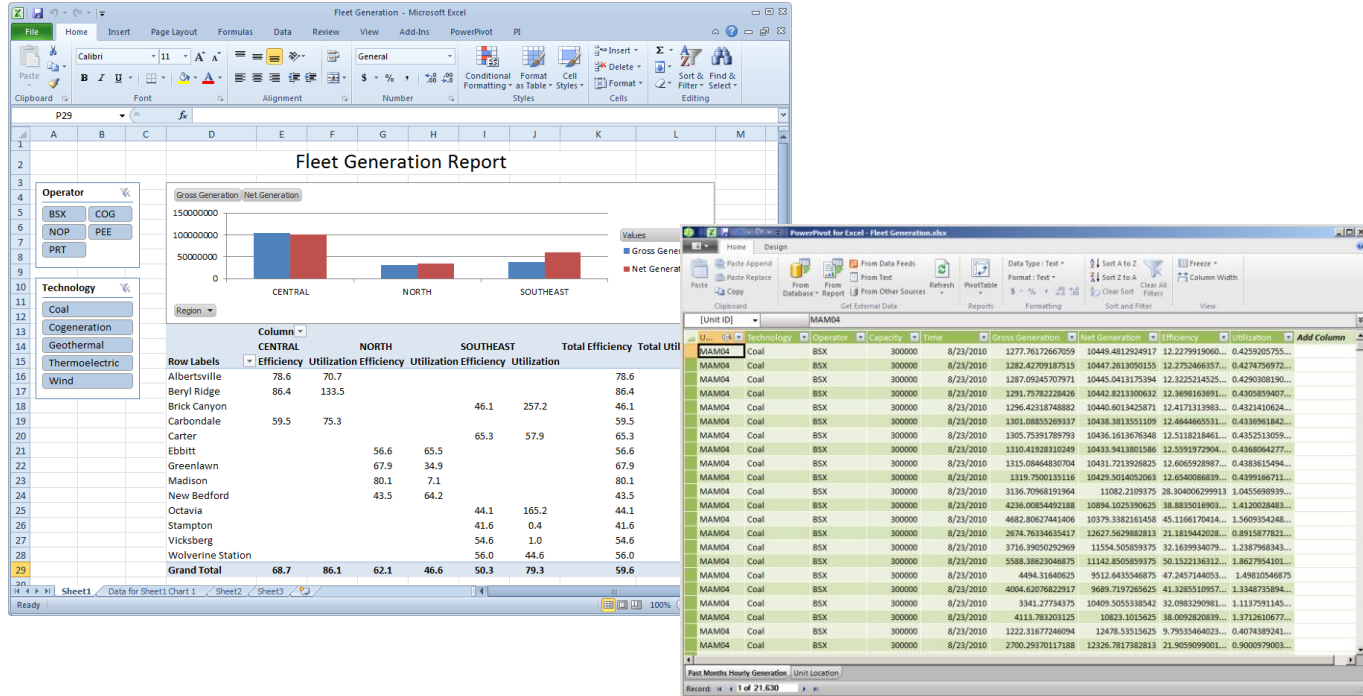
Manufacturing Intelligence



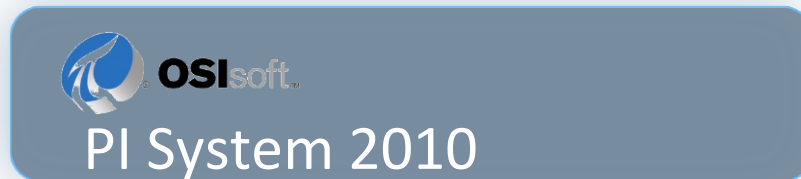
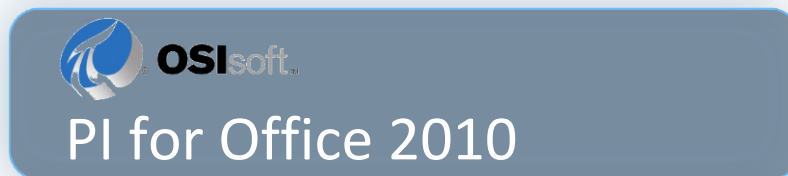
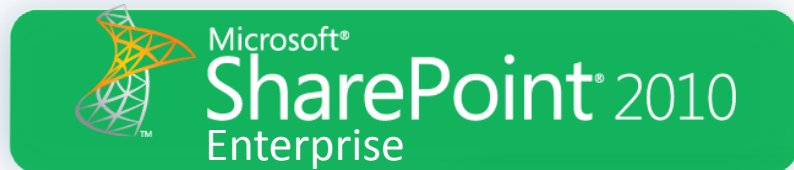
Customer Example: CFE Mexico



Introduction to “Self-Service” BI



OSIsoft / Microsoft BI Stack



Self-service BI Toolkit for the PI System

- Facts and Dimensions
 - PI AF (PI System 2010)
- Datasets for BI Data Extraction
 - PI OLEDB Enterprise 2010 (PI for Office 2010)
- Desktop Analysis and Cube Configuration
 - Microsoft PowerPivot for Excel 2010
- Enterprise Accountability
 - Microsoft PowerPivot for SharePoint 2010
 - Microsoft SharePoint 2010 Enterprise
 - Microsoft SQL Server 2008 R2 Enterprise or above

Example: Product Inventories



PI AF Associates Facts and Dimensions

Facts

Attributes

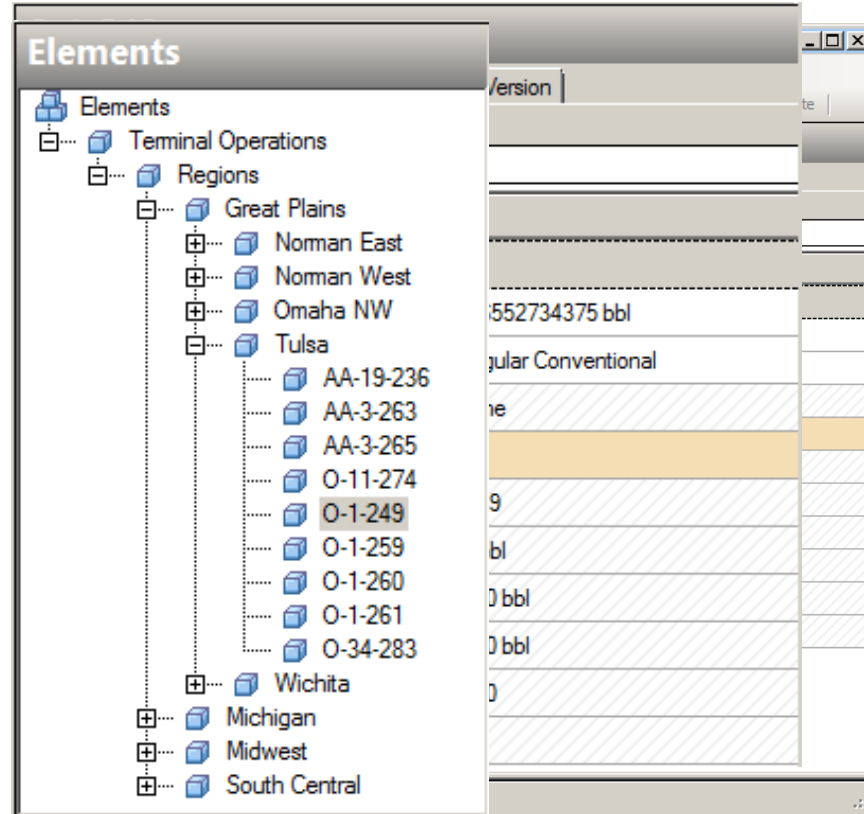
- PI Point
- Formula
- Other

Dimensions

Hierarchy

Templates

Categories



PI OLEDB Enterprise 2010

PI SQL Commander

	Tank ID	Time		Tank ID	Type	Region	Terminal		Nominal Volume
000001	T-14	9/20/2010 5:58:..	001	23-373	Tank	Great Plains	Norman East		50250
000002	T-14	9/20/2010 6:58:..	002	12-372	Tank	Great Plains	Norman East		50250
000003	T-14	9/20/2010 7:58:..	003	24-374	Tank	Great Plains	Norman East		50250
000004	T-14	9/20/2010 8:58:..	004	24-375	Tank	Great Plains	Norman East		50250
000005	T-14	9/20/2010 9:58:..	005	24-376	Tank	Great Plains	Norman East		50250
000006	T-14	9/20/2010 10:58:..	006	40-370	Tank	Great Plains	Norman East		50250
000007	T-14	9/20/2010 11:58:..	007	41-371	Tank	Great Plains	Norman East		50250
► 000008	T-14	9/21/2010 12:58:..	008	52-377	Tank	Great Plains	Norman East		50250
000009	T-14	9/21/2010 1:58:..	009	15-11	Tank	Great Plains	Omaha NW		50250
000010	T-14	9/21/2010 2:58:..	010	35-1	Tank	Great Plains	Omaha NW		50250
000011	T-14	9/21/2010 3:58:..	011	35-2	Tank	Great Plains	Omaha NW		50250
000012	T-14	9/21/2010 4:58:..	012	35-9	Tank	Great Plains	Omaha NW		50250
000013	T-14	9/21/2010 5:58:..	013	55-12	Tank	Great Plains	Omaha NW		50250
000014	T-14	9/21/2010 6:58:..	014	55-3	Tank	Great Plains	Omaha NW		50250
000015	T-14	9/21/2010 7:58:..	015	55-7	Tank	Great Plains	Omaha NW		50250
000016	T-14	9/21/2010 8:58:..	016	80.4	Tank	Great Plains	Omaha NW		50250
000017	T-14	9/21/2010 9:58:..	017	80.6	Tank	Great Plains	Omaha NW		50250
000018	T-14	9/21/2010 10:58:..	018	T-1-3	Tank	Great Plains	Omaha NW		50250
			019	AA-10-2	Tank	Great Plains	Omaha NW		50250
			020	T-8-1	Tank	Great Plains	Omaha NW		50250
			021	RB-10-1	Tank	Great Plains	Omaha NW		50250
			022	AA-19-236	Tank	Great Plains	Tulsa		50250

Ready

Ch 1

INS

Microsoft BI Vision and Strategy

Democratizing Business Intelligence

Improving organizations by providing business insights to ***all*** employees leading to better, faster, and more relevant decisions.

Delivered through a familiar environment

Integrated into business productivity infrastructure

Built on a trusted and extensible platform

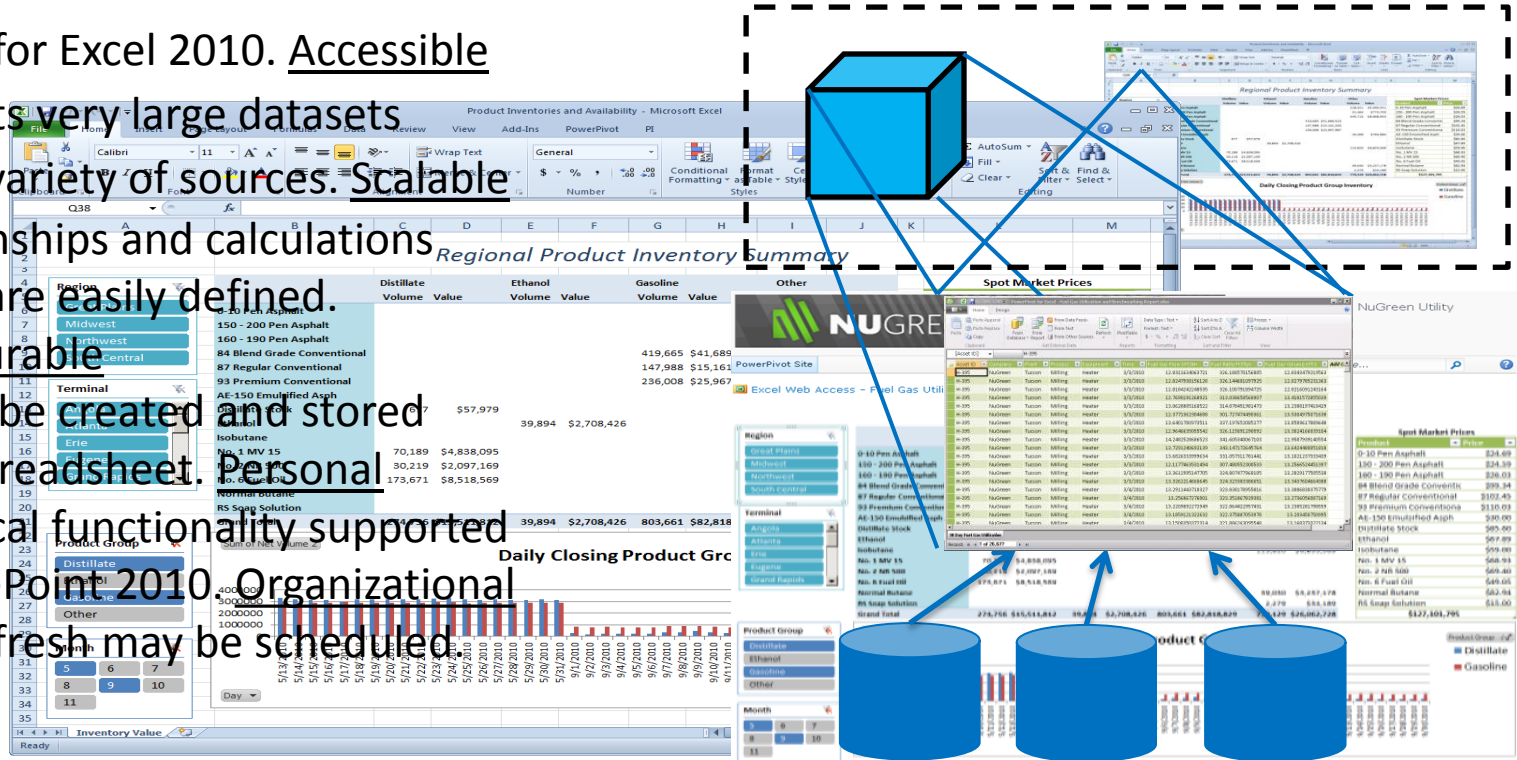


Microsoft PowerPivot for Excel 2010

- Add-In for Excel 2010. Accessible
- Supports very large datasets from a variety of sources. Scalable
- Relationships and calculations (DAX¹) are easily defined. Configurable
- Data cube created and stored with spreadsheet. Personal
- Analytical functionality supported in SharePoint 2010. Organizational
- Data refresh may be scheduled. Timely

1. Data Analysis Expression Language

Data Sources: PI, RDB, SAS Cubes, Spreadsheet



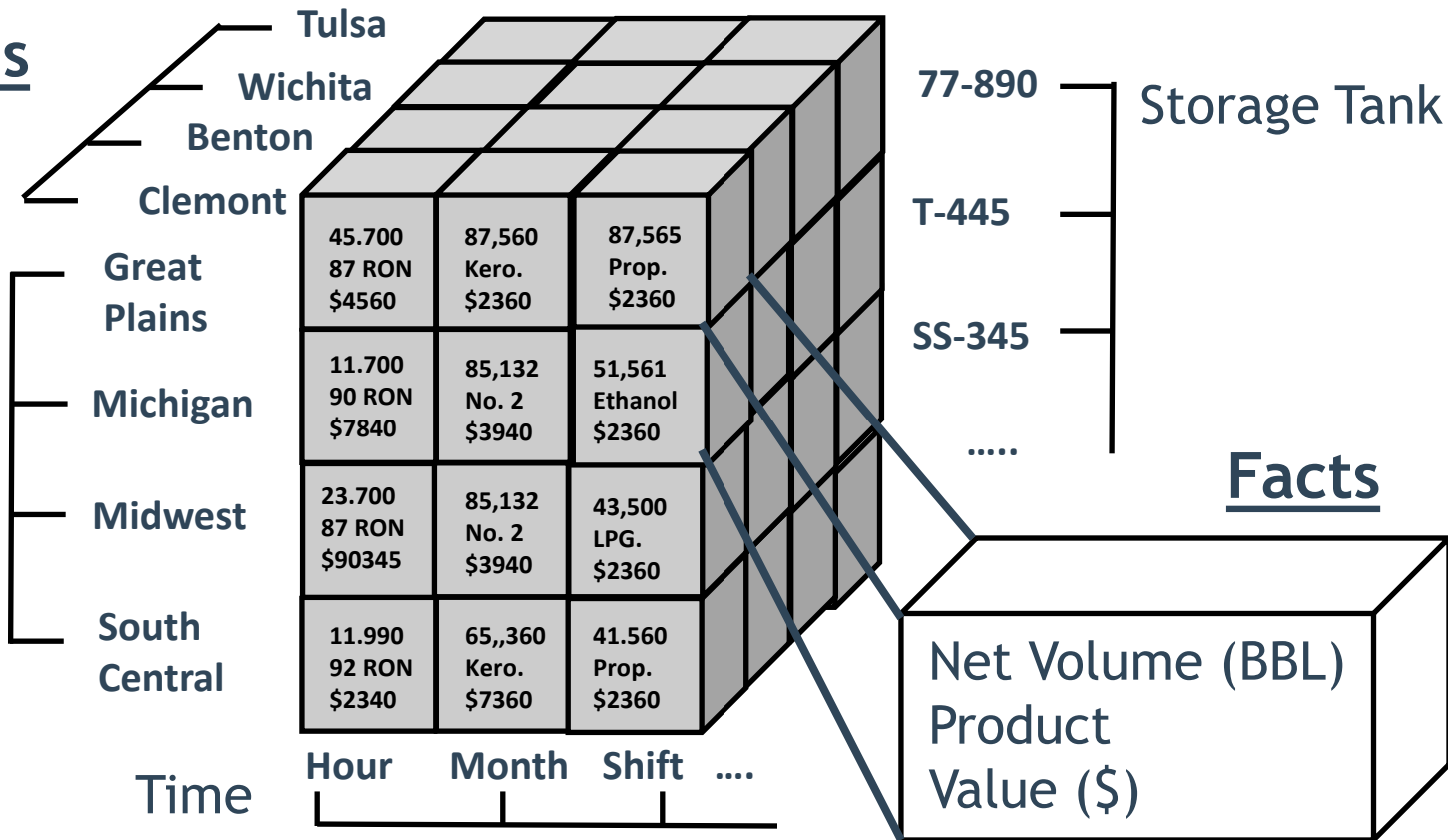
Multidimensional Data “Cube”

Dimensions

Terminal

Region

Time



Example Walk Through

Regional Product Inventory Summary

Region


Great Plains
Midwest
Northwest
South Central

Terminal

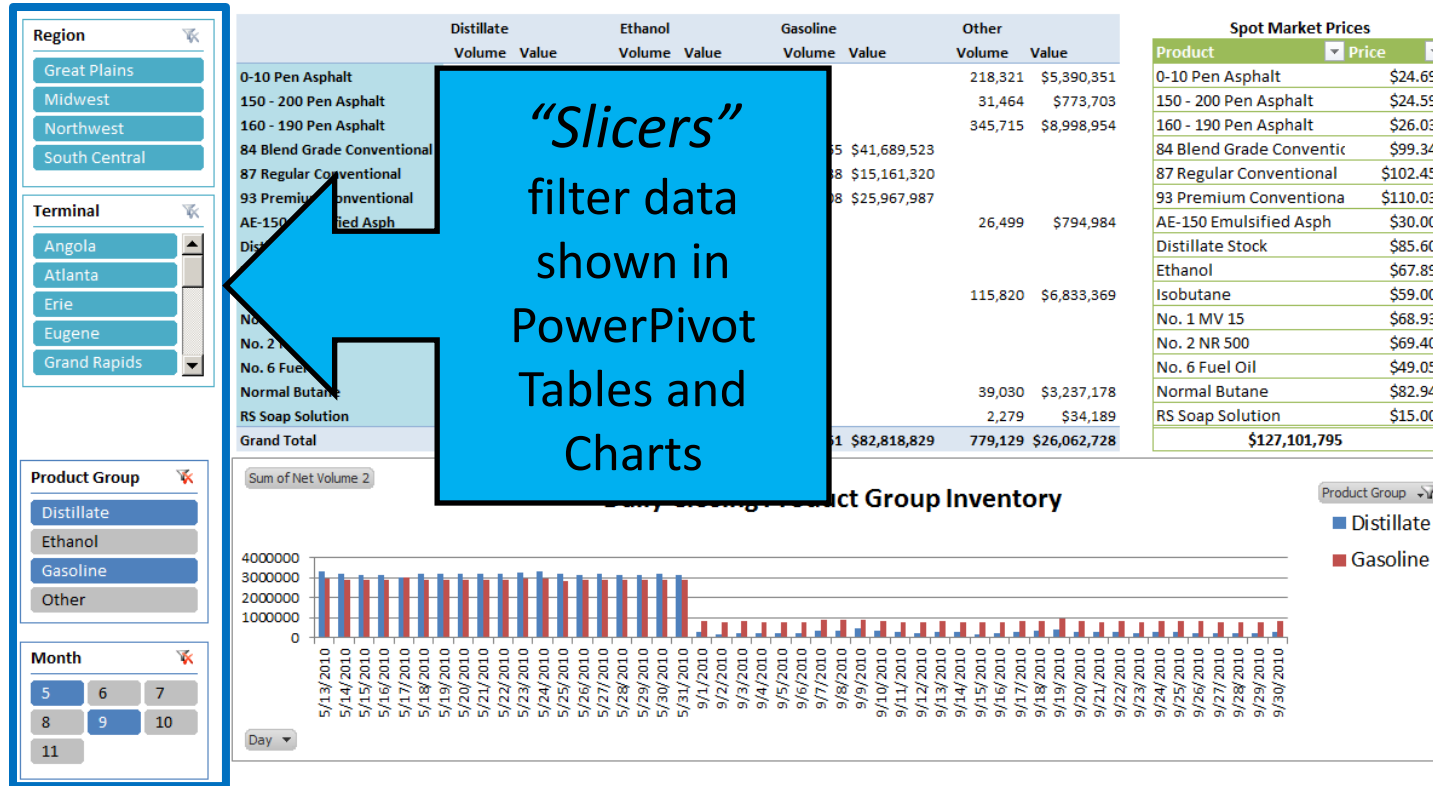

Norman East
Norman West
Omaha NW
Tulsa
Wichita

	Distillate		Ethanol		Gasoline		Other	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value
0-10 Pen Asphalt							1,059	\$26,139
150 - 200 Pen Asphalt							12,737	\$313,195
160 - 190 Pen Asphalt							18,736	\$487,711
84 Blend Grade Conventional					3,451	\$342,778		
87 Regular Conventional					14,256	\$1,460,555		
93 Premium Conventional					13,154	\$1,447,356		
AE-150 Emulsified Asph								
Distillate Stock								
Ethanol			5,423	\$368,142				
Isobutane							104,040	\$6,138,333
No. 1 MV 15								
No. 2 NR 500								
No. 6 Fuel Oil	128,444	\$6,300,192						
Normal Butane								
RS Soap Solution								
Grand Total	128,444	\$6,300,192	5,423	\$368,142	30,861	\$3,250,690	136,571	\$6,965,378

Spot Market Prices	
Product	Price
0-10 Pen Asphalt	\$24.69
150 - 200 Pen Asphalt	\$24.59
160 - 190 Pen Asphalt	\$26.03
84 Blend Grade Conventic	\$99.34
87 Regular Conventional	\$102.45
93 Premium Conventiona	\$110.03
AE-150 Emulsified Asph	\$30.00
Distillate Stock	\$85.60
Ethanol	\$67.89
Isobutane	\$59.00
No. 1 MV 15	\$68.93
No. 2 NR 500	\$69.40
No. 6 Fuel Oil	\$49.05
Normal Butane	\$82.94
RS Soap Solution	\$15.00
\$16,884,402	

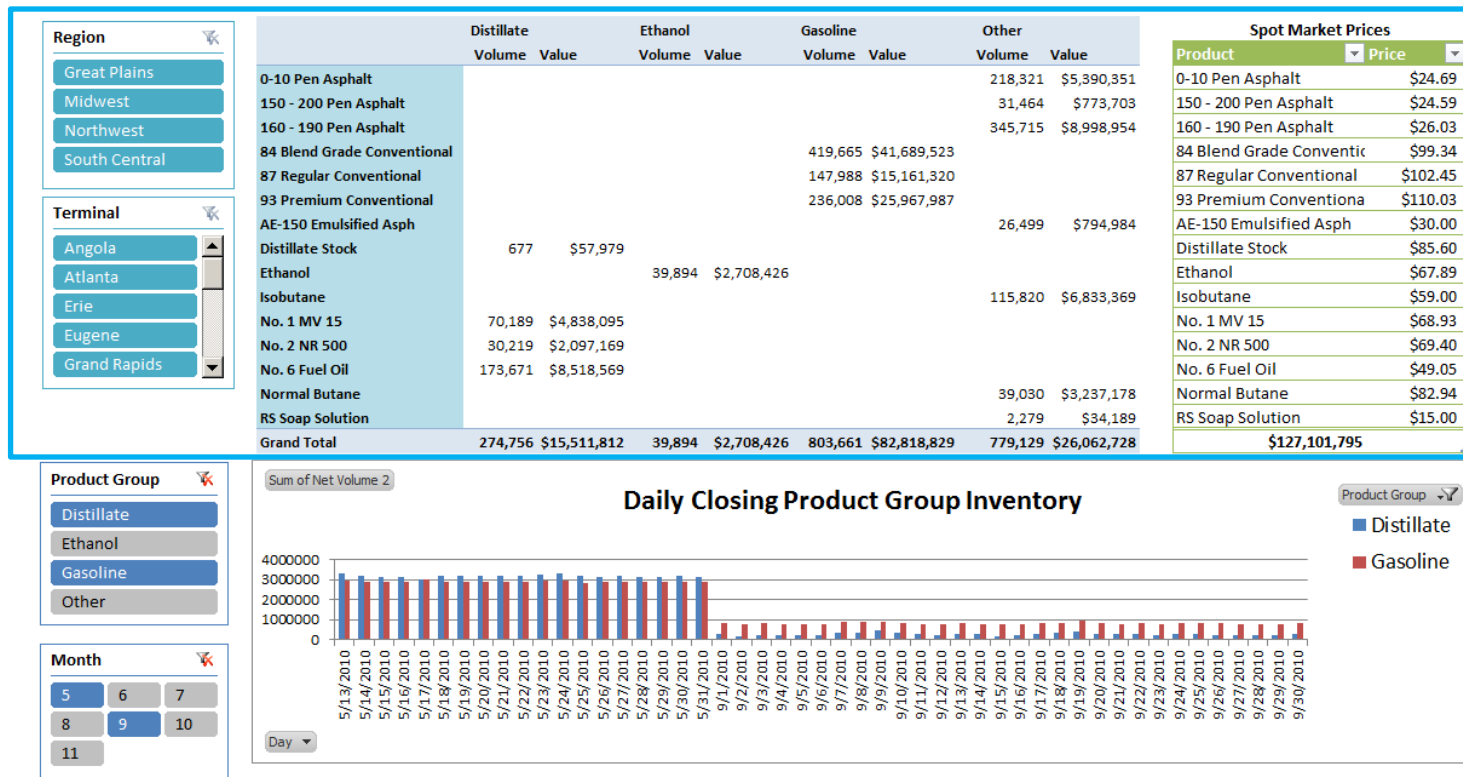
Product Inventories and Valuation

Regional Product Inventory Summary



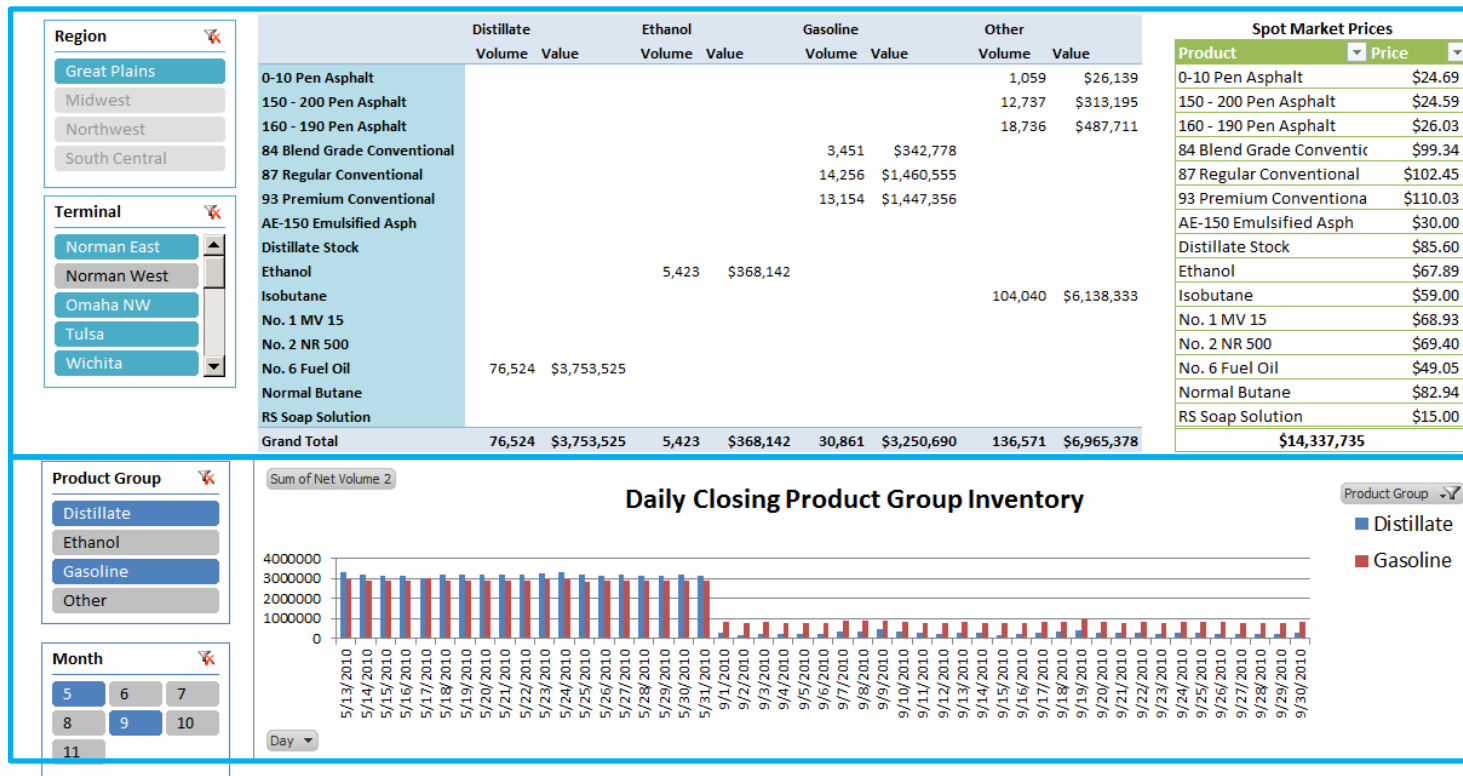
Product Inventories and Valuation

Regional Product Inventory Summary



Product Inventories and Valuation

Regional Product Inventory Summary



Product Inventories and Valuation

Regional Product Inventory Summary

Region

Great Plains

Midwest

Northwest

South Central

Terminal

Norman East

Norman West

Omaha NW

Tulsa

Wichita

	Distillate		Ethanol		Gasoline		Other	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value
0-10 Pen Asphalt							1,059	\$26,139
150 - 200 Pen Asphalt							12,737	\$313,195
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84 Blend Grade Conventional					3,451	\$342,778		
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AE-150 Emulsified Asph								
Distillate Stock								
Ethanol			5,423	\$368,142				
Isobutane							104,040	\$6,138,333
No. 1 MV 15								
No. 2 NR 500								
No. 6 Fuel Oil	76,524	\$3,753,525						
Normal Butane								
RS Soap Solution								
Grand Total	76,524	\$3,753,525	5,423	\$368,142	30,861	\$3,250,690	136,571	\$6,965,378

Spot Market Prices

Product	Price
0-10 Pen Asphalt	\$24.69
150 - 200 Pen Asphalt	\$24.59
160 - 190 Pen Asphalt	\$26.03
84 Blend Grade Conventic	\$99.34
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AE-150 Emulsified Asph	\$30.00
Distillate Stock	\$85.60
Ethanol	\$67.89
Isobutane	\$59.00
No. 1 MV 15	\$68.93
No. 2 NR 500	\$69.40
No. 6 Fuel Oil	\$49.05
Normal Butane	\$82.94
RS Soap Solution	\$15.00
Total	\$14,337,735

Product Group

Distillate

Ethanol

Gasoline

Other

Month

5

6

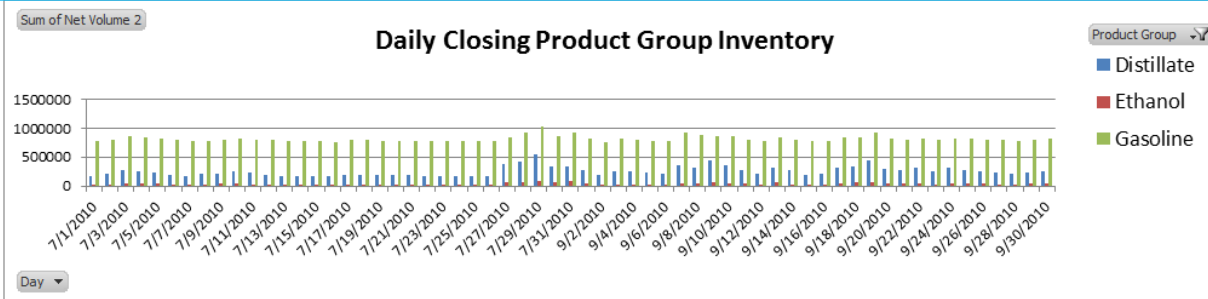
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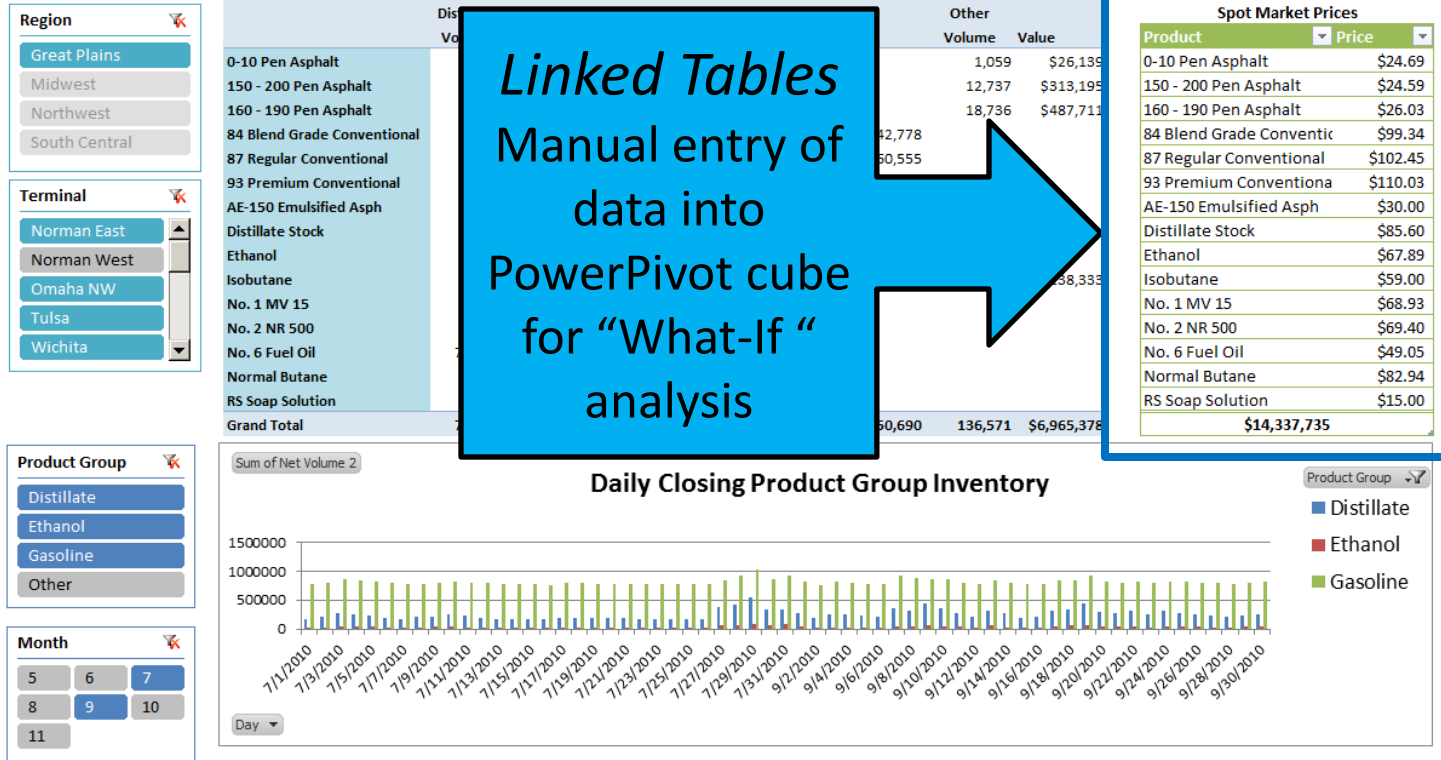
10

11



Product Inventories and Valuation

Regional Product Inventory Summary



Import Data into PowerPivot

='Current Product Inventories'[Net Volume]*RELATED(Product_Prices[Price])

PowerPivot
Add-In for
Excel 2010

Configure
Relationships

Add Calculations
Using DAX¹

1. Data Analysis Expression Language

Value

\$152,661.44
\$226,440.90
\$84,130.78
\$126,491.38
\$863,093.15
\$180,081.09
\$107,543.63
\$112,970.57
\$290,407.91
\$442,314.19
\$205,521.74
\$405,515.56
\$63,987.56
\$1,266,947.89

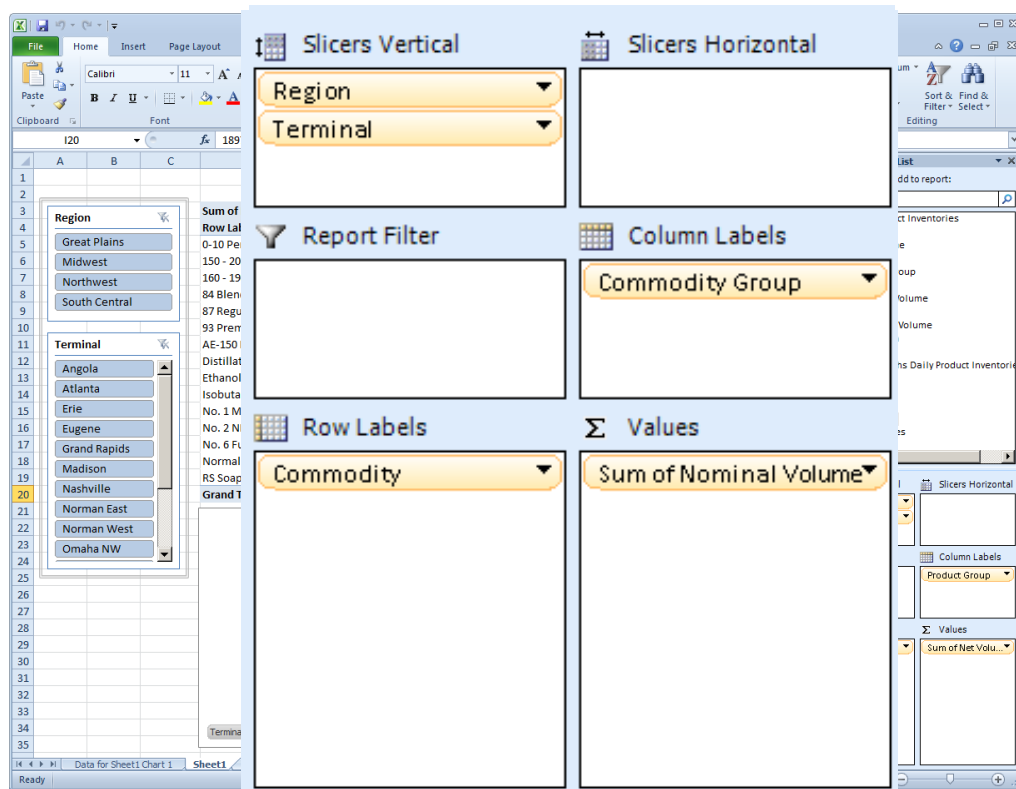
Current Product Inventories
PI OLEDB Enterprise 2010

Six Months Daily Inventories
PI OLEDB Enterprise 2010

Tank Location
PI OLEDB Enterprise 2010

Commodity Prices
Excel Linked Table

Build PowerPivot Tables and Charts



Upload to PowerPivot Gallery

- SilverLight visualization
- Report usage statistics
- Scheduled updates



Schedule PowerPivot Data Update

The image shows a Windows Internet Explorer window displaying the 'Manage Data Refresh' configuration for a PowerPivot data source. The background shows a PowerPivot data table with columns for Region, Terminal, Product Group, and Distillate, and a bar chart showing sales data.

Manage Data Refresh: PGE CommercialCurrent PowerPivot for SharePoint - Windows Internet Explorer

URL: http://dfpiweb2010_layouts/PowerPivot/ManageDataRefresh.aspx?list=%7b42434f7a-2bc4-44cf-a150-2af602853776%7d&dID=40&So

Site Actions Curt Hertler

Data Refresh

☒ Enable

Schedule Details

Specify the frequency (daily, weekly, monthly or once) and the timing details for the refresh schedule.

☒ Daily
☐ Weekly
☐ Monthly
☐ Once

☐ Every 1 day(s)
☐ Every weekday
☒ On the following days:

☒ Sunday ☒ Monday ☒ Tuesday ☒ Wednesday
☒ Thursday ☐ Friday ☐ Saturday

☐ Also refresh as soon as possible

Earliest Start Time

Specify the earliest start time that the data refresh will begin

☐ After business hours
☒ Specific earliest start time: 1 : 30 am

E-mail Notifications

Specify e-mail address of the users to be notified in the event of data refresh failures.

Curt.Hertler ;

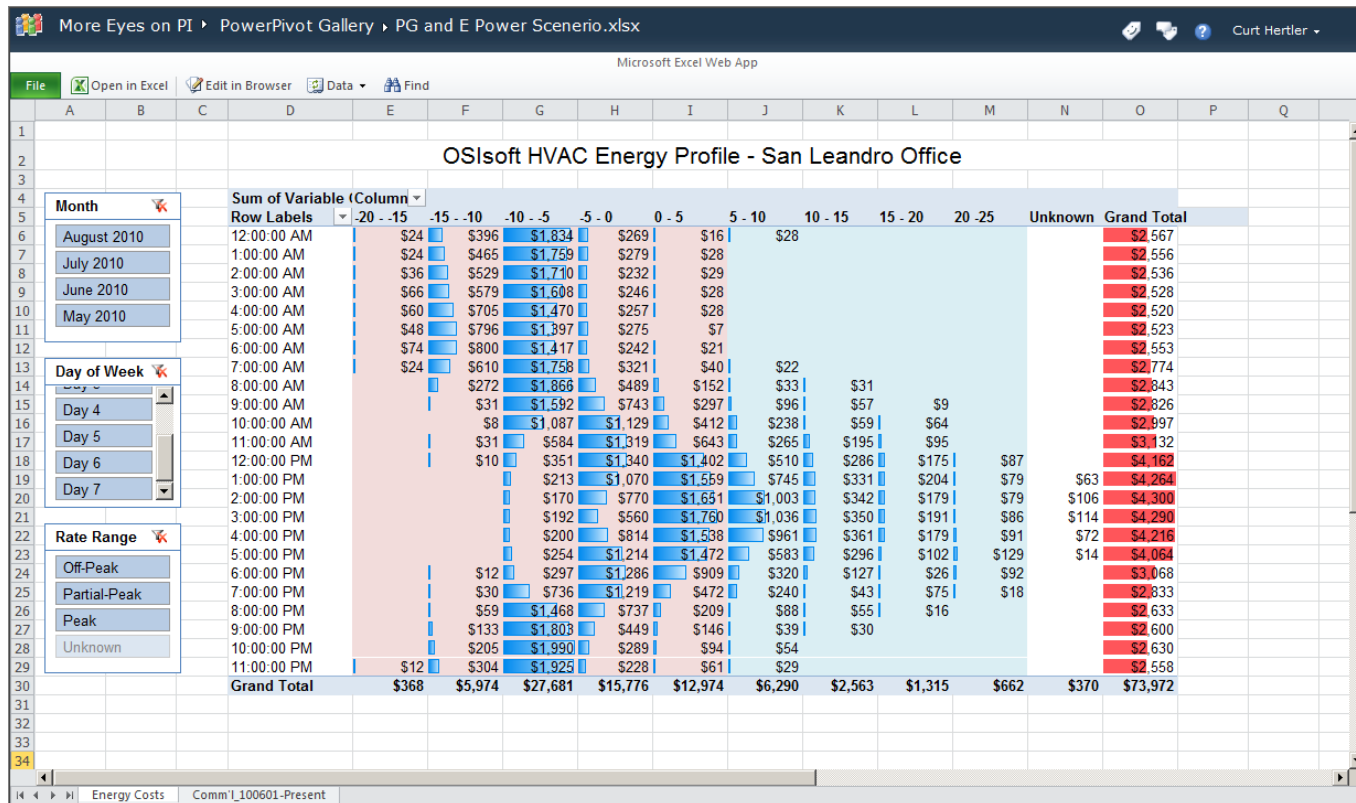
Credentials

☒ Use the data refresh account configured by the administrator

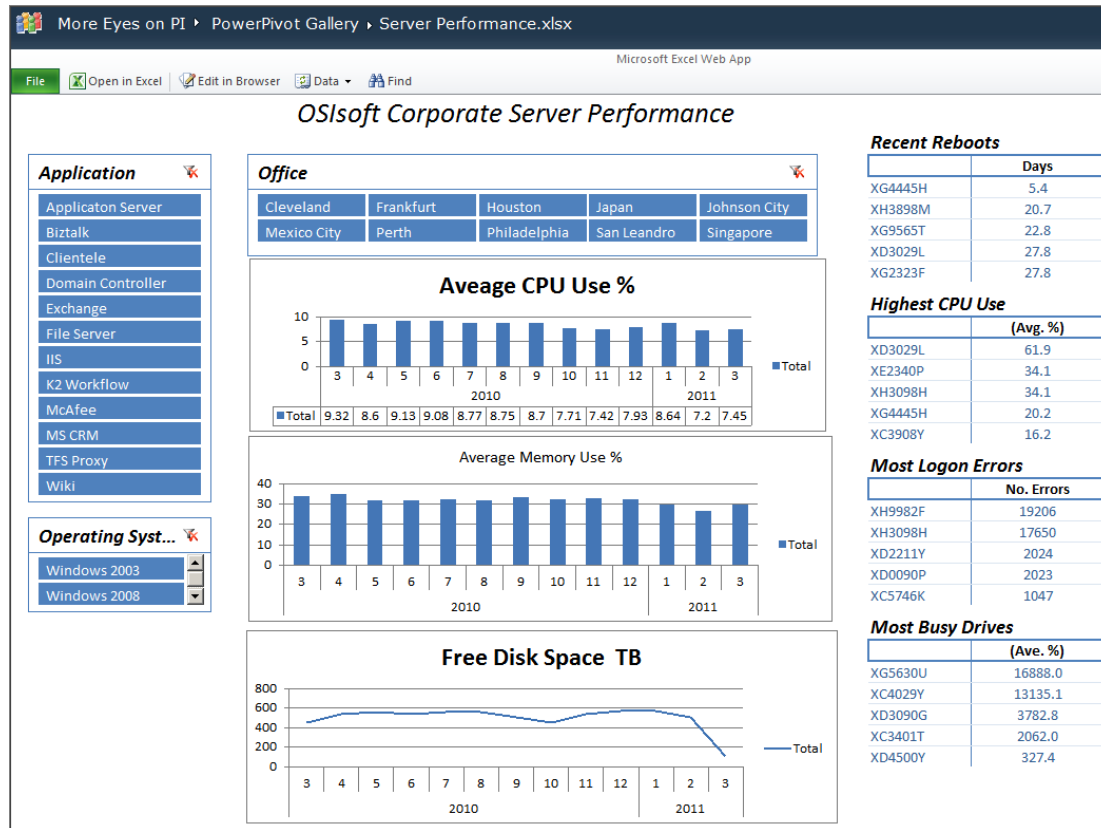
Additional Examples and Information



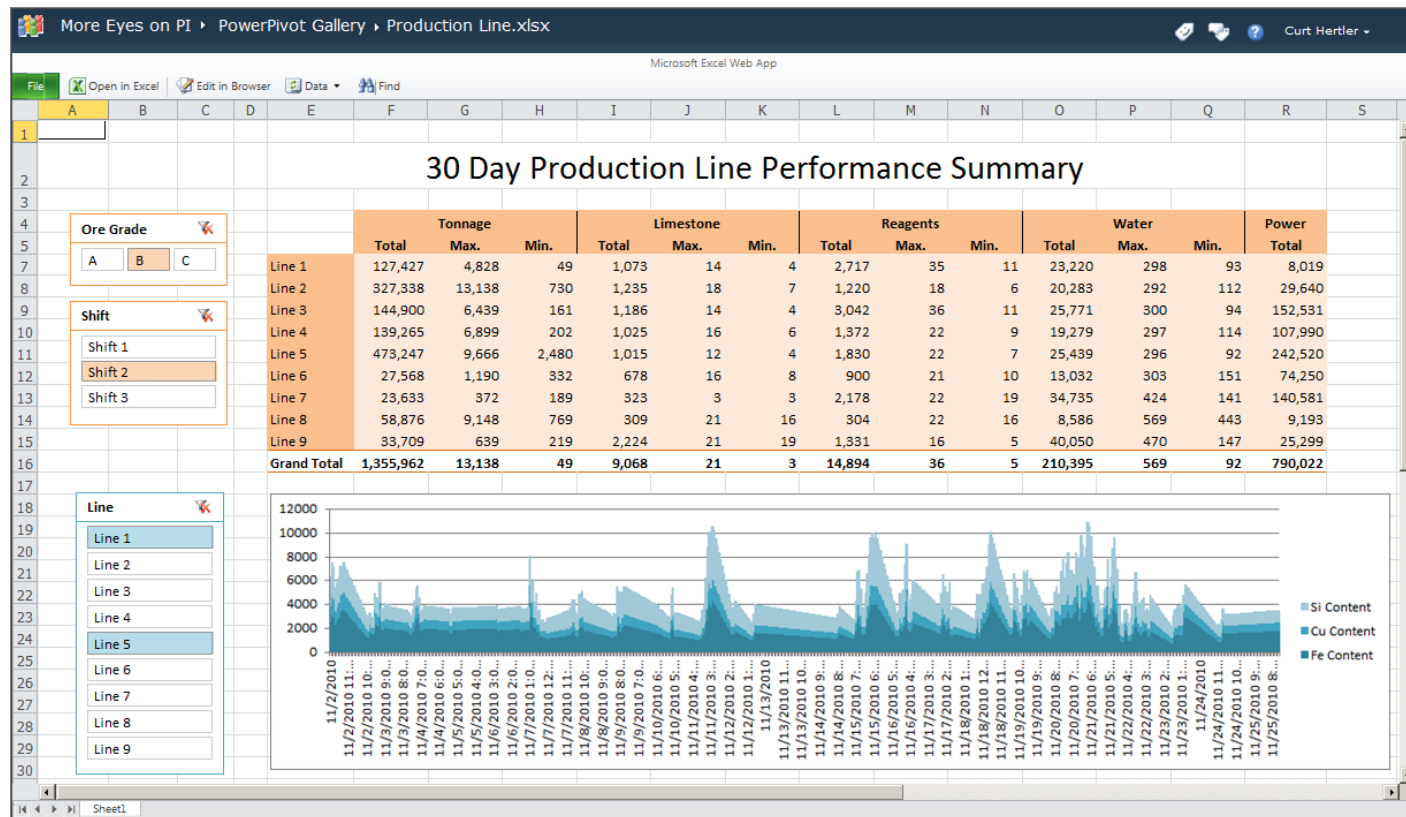
Performance Profiling



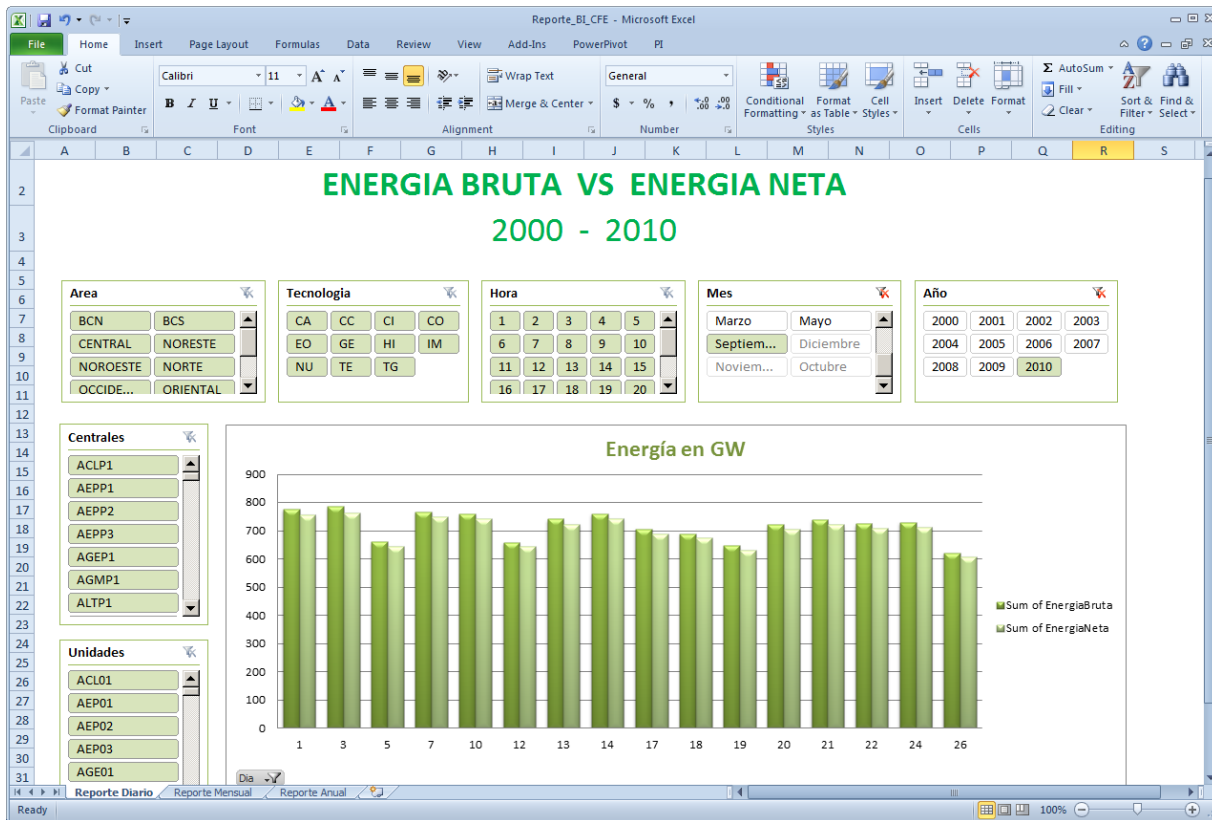
Historical Analytics



Feedstock Analysis



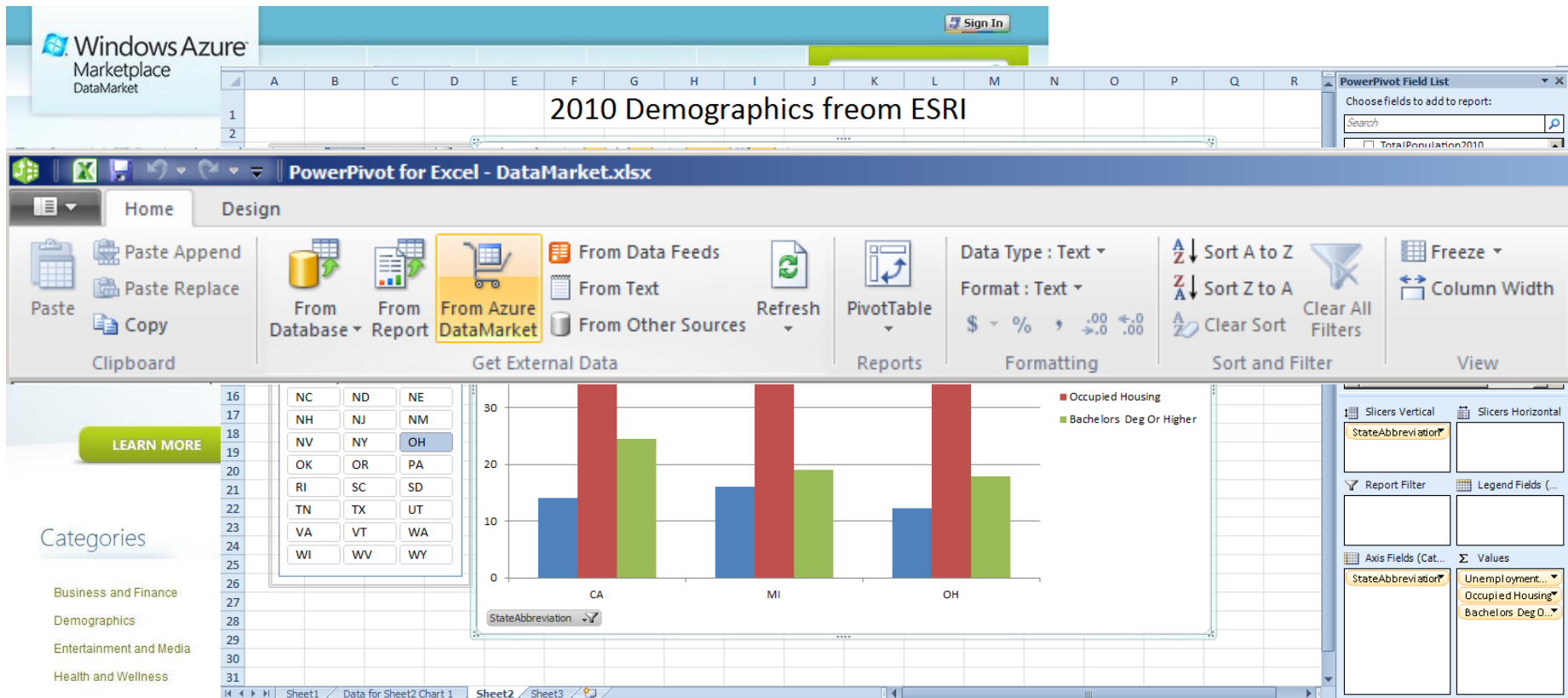
Customer Example: CFE Mexico



Additional Information

- Customer Resources
 - Recorded vCampus Presentations
 - “Personal BI with PI DataLink and Office 2010”
 - “Building a BI Infrastructure Part 1: Warehousing, ETL, and Cube Building”
 - “Building a BI Infrastructure Part 2: Visualization, Analysis, and Personalization”
 - Prescriptive Architecture Guides
- Microsoft Resources
 - PowerPivot (www.PowerPivot.com)
 - CFE Case Study (www.microsoft.com/casestudies/Microsoft-Sharepoint-Server-2010/Comisi-n-Federal-de-Electricidad-CFE/Mexico-s-Electrical-Utility-Sees-Saving-Millions-of-Dollars-through-Collaborative-BI/4000007996)
 - Windows Azure DataMarket (datamarket.azure.com)

Windows Azure DataMarket





Thank you

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