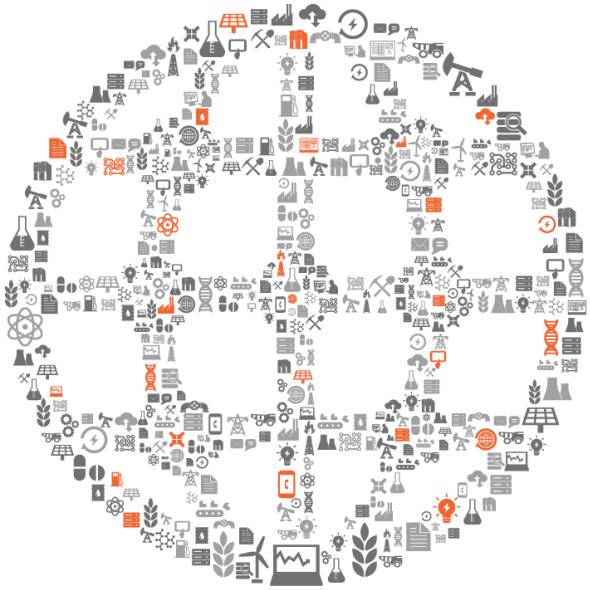


OSIsoft.

# USERS CONFERENCE 2013

## The Power of Data

THRIVING IN A WORLD OF CHANGE

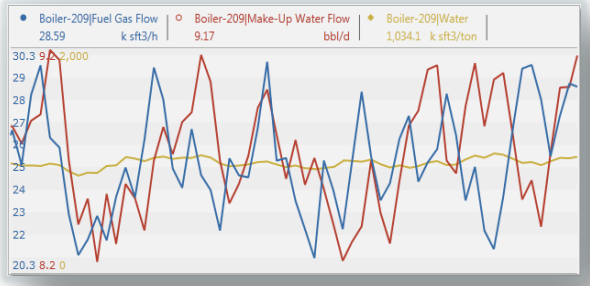
# Tools & Best Practices For PI System Analytics & Reporting

Presented by **Christian Leroux, EPM**

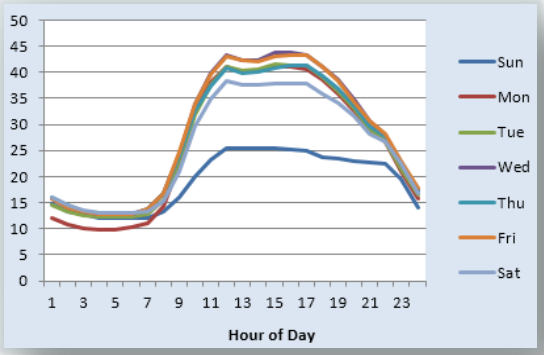
**Matt Ziegler, Product Manager**

# Visual Contexts for PI System Data

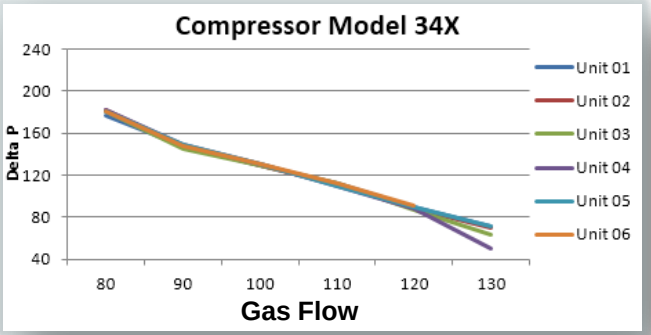
## Time and Events




## Profile




## Behavioral




## Performance Scorecard

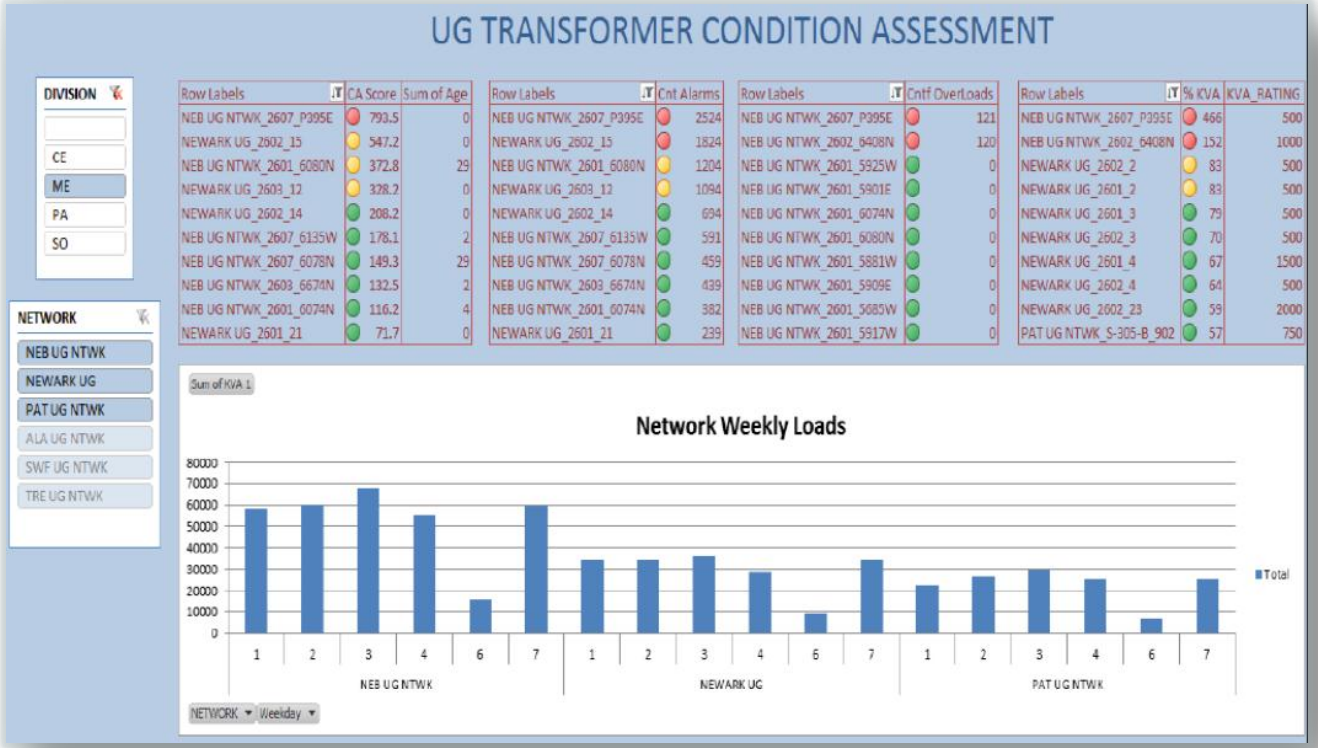
| | Bahrain | | | Kuwait | | |
|---|---|---|---|---|---|---|
| | KPI Value | Plan Target | Dev % | KPI Value | Plan Target | Dev % |
| **Crude Unit** | | | | | | |
| Light Naphtha 90 Pct. Pt. | 179.9 | 180 | -0.1 % | 177.2 | 175 | 1.3 % |
| **FCCU** | | | | | | |
| Conversion | 63.4 | 64 | -0.9 % | 67.8 | 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

# Asset Benchmarking and Scorecarding

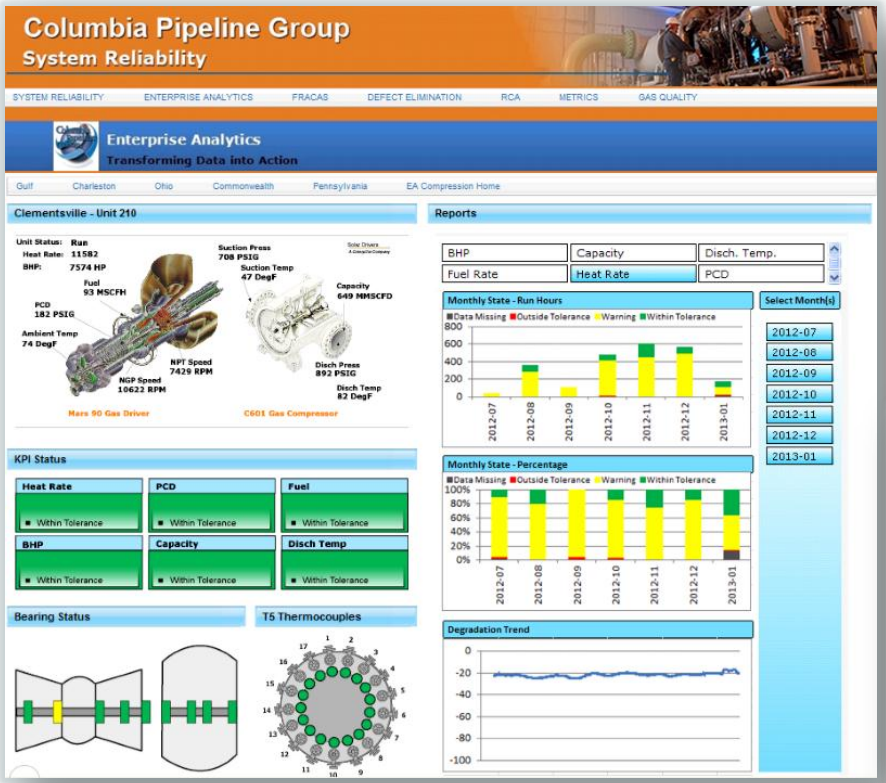
*PSE&G drives Operational Excellence, DistribuTECH 2013*



# Gas Transmission Pipeline Reliability

Microsoft® SharePoint® 2010 Enterprise

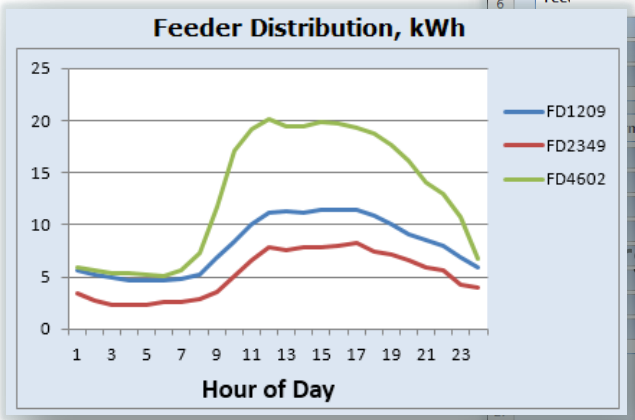
*Columbia Gas, OSIsoft O&G Day Zero Event 2013*

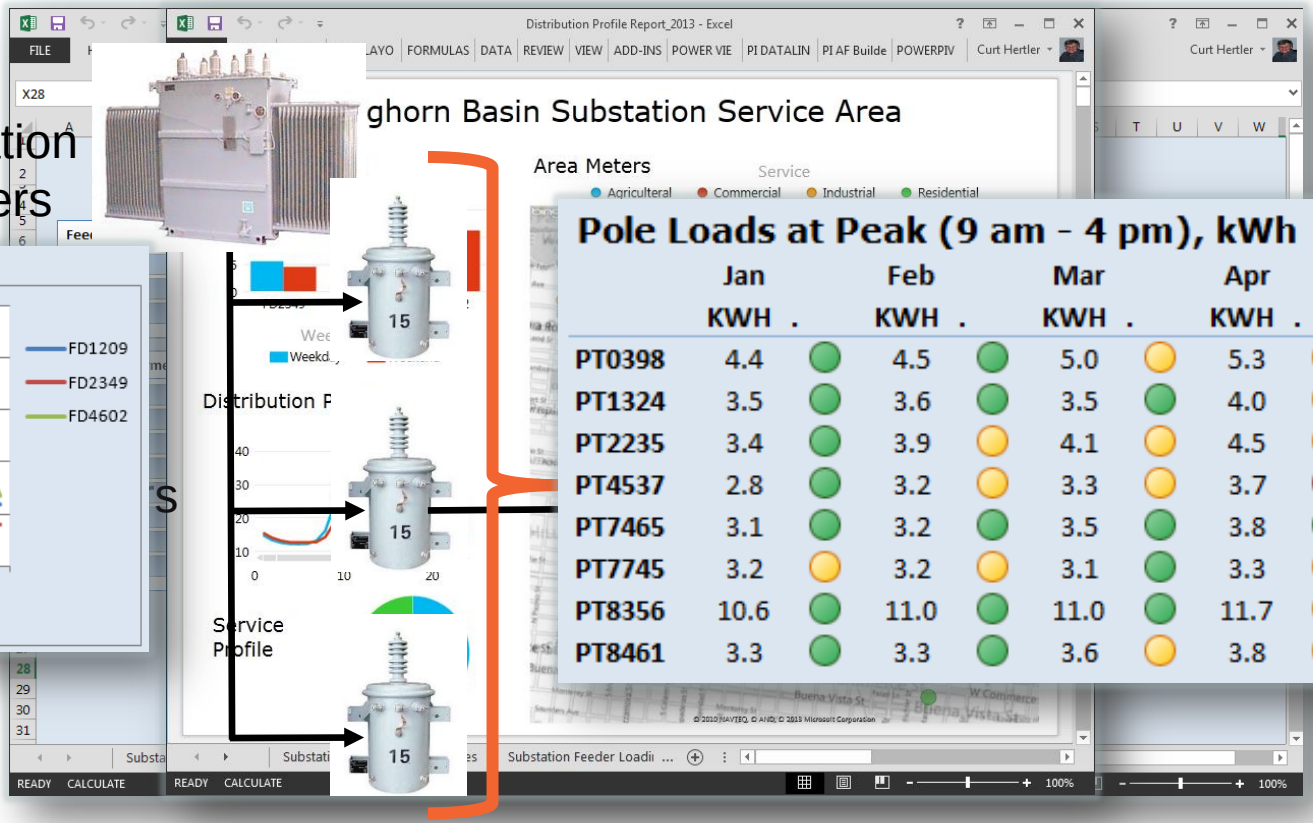



# Demand Profile and Network Analysis

Excel

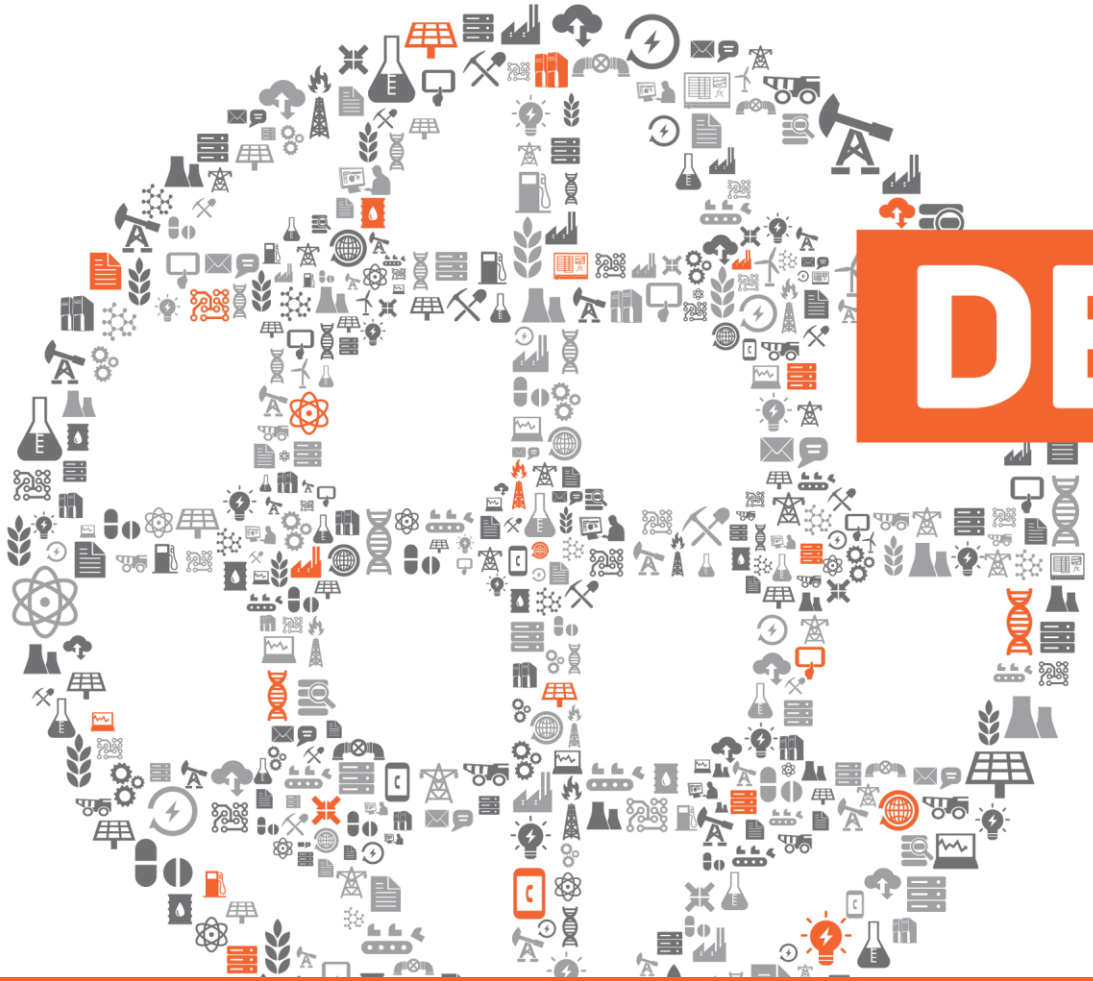
Substation
Feeders




**Pole Loads at Peak (9 am - 4 pm), kWh**

| | Jan KWH | | Feb KWH | | Mar KWH | | Apr KWH | |
|---|---|---|---|---|---|---|---|---|
| PT0398 | 4.4 | 🟢 | 4.5 | 🟢 | 5.0 | 🟡 | 5.3 | 🟡 |
| PT1324 | 3.5 | 🟢 | 3.6 | 🟢 | 3.5 | 🟢 | 4.0 | 🟡 |
| PT2235 | 3.4 | 🟢 | 3.9 | 🟡 | 4.1 | 🟡 | 4.5 | 🟡 |
| PT4537 | 2.8 | 🟢 | 3.2 | 🟡 | 3.3 | 🟡 | 3.7 | 🔴 |
| PT7465 | 3.1 | 🟢 | 3.2 | 🟢 | 3.5 | 🟢 | 3.8 | 🟢 |
| PT7745 | 3.2 | 🟡 | 3.2 | 🟡 | 3.1 | 🟢 | 3.3 | 🟡 |
| PT8356 | 10.6 | 🟢 | 11.0 | 🟢 | 11.0 | 🟢 | 11.7 | 🟡 |
| PT8461 | 3.3 | 🟢 | 3.3 | 🟢 | 3.6 | 🟡 | 3.8 | 🟡 |



# DEMO

Distribution Profile Report_2013 - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW ADD-INS PI DATALINK PI AF Builder POWERPIVOT

Curt Hertler

B3

# Feeder and Pole Transformer Analysis

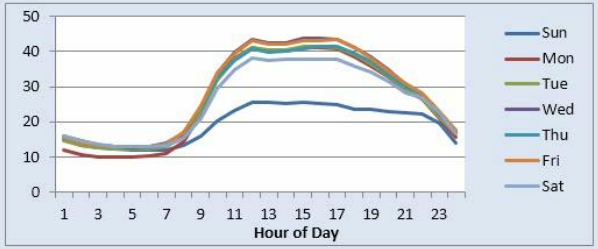
**Feeder Circuit**

- FD1209
- FD2349
- FD4602

**Pole Transformer**

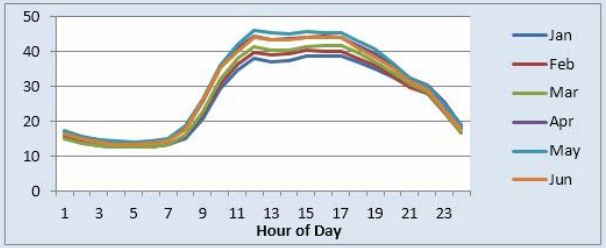
- PT0398
- PT1324
- PT2235
- PT4537
- PT7465
- PT7745
- PT8356
- PT8461

## Weekday Profiles, kWh




## Weekday \ Weekday Profiles, kWh


## Monthy Profiles, kWh




## Pole Loads at Peak (9 am - 4 pm), kWh

| | Jan KWH | Feb KWH | Mar KWH | Apr KWH | May KWH | Jun KWH |
|---|---|---|---|---|---|---|
| PT0398 | 4.4 | 4.5 | 5.0 | 5.3 | 5.5 | 5.5 |
| PT1324 | 3.5 | 3.6 | 3.5 | 4.0 | 4.1 | 4.2 |
| PT2235 | 3.4 | 3.9 | 4.1 | 4.5 | 4.7 | 3.1 |
| PT4537 | 2.8 | 3.2 | 3.3 | 3.7 | 3.8 | 3.7 |
| PT7465 | 3.1 | 3.2 | 3.5 | 3.8 | 3.9 | 4.0 |
| PT7745 | 3.2 | 3.2 | 3.1 | 3.3 | 3.6 | 4.3 |
| PT8356 | 10.6 | 11.0 | 11.0 | 11.7 | 12.1 | 11.7 |
| PT8461 | 3.3 | 3.3 | 3.6 | 3.8 | 3.8 | 3.5 |

Substation | Feeder and Poles | Substation Service Area | Substation Feeder Loading

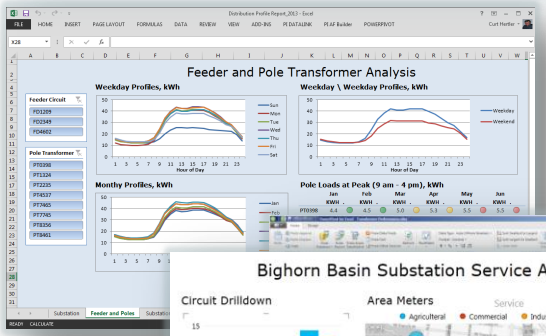
READY CALCULATE 110%

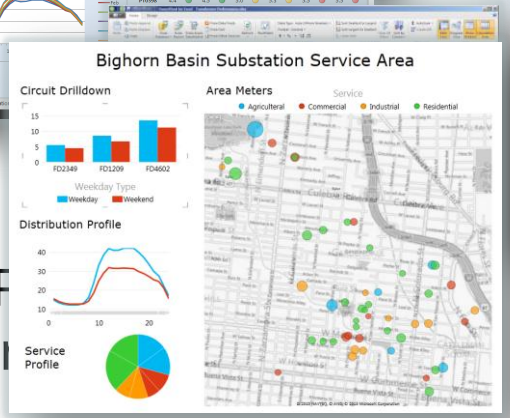
# Toolkit for Operational Insight – 2013 Update

Microsoft Excel 2010

Microsoft SQL Server 2012 Business Intelligence

Microsoft SharePoint 2010 Enterprise




OSIsoft

PI Server 2012

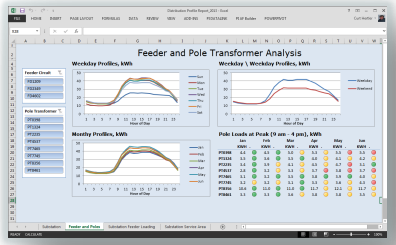
PI OLEDB Enterprise


Power View

# Excel 2013 Anatomy

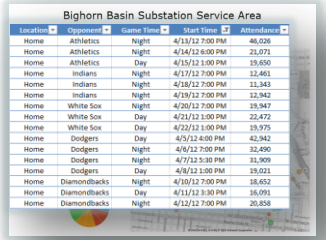
Worksheets

Pivot Tables & Charts




Excel Tables

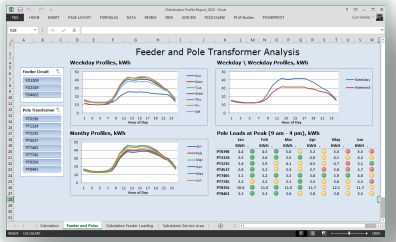
Reports



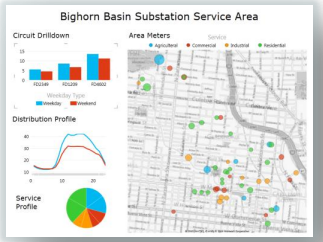
# Excel 2013 Anatomy

Worksheets

Pivot Tables & Charts




Power View Reports




Excel Tables

Data Model

PowerPivot Tables

Data Sources

OSIsoft

PI AF

Microsoft SQL Server 2012

Relational Data

Windows Azure Marketplace

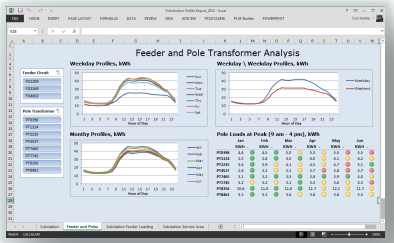
Paste

Clipboard

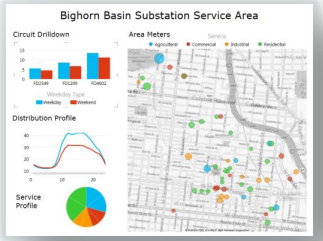
# Excel 2013 Anatomy

Worksheets

Pivot Tables & Charts



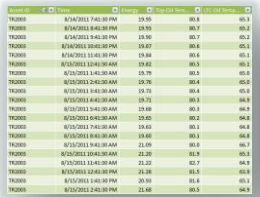

Power View Reports

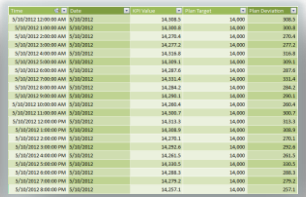



Excel Tables

Data Model

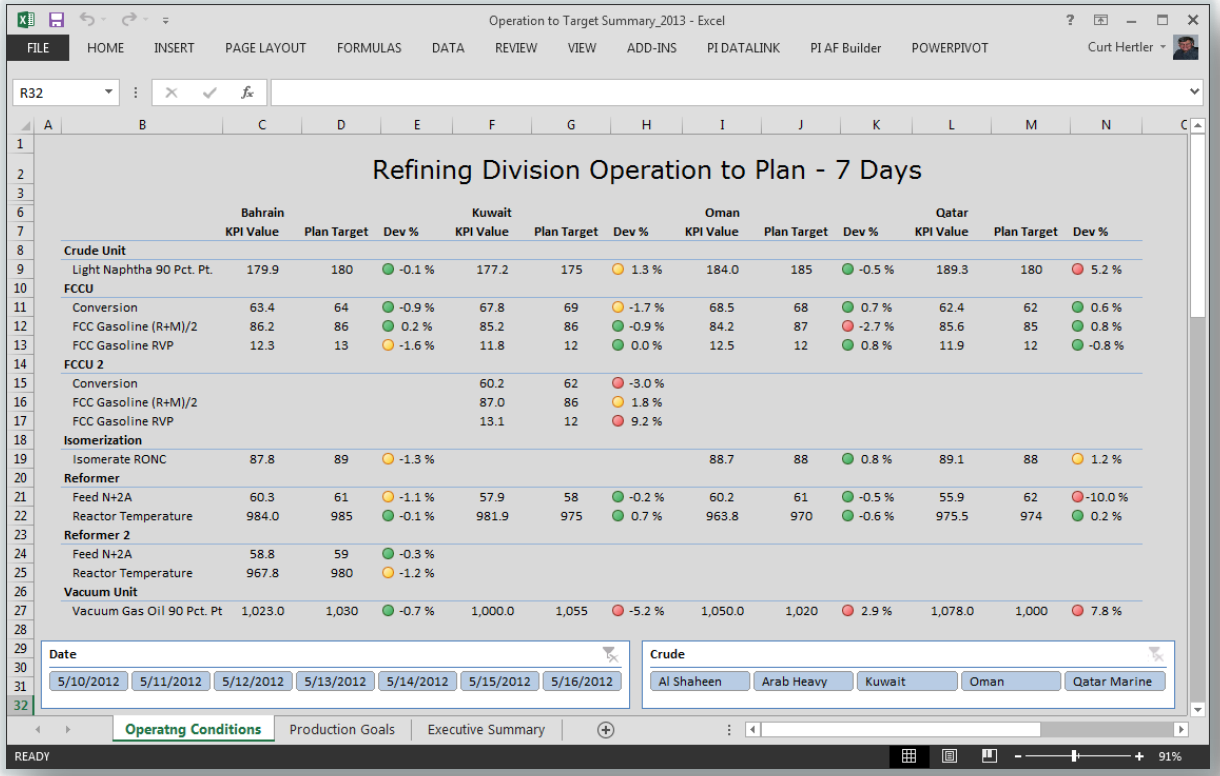
PowerPivot Tables





Excel

# Performance Scorecard




| | Bahrain | | | Kuwait | | | Oman | | | Qatar | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KPI Value | Plan Target | Dev % | KPI Value | Plan Target | Dev % | 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 % | 184.0 | 185 | -0.5 % | 189.3 | 180 | 5.2 % |
| **FCCU** | | | | | | | | | | | | |
| Conversion | 63.4 | 64 | -0.9 % | 67.8 | 69 | -1.7 % | 68.5 | 68 | 0.7 % | 62.4 | 62 | 0.6 % |
| FCC Gasoline (R+M)/2 | 86.2 | 86 | 0.2 % | 85.2 | 86 | -0.9 % | 84.2 | 87 | -2.7 % | 85.6 | 85 | 0.8 % |
| FCC Gasoline RVP | 12.3 | 13 | -1.6 % | 11.8 | 12 | 0.0 % | 12.5 | 12 | 0.8 % | 11.9 | 12 | -0.8 % |
| **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 % | | | | | | |
| **Isomerization** | | | | | | | | | | | | |
| Isomerate RONC | 87.8 | 89 | -1.3 % | | | | 88.7 | 88 | 0.8 % | 89.1 | 88 | 1.2 % |
| **Reformer** | | | | | | | | | | | | |
| Feed N+2A | 60.3 | 61 | -1.1 % | 57.9 | 58 | -0.2 % | 60.2 | 61 | -0.5 % | 55.9 | 62 | -10.0 % |
| Reactor Temperature | 984.0 | 985 | -0.1 % | 981.9 | 975 | 0.7 % | 963.8 | 970 | -0.6 % | 975.5 | 974 | 0.2 % |
| **Reformer 2** | | | | | | | | | | | | |
| Feed N+2A | 58.8 | 59 | -0.3 % | | | | | | | | | |
| Reactor Temperature | 967.8 | 980 | -1.2 % | | | | | | | | | |
| **Vacuum Unit** | | | | | | | | | | | | |
| Vacuum Gas Oil 90 Pct. Pt | 1,023.0 | 1,030 | -0.7 % | 1,000.0 | 1,055 | -5.2 % | 1,050.0 | 1,020 | 2.9 % | 1,078.0 | 1,000 | 7.8 % |

Date: 5/10/2012 | 5/11/2012 | 5/12/2012 | 5/13/2012 | 5/14/2012 | 5/15/2012 | 5/16/2012

Crude: Al Shaheen | Arab Heavy | Kuwait | Oman | Qatar Marine

Scoring of Operational Objectives

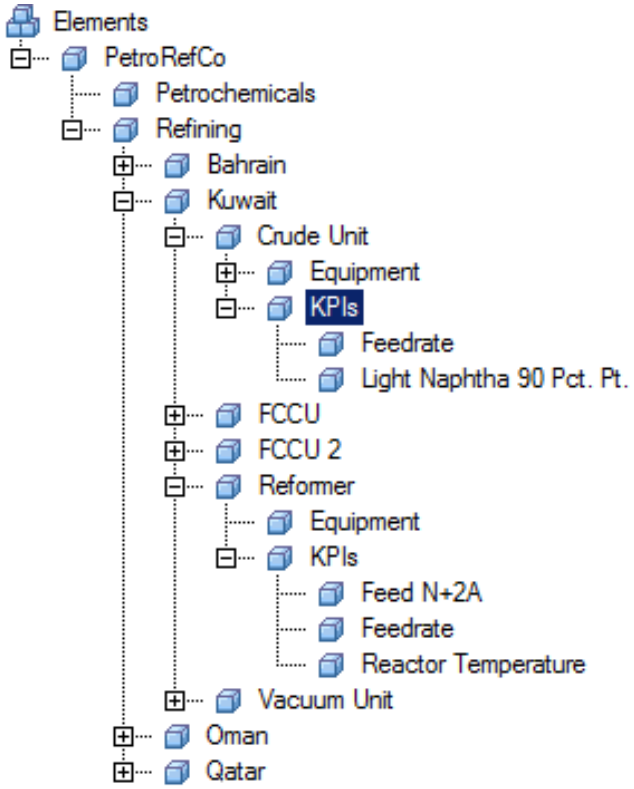
- Quality
- Production
- Energy

Can be driven by PI AF structure

# Asset Context – *PI Asset Framework*

Asset Hierarchy

- Plant
- Process
- KPI




"KPI Total" Template

| Name | Value |
|---|---|
| Category: Operating Plan Data | |
| Operating Plan Target | 16700 bbl |
| Category: Process Data | |
| Hourly Throughput | 16761.332951708042 |
| Process Value | 401676.21875 bbl/d |

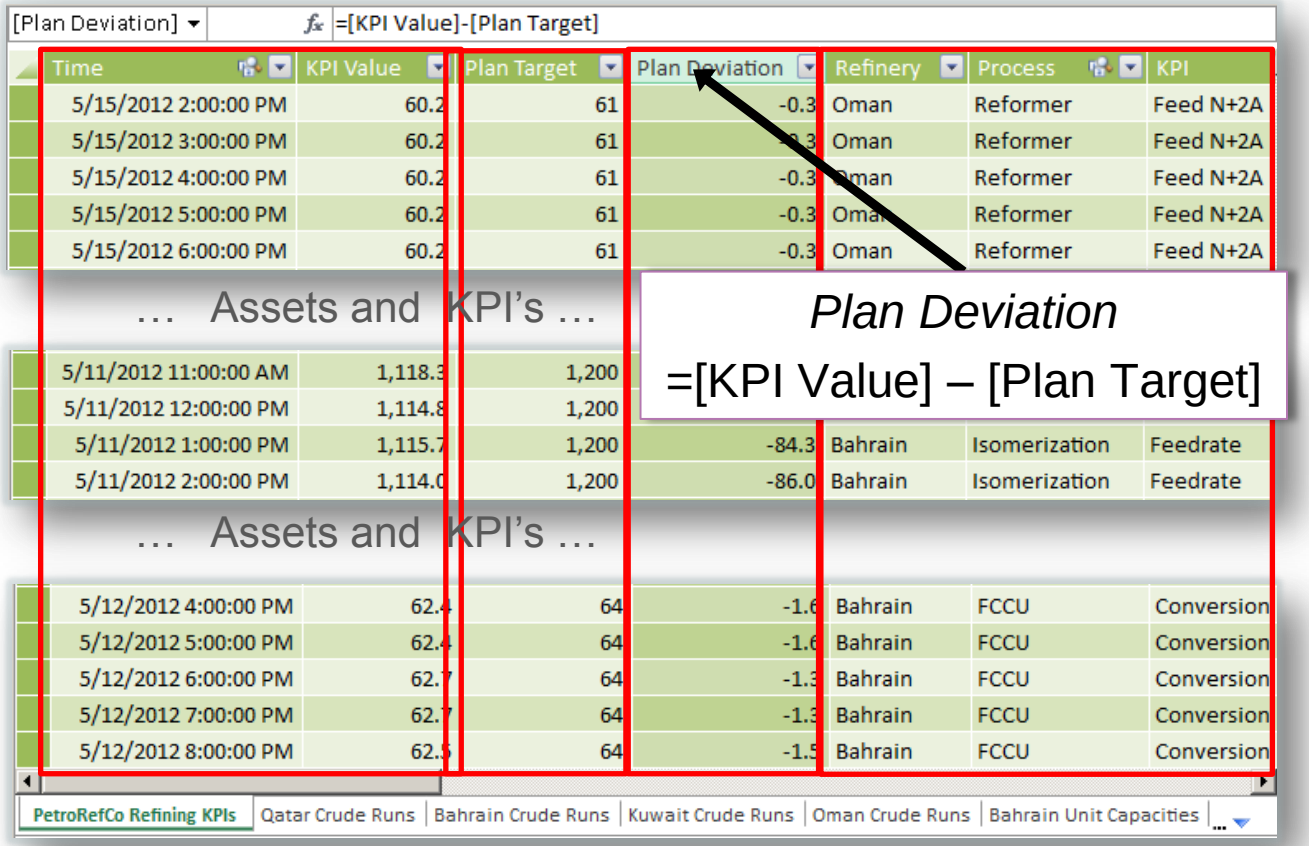
"KPI Laboratory" Template

| Name | Value |
|---|---|
| Category: Operating Plan Data | |
| Operating Plan Target | 175 °F |
| Category: Process Data | |
| Laboratory Value | 177.199996948242 °F |

# Operating Data with Context - PI OLEDB Enterprise

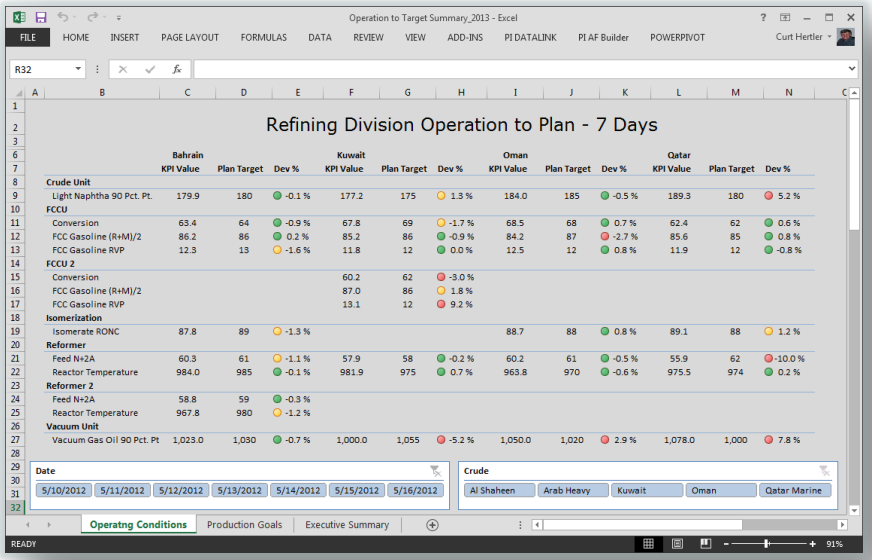
PowerPivot Table

- AF Attributes
  - PI Data
  - Table Lookup
- Calculations
- AF Hierarchy
  - Process
  - Context

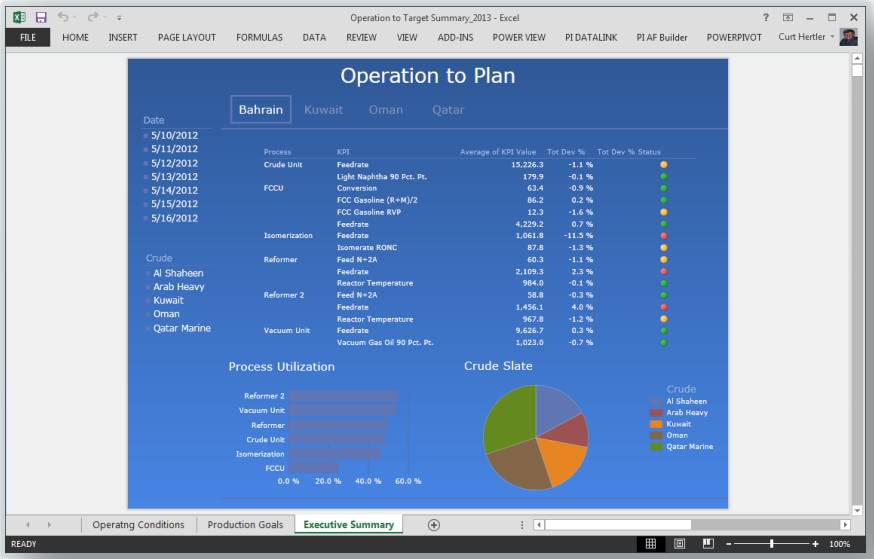


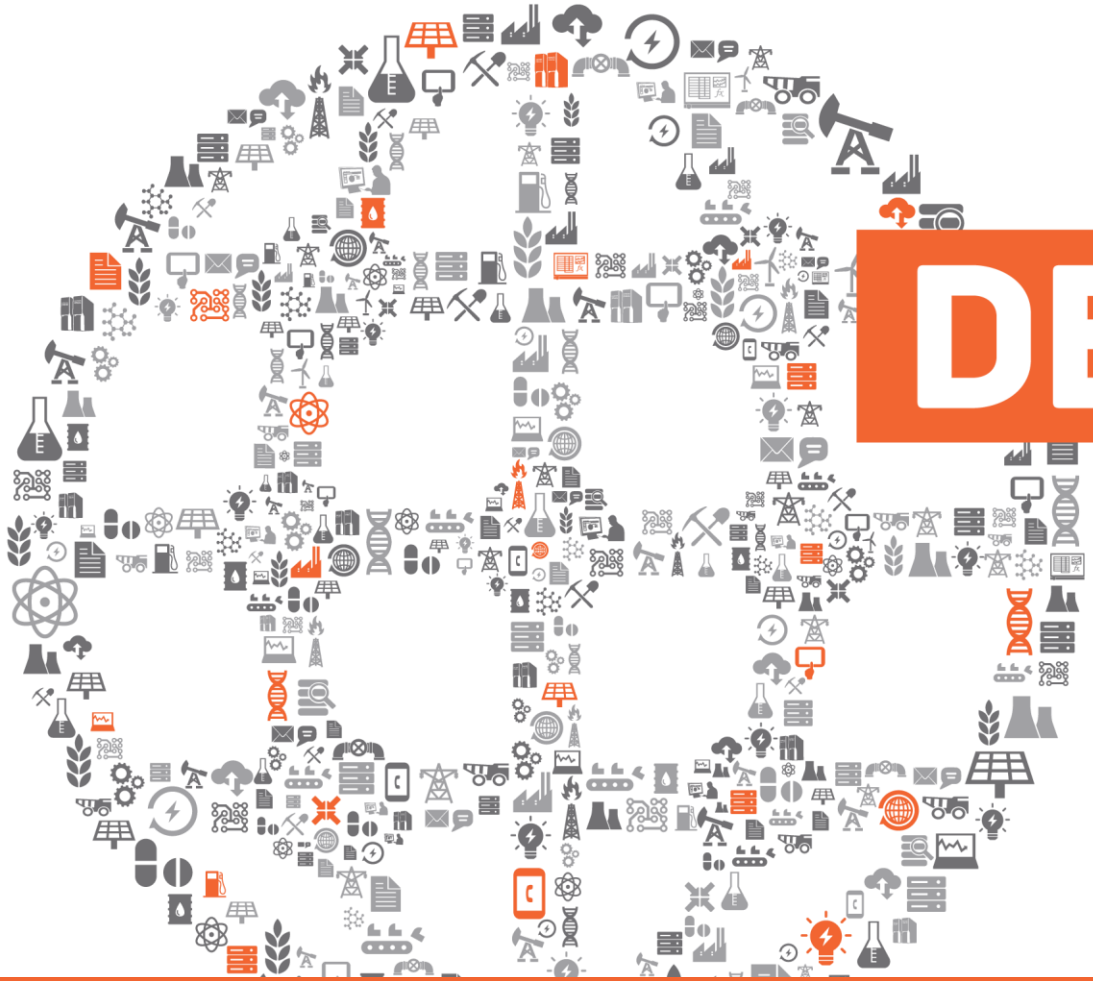
# Operational Insight for the Organization

## Excel 2013 Worksheet

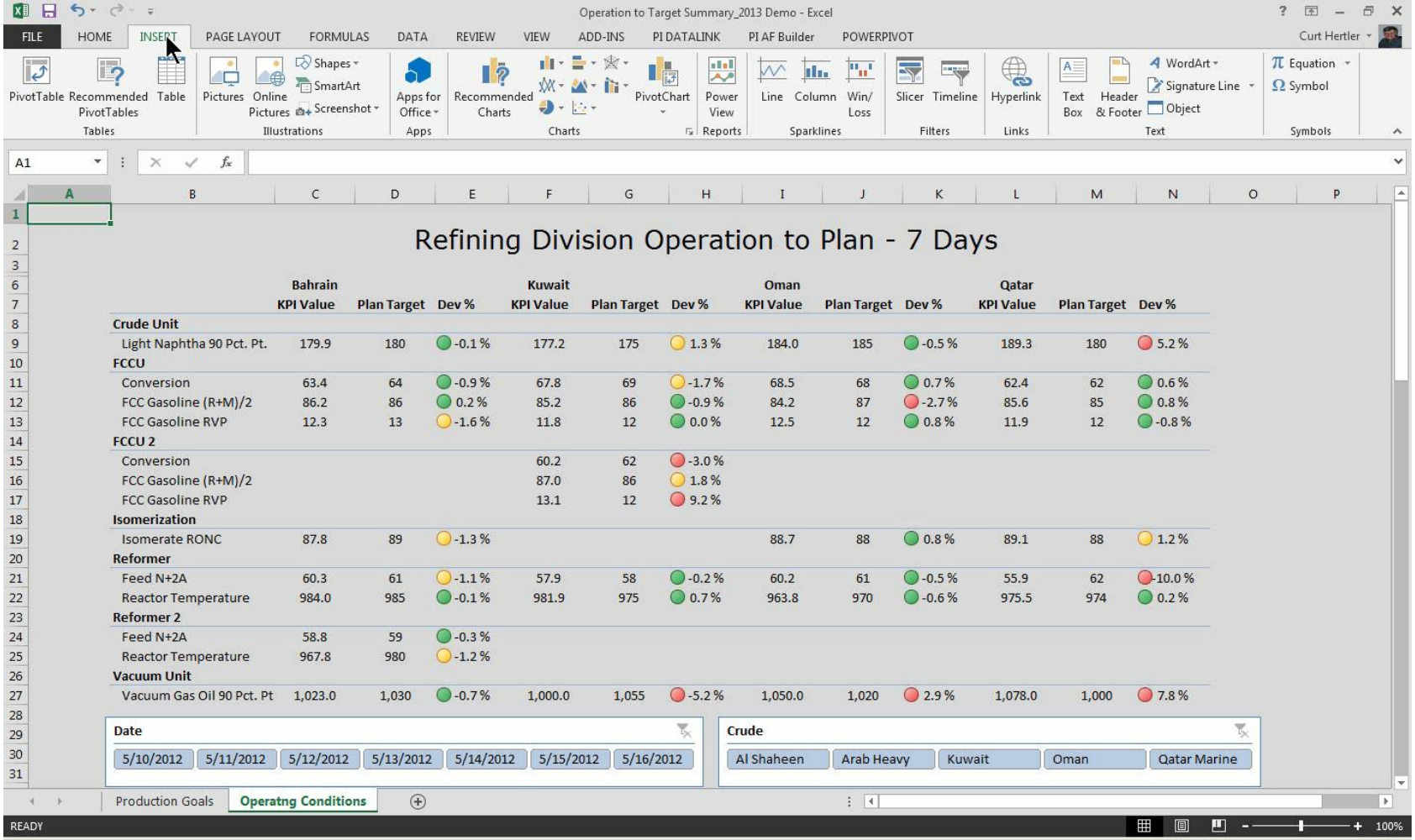



## Excel 2013 Power View Report



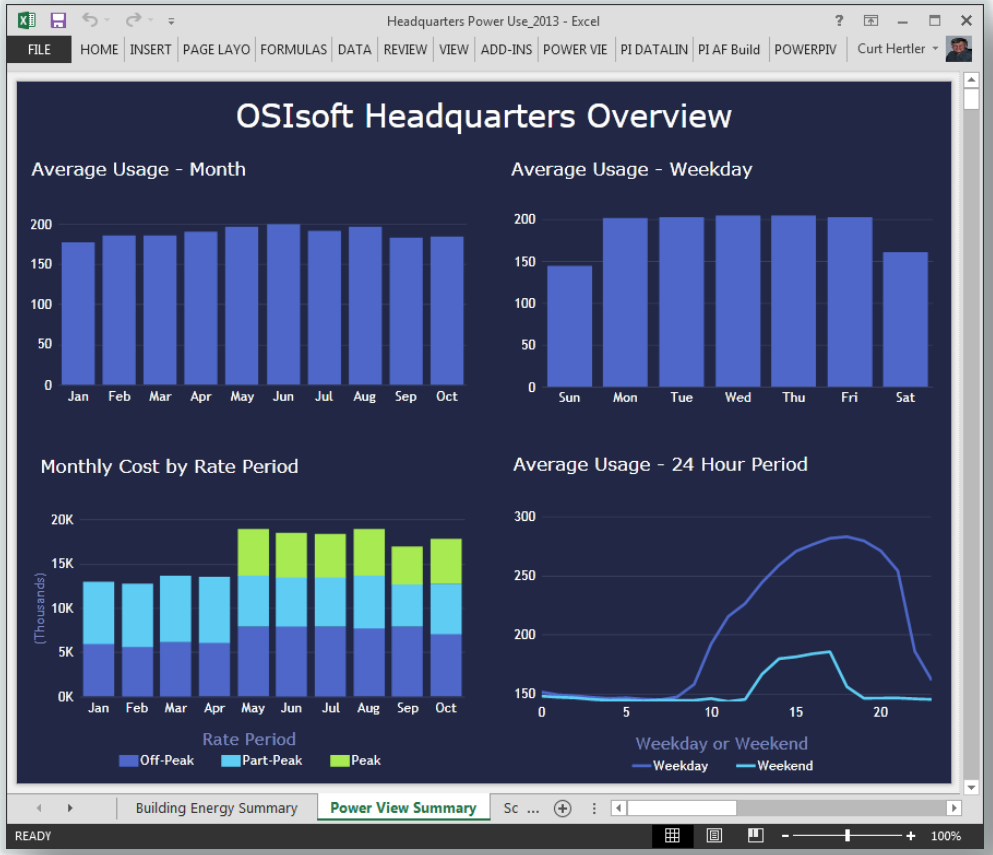


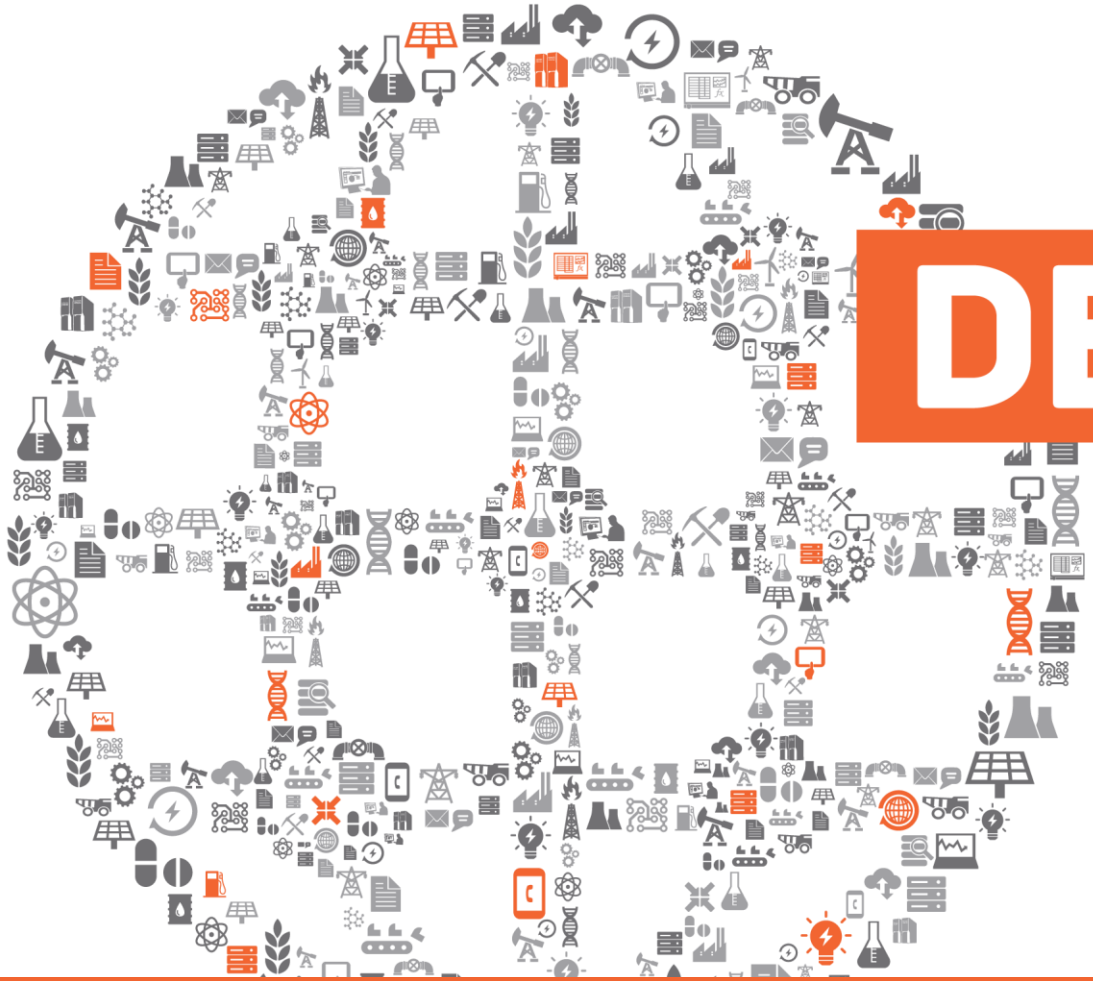
# DEMO



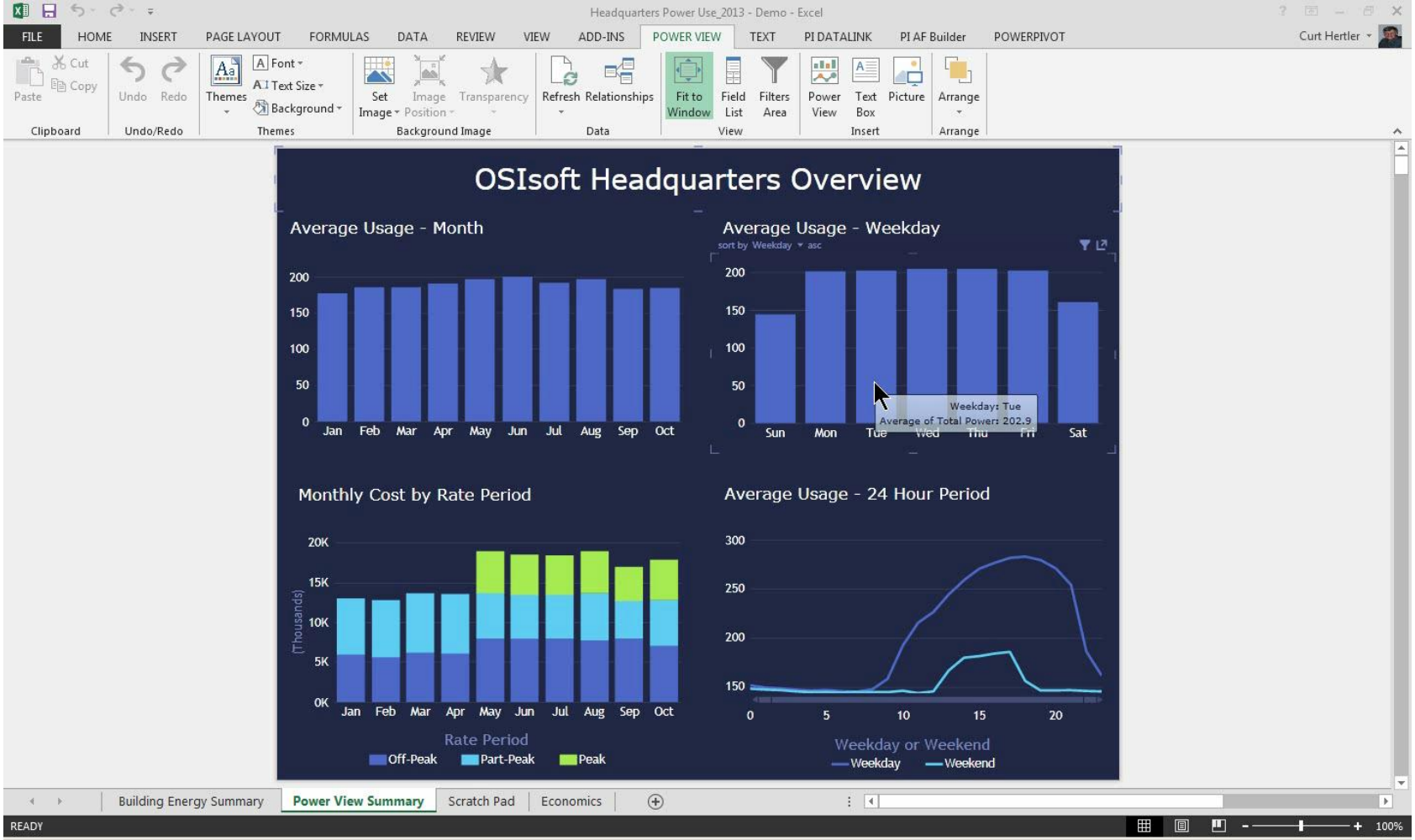
# Ad Hoc Analysis

Power Use at OSIsoft Headquarters

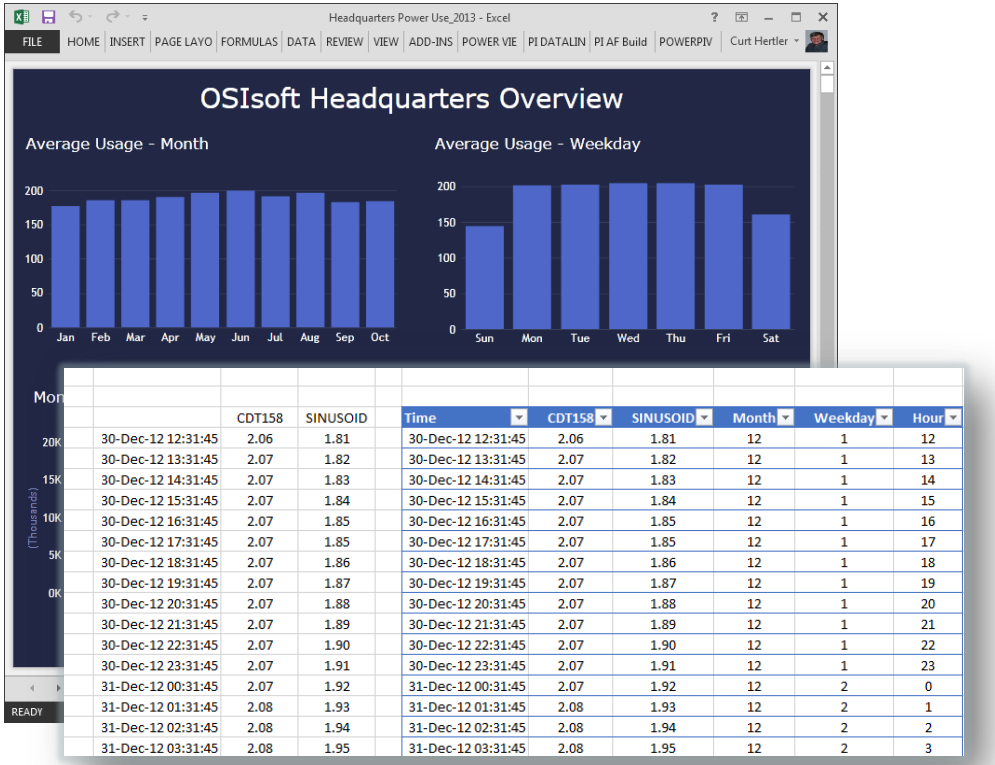




# DEMO



# Data Integration using DataLink




| | CDT158 | SINUSOID |
|---|---|---|
| 30-Dec-12 12:31:45 | 2.06 | 1.81 |
| 30-Dec-12 13:31:45 | 2.07 | 1.82 |
| 30-Dec-12 14:31:45 | 2.07 | 1.83 |
| 30-Dec-12 15:31:45 | 2.07 | 1.84 |
| 30-Dec-12 16:31:45 | 2.07 | 1.85 |
| 30-Dec-12 17:31:45 | 2.07 | 1.85 |
| 30-Dec-12 18:31:45 | 2.07 | 1.86 |
| 30-Dec-12 19:31:45 | 2.07 | 1.87 |
| 30-Dec-12 20:31:45 | 2.07 | 1.88 |
| 30-Dec-12 21:31:45 | 2.07 | 1.89 |
| 30-Dec-12 22:31:45 | 2.07 | 1.90 |
| 30-Dec-12 23:31:45 | 2.07 | 1.91 |
| 31-Dec-12 00:31:45 | 2.07 | 1.92 |
| 31-Dec-12 01:31:45 | 2.08 | 1.93 |
| 31-Dec-12 02:31:45 | 2.08 | 1.94 |
| 31-Dec-12 03:31:45 | 2.08 | 1.95 |

| Time | CDT158 | SINUSOID | Month | Weekday | Hour |
|---|---|---|---|---|---|
| 30-Dec-12 12:31:45 | 2.06 | 1.81 | 12 | 1 | 12 |
| 30-Dec-12 13:31:45 | 2.07 | 1.82 | 12 | 1 | 13 |
| 30-Dec-12 14:31:45 | 2.07 | 1.83 | 12 | 1 | 14 |
| 30-Dec-12 15:31:45 | 2.07 | 1.84 | 12 | 1 | 15 |
| 30-Dec-12 16:31:45 | 2.07 | 1.85 | 12 | 1 | 16 |
| 30-Dec-12 17:31:45 | 2.07 | 1.85 | 12 | 1 | 17 |
| 30-Dec-12 18:31:45 | 2.07 | 1.86 | 12 | 1 | 18 |
| 30-Dec-12 19:31:45 | 2.07 | 1.87 | 12 | 1 | 19 |
| 30-Dec-12 20:31:45 | 2.07 | 1.88 | 12 | 1 | 20 |
| 30-Dec-12 21:31:45 | 2.07 | 1.89 | 12 | 1 | 21 |
| 30-Dec-12 22:31:45 | 2.07 | 1.90 | 12 | 1 | 22 |
| 30-Dec-12 23:31:45 | 2.07 | 1.91 | 12 | 1 | 23 |
| 31-Dec-12 00:31:45 | 2.07 | 1.92 | 12 | 2 | 0 |
| 31-Dec-12 01:31:45 | 2.08 | 1.93 | 12 | 2 | 1 |
| 31-Dec-12 02:31:45 | 2.08 | 1.94 | 12 | 2 | 2 |
| 31-Dec-12 03:31:45 | 2.08 | 1.95 | 12 | 2 | 3 |

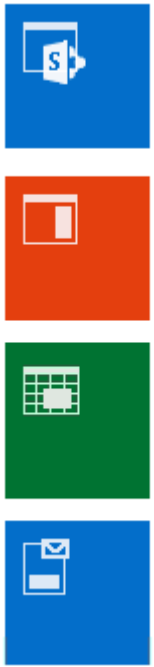
Requires reference to DataLink array for table range formatting

Limited to ~1 million rows

Best for single assets

No support for automatic refresh in SharePoint 2013

No support for upsizing to SQL Analysis Services 2012



# PI for Office 365

*Evolving Excel*

# Motivation

**Increase Productivity**

- Shorten the time to develop reports
- More visuals - Integrate natively with charts and tables
- Make it easy to share insights

**Collections of things**

- Report by exception
- Compare across equipment
- Do BI on aggregate and summary information
- Work with bigger collections of data

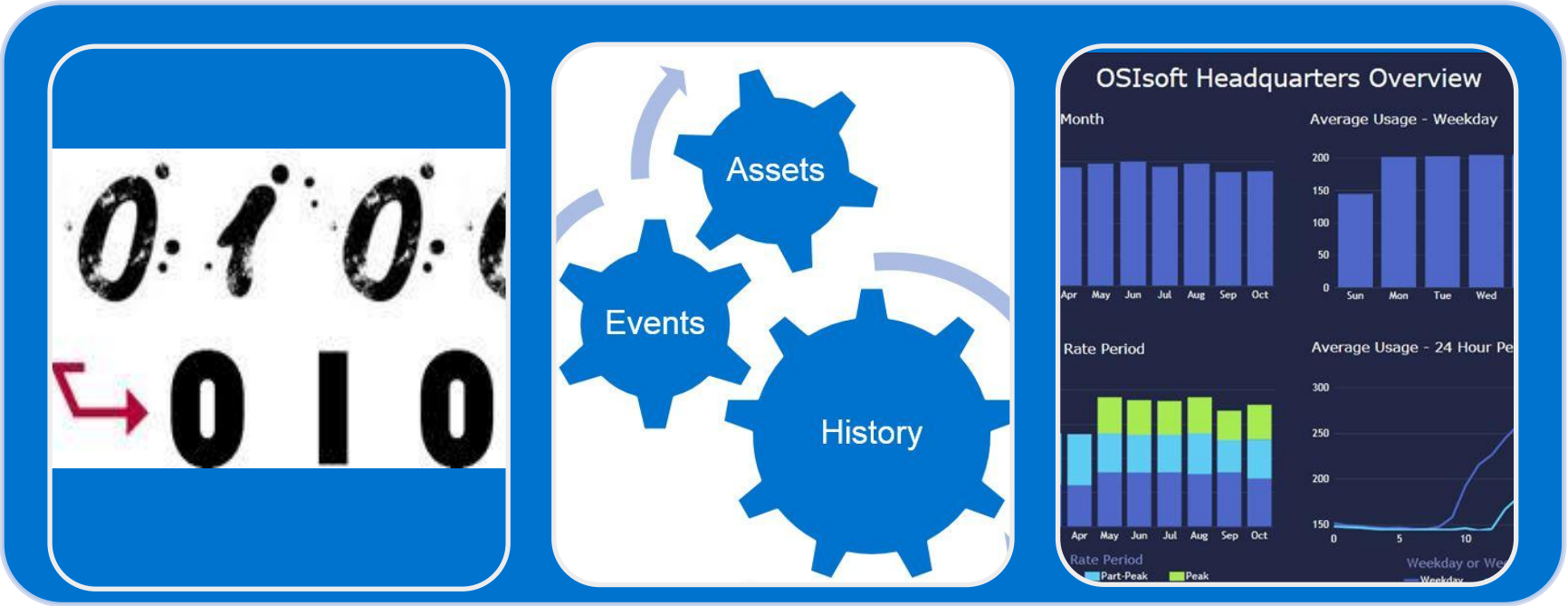
**Redefining how we work**

- Work with Mobile devices
- Make it web based
- Embrace non-experts
- Ensure the data is decision ready

# Beyond spreadsheets

- Microsoft Power Query for Excel
- Microsoft PowerPivot for Excel
- Microsoft PowerView for Excel
- Microsoft Power Map for Excel

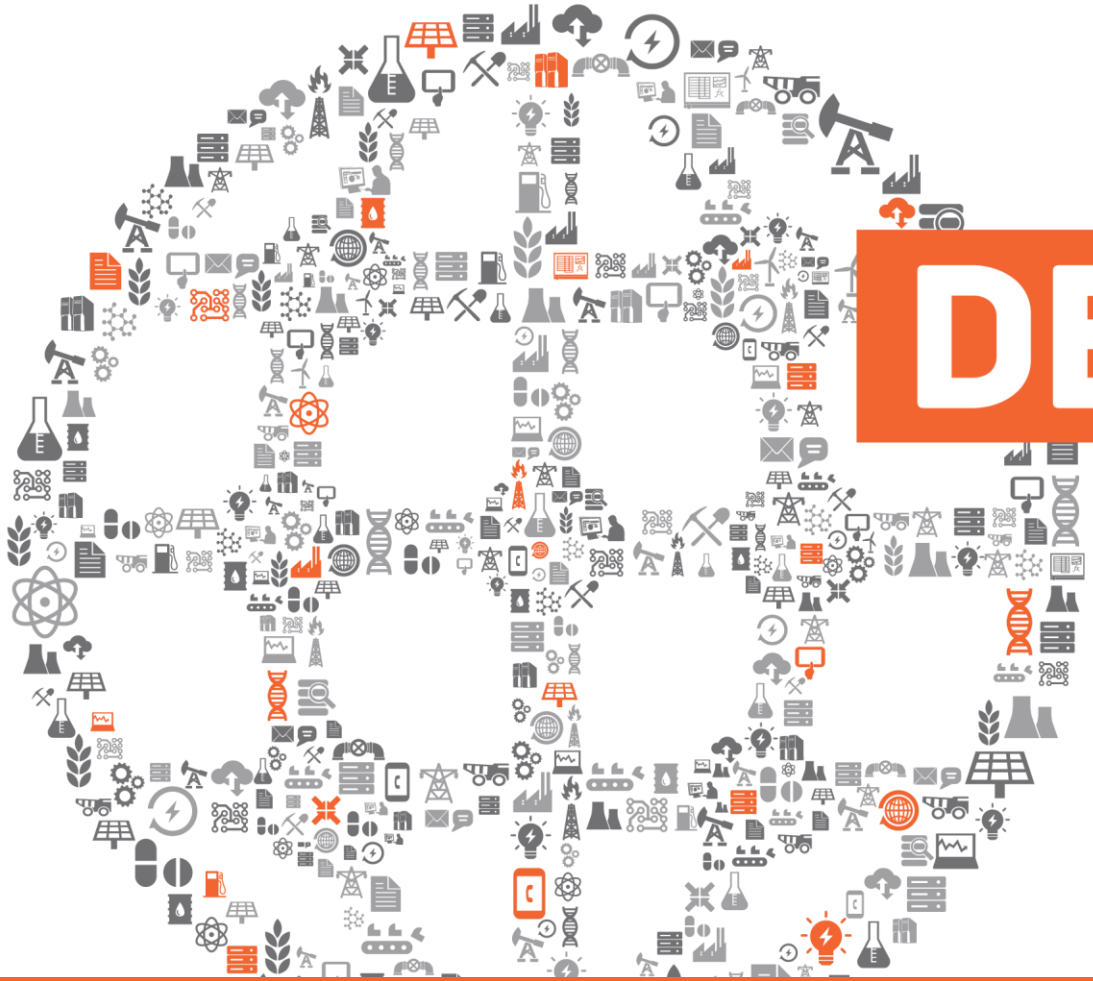
# Streamlining reporting and analysis




Decision Ready Data

In Context

Rich Visualization



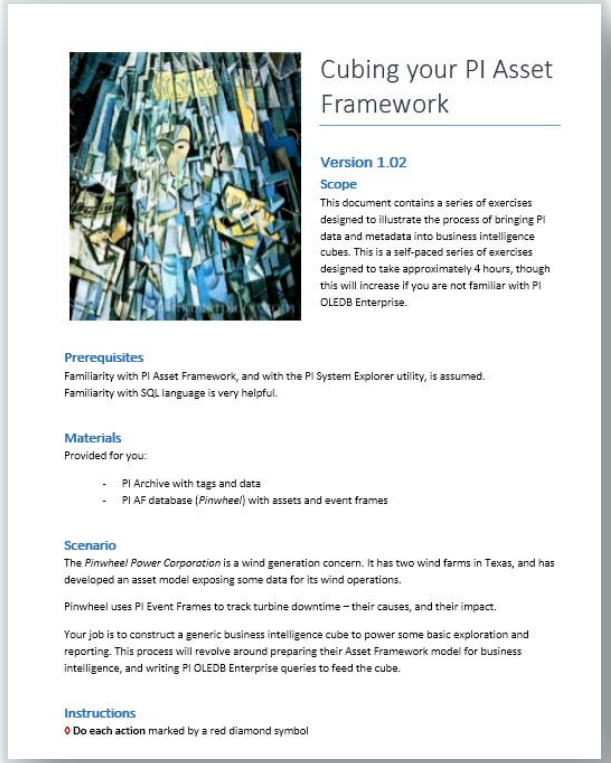
# DEMO

# Additional Information

## OSIsoft Resources

- "Using Microsoft PowerPivot and Power View with the PI System"
  OSIsoft Tech Support
  \ Download Center \Training Materials
  techsupport.osisoft.com

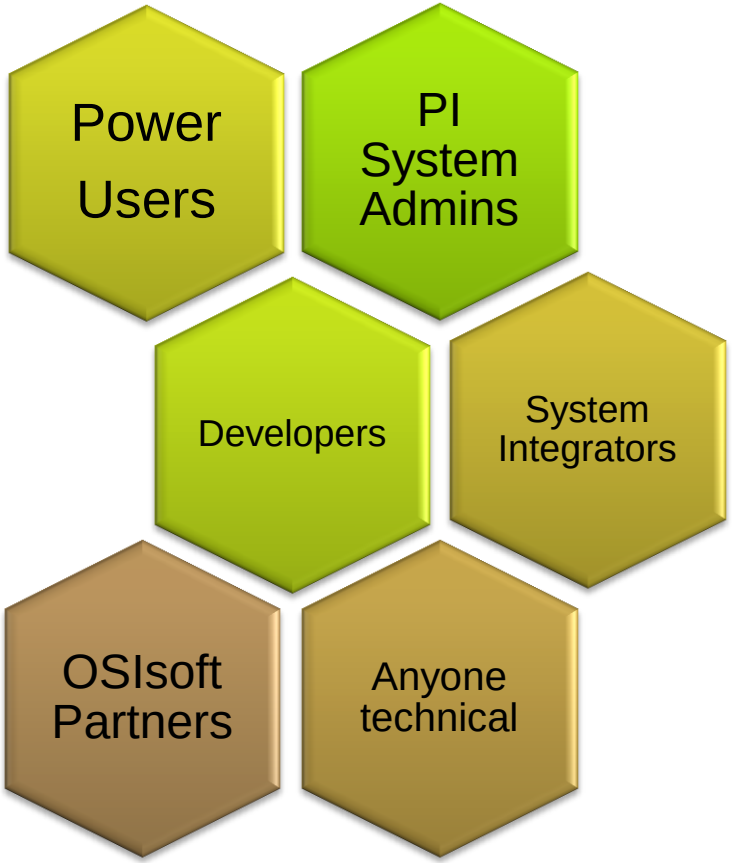
- OSIsoft vCampus vcampus.osisoft.com
- For SRP Customers learning.osisoft.com
- For EA Customers, contact your EPM.




## Helpful Books

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

# Get hands on knowledge of how to use and get value from the PI System

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# THANK YOU

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