



实时数据的可视化探索

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王彤彤
2020.06.16



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OSIsoft 与 PI System



OSIsoft是引领全球数字化转型的先驱企业

40
年历史

20%
研发投入

65%
财富 500

147
个国家

2.1万
家工厂

96%
长期用户

Calgary, Alberta
Mayfield Heights, OH
San Leandro, CA
Phoenix, AZ
Mexico City, Mexico
Houston & Longview, TX
Savannah, GA
Johnson City, TN
Philadelphia, PA
Montreal, Quebec

London, UK
Paris, France
Madrid, Spain
Frankfurt, Germany
Ostrava, Czech Republic
Manama, Bahrain

Beijing, China
Shanghai, China
Seoul, South Korea (AID)
Tokyo, Japan

战略合作伙伴:

Microsoft, Mitsui, Esri,
Emerson, Rockwell,
Yokogawa, Siemens,
SAP, Cisco, PTC, Dell

一个产品：
PI System

★ 总部：美国加州圣莱安德罗

● 分支机构



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发电 / 输配电



金属和 矿业



石油天然气



制药 / 食品饮料



纸浆和 造纸



石化/化工



水务/设施

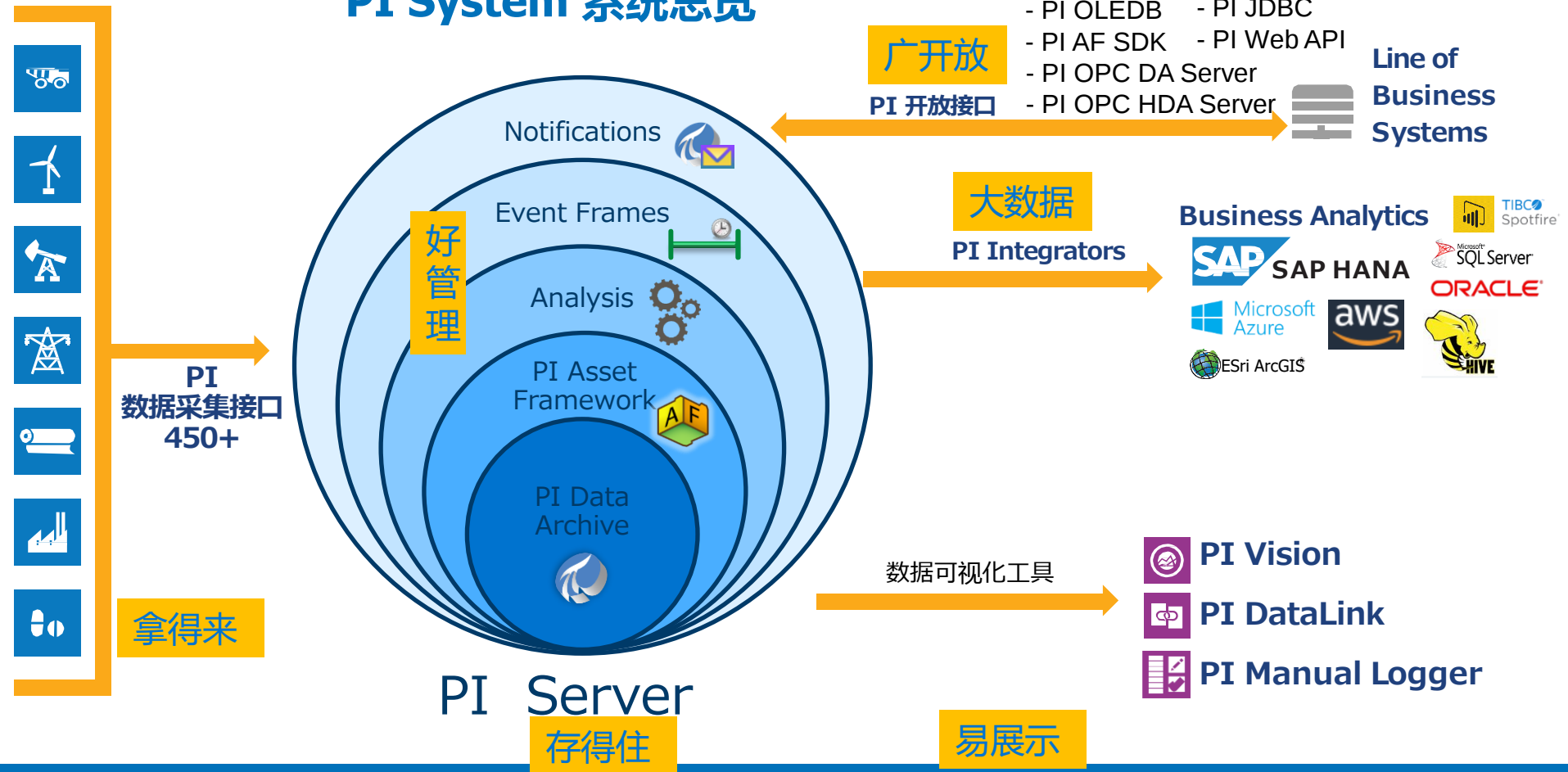


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PI System 系统总览



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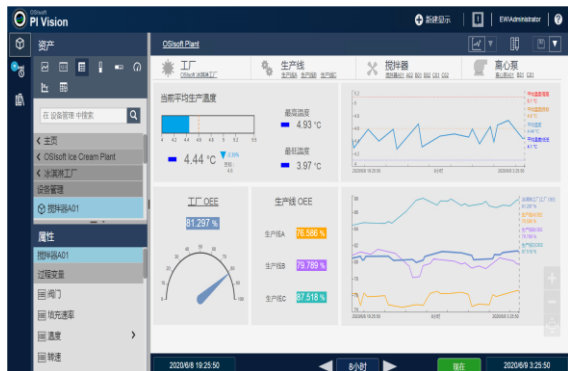
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可视化工具对比



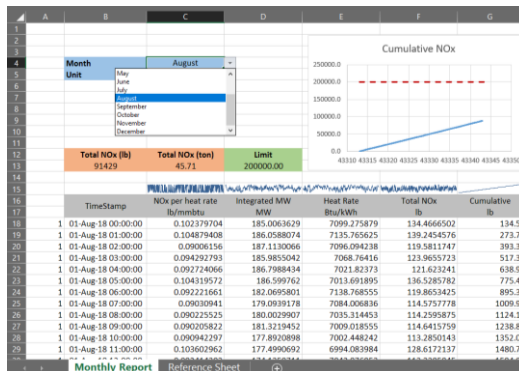
PI Vision

- 监控实时数据
- 快速比较相关资产
- AF的层级架构可增强显示



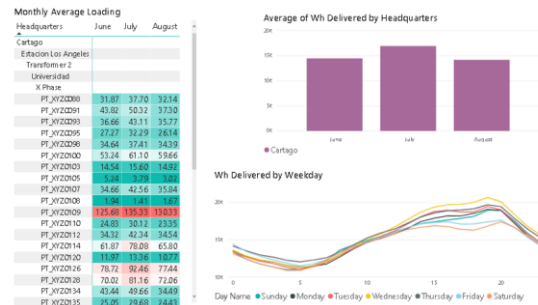
PI DataLink

- 结合Excel的功能
- 报表功能
- 历史数据分析



BI Tools

- 生产数据和商业数据结合
- 在变量之间切片和切块找到关联性
- 创建变量矩阵以查看其与一个因变量的关系



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PI Vision

可视化PI 系统数据最快、最简单的方法

- 从任何web浏览器（包括移动设备浏览器）访问数据
- 在整个企业内组织和共享展示图
- 快速部署和推出



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PI Vision -今天使用, 规划未来



易使用

界面直观

缩短了新用户探索功能的时间

动态显示

显示图自动展示新数据

导航链接

只需双击符号即可轻松打开新的显示图



自助式服务

快速访问数据

上下文的数据使任何操作员或工程师都可以快速找到所需的数据

迅速创建显示

无需等待其他部门的帮助, 迅速创建自己的显示图

移动性

可在任何笔记本和移动设备上创建、编辑、查看显示图



可扩展

减少显示图数量

创建一个显示图, 单击按钮即可在相关资产之间切换

组织性

使用文件夹轻松组织管理显示图

快速部署和推出

不需要每台设备上安装客户端, IT部门可快速部署并推广到组织中。



PI Vision核心功能演示



PI Vision 2019



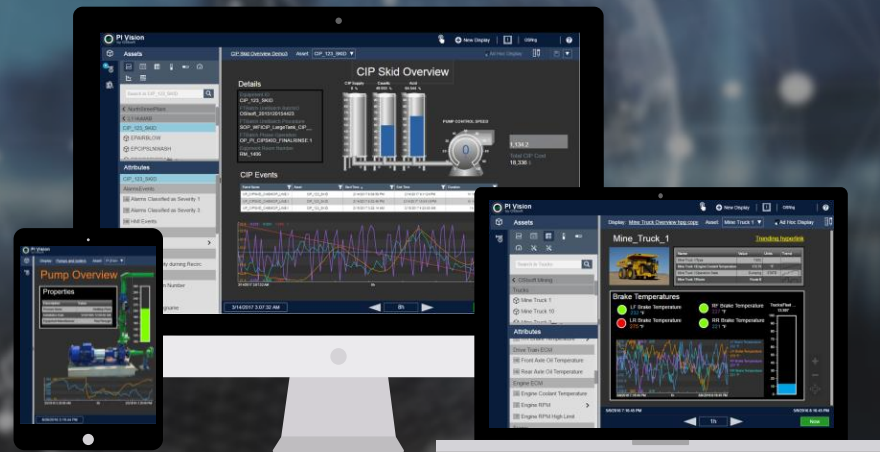
PI ProcessBook 迁移



即席趋势图



XY 图 和资产比较表的简化安全性



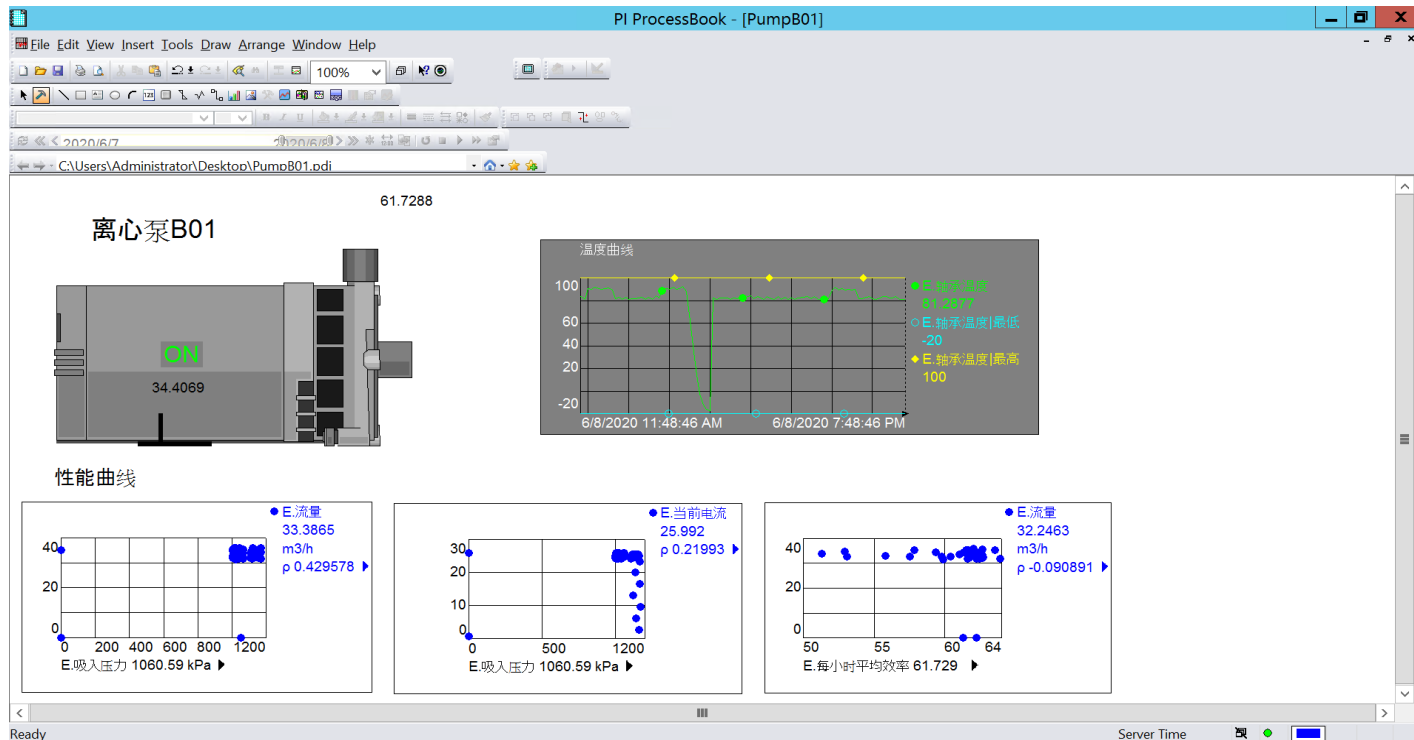
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PI ProcessBook 迁移

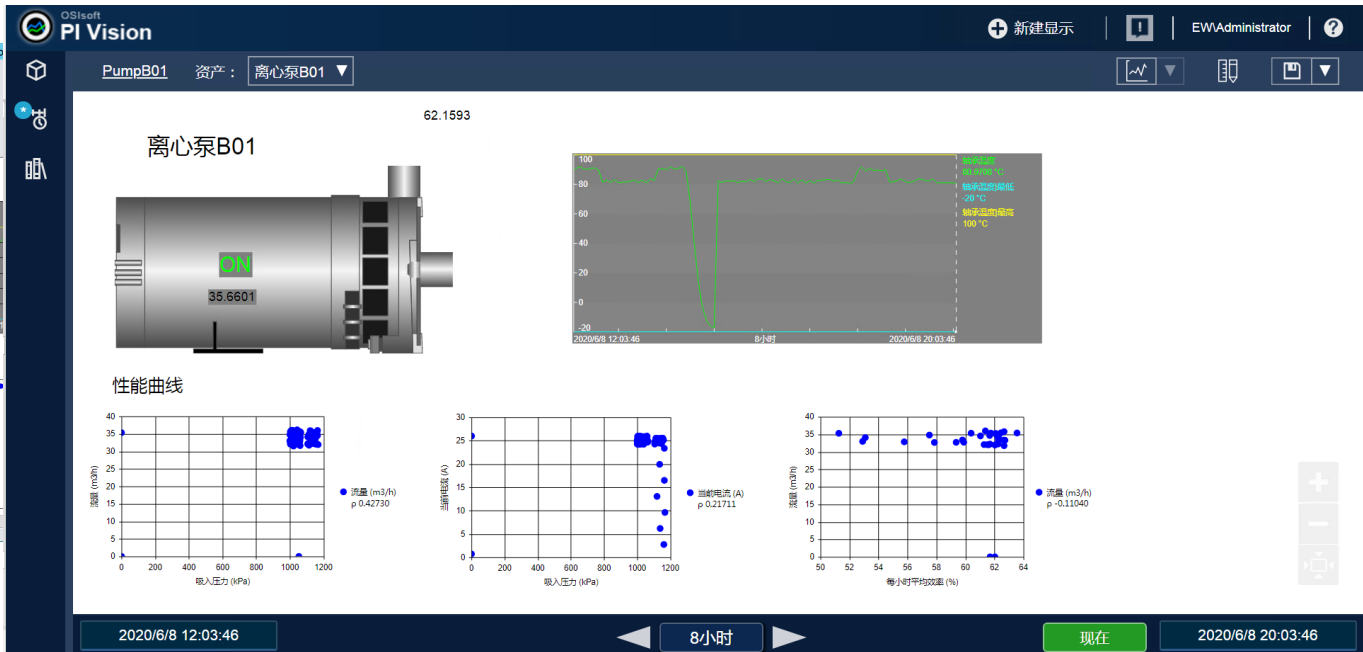
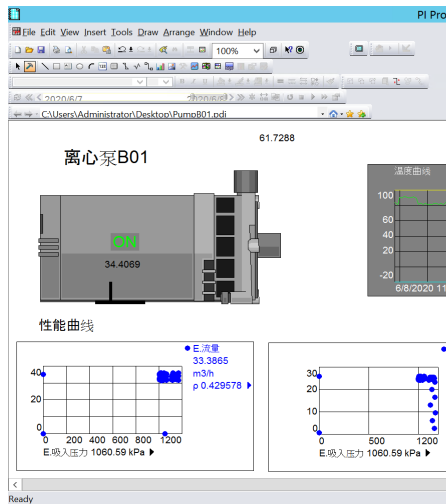
—PI ProcessBook to PI Vision Migration Utility



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加快通往最新可视化工具的道路

PI ProcessBook迁移

1 选择

Files and Folders

+ Add Files

Path/FileName	Date Modified
[-] C:\Displays	
[-] C:\Displays\Process Monitoring	
[-] C:\Displays\Process Monitoring\Animation #1.PDI	4/5/2019 2:34 PM
[-] C:\Displays\Process Monitoring\Animation #2.PDI	4/5/2019 2:35 PM
[-] C:\Displays\Process Monitoring\Batch Reactor #1.PDI	4/5/2019 2:44 PM
[-] C:\Displays\Process Monitoring\Batch Reactor #2.PDI	4/5/2019 2:44 PM
[-] C:\Displays\Process Monitoring\Kamyr.PDI	4/5/2019 2:28 PM
[-] C:\Displays\Process Monitoring\Main Column Bottom.PDI	4/5/2019 2:18 PM
[-] C:\Displays\Process Monitoring\Paper Machine.PDI	4/5/2019 2:18 PM
[-] C:\Displays\Process Monitoring\Particulate Removal System.PDI	4/5/2019 2:59 PM
[-] C:\Displays\Process Monitoring\PI Expressions.PDI	4/5/2019 2:42 PM
[-] C:\Displays\Process Monitoring\PI Summary.PDI	4/5/2019 2:43 PM
[-] C:\Displays\Process Monitoring\Process Display.PDI	4/5/2019 2:18 PM
[-] C:\Displays\Process Monitoring\Pulp Prep #1.PDI	4/5/2019 2:18 PM
[-] C:\Displays\Process Monitoring\Pulp Prep #2.PDI	4/5/2019 2:18 PM
[-] C:\Displays\Process Monitoring\Trends #1.PDI	4/5/2019 2:28 PM
[-] C:\Displays\Process Monitoring\Trends #2.PDI	4/5/2019 2:28 PM
[-] C:\Displays\Process Monitoring\Trends #3.PDI	4/5/2019 2:21 PM
[-] C:\Displays\SLTC Building	
[-] C:\Displays\SLTC Building\SLTC - AC RTU Displays - AC2.pdi	4/5/2019 1:48 PM
[-] C:\Displays\SLTC Building\SLTC - Device View - VAVCO.pdi	3/18/2019 10:05 AM
[-] C:\Displays\SLTC Building\SLTC - Energy Management Overview.pdi	4/5/2019 2:41 PM

Select All 19 files listed 19 files selected

Remove From List Run Analysis

2 分析

Analysis Results

Summary Tree View

Path/FileName	Issue Tags
[-] Can be Fully Migrated	
[-] Displays\Process Monitoring\Animation #1	
[-] Displays\Process Monitoring\Animation #2	
[-] Displays\Process Monitoring\Batch Reactor #1	
[-] Displays\Process Monitoring\Batch Reactor #2	
[-] Displays\Process Monitoring\Kamyr	
[-] Displays\Process Monitoring\Main Column Bottom	
[-] Displays\Process Monitoring\Paper Machine	
[-] Displays\Process Monitoring\PI Expressions	
[-] Displays\Process Monitoring\PI Summary	
[-] Displays\Process Monitoring\Process Display	
[-] Displays\Process Monitoring\Pulp Prep #1	
[-] Displays\Process Monitoring\Pulp Prep #2	
[-] Displays\Process Monitoring\Trends #1	
[-] Displays\Process Monitoring\Trends #2	
[-] Displays\SLTC Building\SLTC - AC RTU Displays - AC2	
[-] Displays\SLTC Building\SLTC - Device View - VAVCO	
[-] Can be Partially Migrated	
[-] Displays\Process Monitoring\Particulate Removal System	
[-] Displays\Process Monitoring\Trends #3	
[-] Displays\SLTC Building\SLTC - Energy Management Overview	

Select All 19 files listed 19 files selected

View Reports Migrate Displays

3 迁移

Analysis Results

Summary Tree View

Path/FileName	Status	Issue Tags	Progress
[-] Displays			
[-] Process Monitoring			
[-] Animation #1			Migrated
[-] Animation #2			Migrated
[-] Batch Reactor #1			Migrated
[-] Batch Reactor #2			Migrated
[-] Kamyr			Migrated
[-] Main Column Bottom			Migrated
[-] Paper Machine			Migrated
[-] Particulate Removal System			Migrated
[-] PI Expressions			Migrated
[-] PI Summary			Migrated
[-] Process Display			Migrated
[-] Pulp Prep #1			Migrated
[-] Pulp Prep #2			Migrated
[-] Trends #1			Migrated
[-] Trends #2			Migrated
[-] Trends #3			Migrated
[-] SLTC Building			
[-] SLTC - AC RTU Displays - AC2			Migrated
[-] SLTC - Device View - VAVCO			Migrated
[-] SLTC - Energy Management Overview			Migrated

Select All 19 files listed 19 files selected

View Reports Migrate Displays

PI ProcessBook 迁移

Analysis Results		Summary	Tree View
Path/FileName	Issue Tags		
Can be Fully Migrated			
Displays\Process Monitoring\Animation #1			
Displays\Process Monitoring\Batch Reactor #1			
Displays\Process Monitoring\Kamyr			
Displays\Process Monitoring\Main Column Bottom			
Displays\Process Monitoring\Paper Machine			
Displays\Process Monitoring\Pulp Prep #1			
Displays\Process Monitoring\Trends #1			
Displays\SLTC Building\SLTC - Device View - VAVCO			
Can be Partially Migrated			
Displays\Process Monitoring\Particulate Removal System			
Displays\Process Monitoring\Trends #3			
Displays\SLTC Building\SLTC - Energy Management Overview			
Select All		11 files listed 11 files selected	

✓ Trend

✓ XY Plot

✓ Bar

✓ Shapes & Lines

✓ Multistate

✓ Display Links

✓ Displays & Workbooks

✓ Images

! VBA

! SQC Charts

! BatchView

! Data Sets

! ActiveX controls



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PI ProcessBook 迁移演示

Emma Wang

Meeting start time: Thursday, June 11, 2020 3:04:24 PM

Organizer: Emma Wang



即席趋势图

深入研究您的运营情况

选择相关数据

趋势图、探索数据

发现问题



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即席趋势图演示

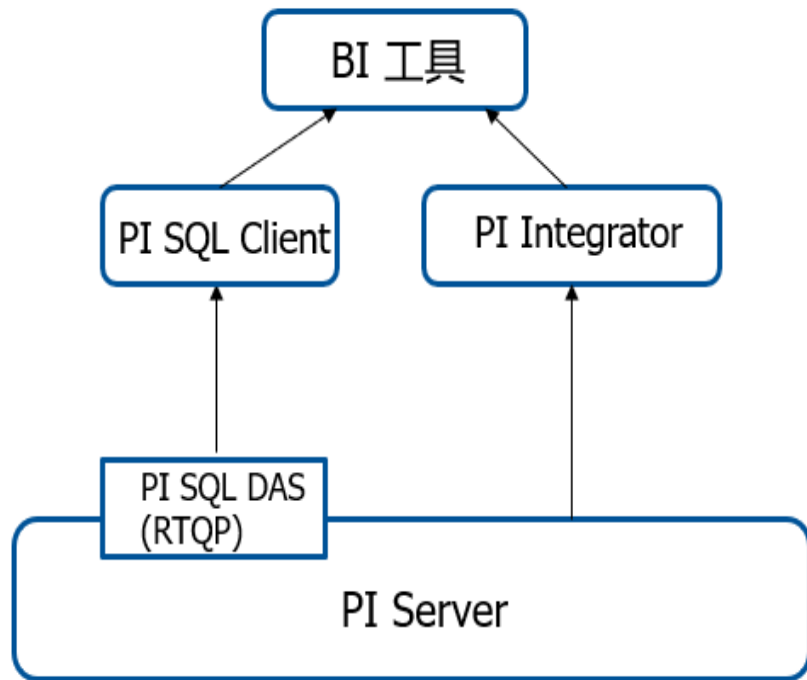
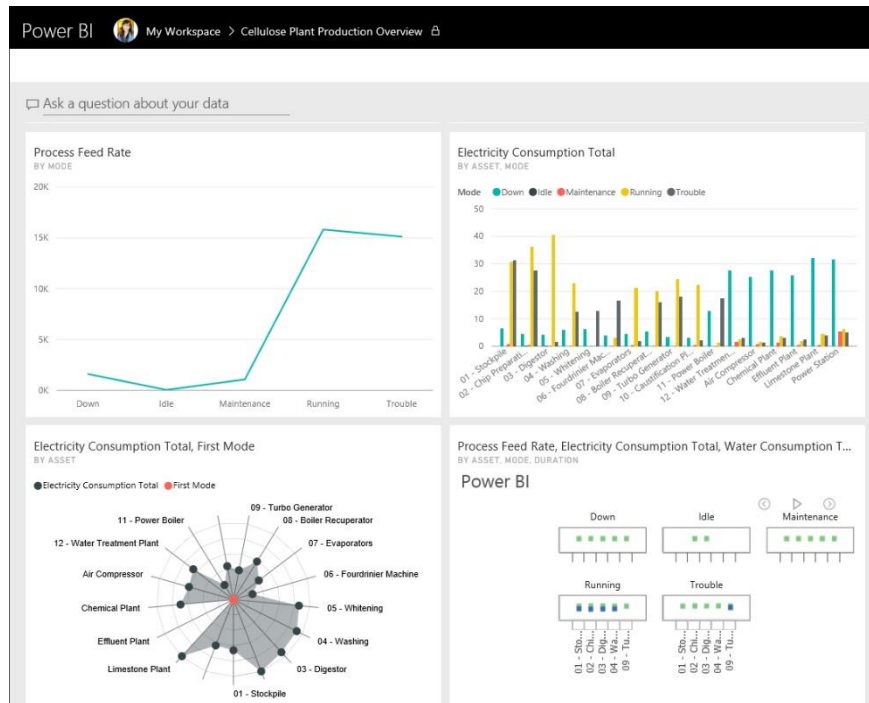
Emma Wang

Meeting start time: Thursday, June 11, 2020 2:23:10 PM

Organizer: Emma Wang



BI 工具



通过PI SQL Client访问PI数据

--PI SQL Data Access Server (RTQP)

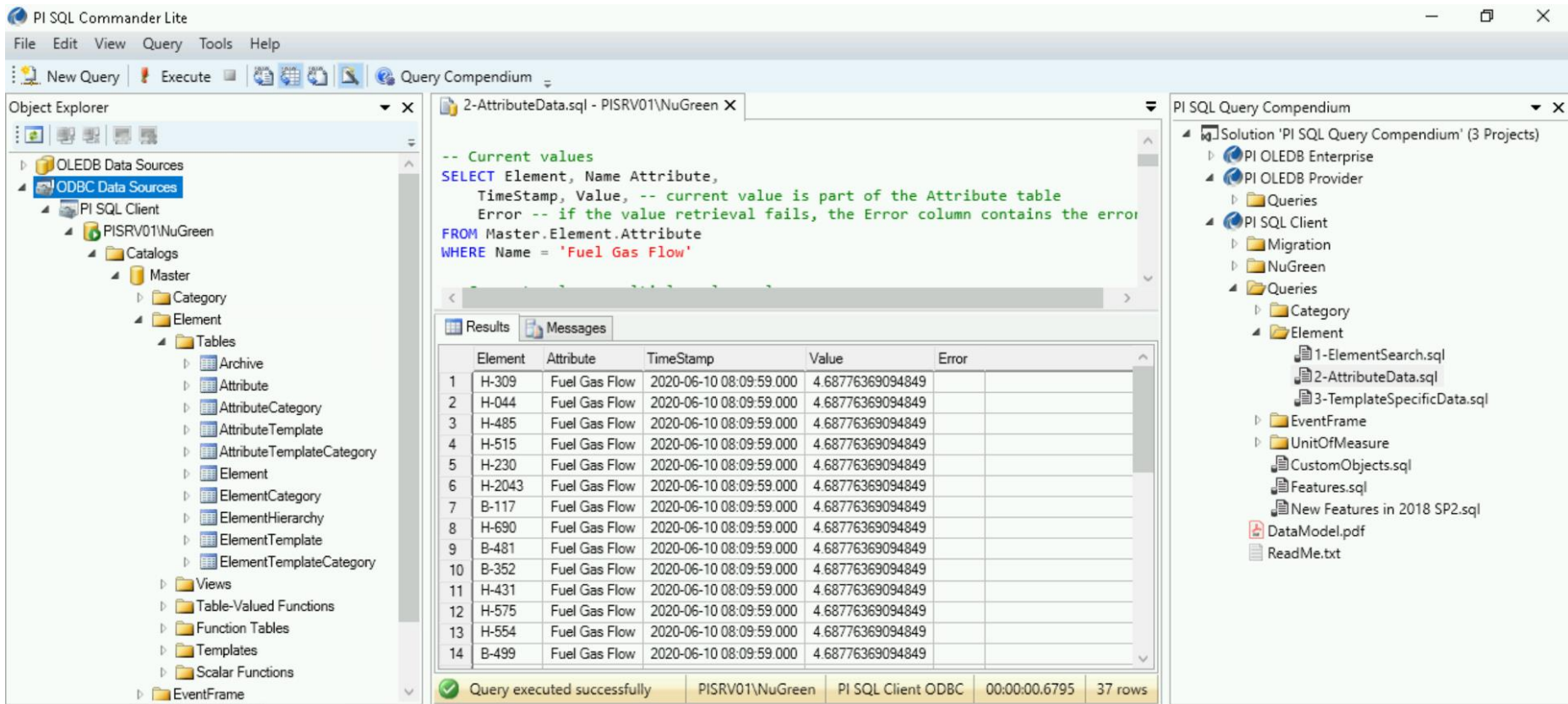


查询引擎: RTQP vs PI OLEDB Provider or Enterprise

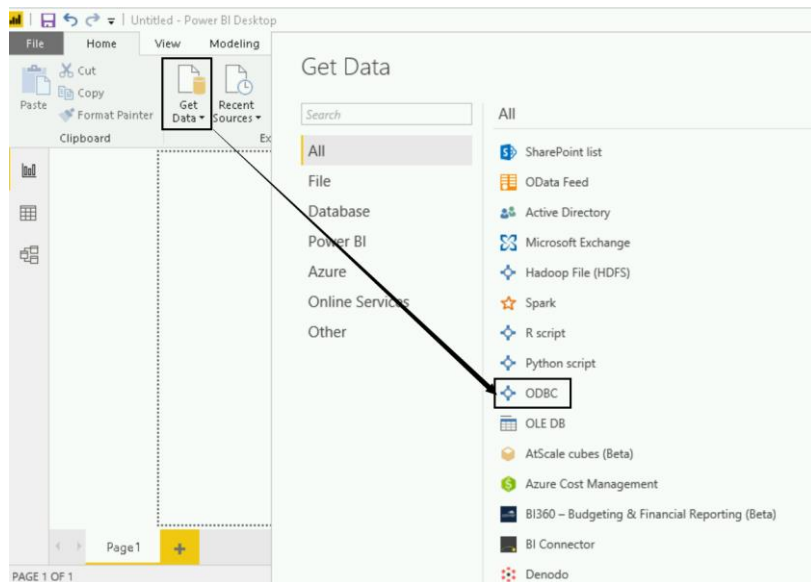
Query Engine	优点	缺点
PI OLEDB Provider	• 直接访问PI Data Archive • 支持读/写 • 结构简单	• 不能访问AF Server
PI OLEDB Enterprise	• 直接访问AF Server • 高度标准化 • 转置查询	• 只读 • 不能直接访问PI Data Archive (只能通过PI Points Data Reference) • 被RTQP取代
PI SQL Data Access Server(RTQP)	• 性能优化明显 • 数据流简单 • 转置查询	• 只读 • 只能装在AF Server上 • 不能直接访问PI Data Archive (只能通过PI Points Data Reference)



PI SQL Commander 工具的使用



在Power BI内导入PI 数据



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在Power BI内导入PI 数据

Untitled - Power BI Desktop

File Home Modeling Help

Clipboard: Paste, Cut, Copy, Format Painter

External data: Get Data, Recent Sources, Enter Data, Edit Queries, Refresh

Insert: New Page, New Visual, Ask A Question, Buttons, Text box, Image, Shapes

Custom visuals: From Marketplace, From File

Themes: Switch Theme

Relationships: Manage Relationships

Calculations: New Measure, New Column, New Quick Measure

Share: Publish

Sign in

Element	Attribute	TimeStamp	Value	Error
B-555	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
B-309	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
B-737	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
B-914	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
B-459	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
B-334	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
B-125	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
B-045	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
H-309	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
H-044	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
H-485	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
H-515	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
H-230	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	
H-2043	Fuel Gas Flow	6/9/2020 11:45:29 AM	43.68257141	

TABLE: Query1 (37 rows)

Fields: Search, Query1, Attribute, Element, Error, TimeStamp, Value

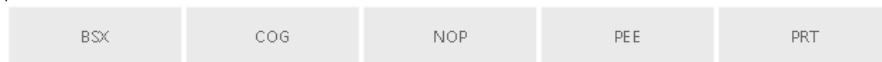
UPDATE AVAILABLE (CLICK TO DOWNLOAD)



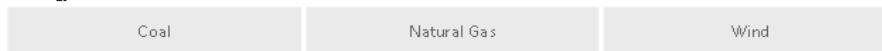
Power BI数据展示与分析

Unit	Average of Generating Efficiency	Average of Utilization
ZMND01	69.12	40.04
PTC01	64.31	28.74
PLTD2	63.09	64.15
BAU02	62.00	43.52
BCU02	61.00	56.88
MAM01	59.92	53.35
ZMND2	59.39	64.04
MAM02	58.93	51.32
MAM03	58.70	49.11
TCB01	58.05	53.40
GAC01	58.04	57.59
TCB06	57.80	54.80
TCB05	57.28	56.09
PQB03	57.20	71.32
ALD01	57.13	62.84
PTC02	55.70	53.46
PQB04	55.46	59.71
TCB02	53.23	35.57
PLTD1	52.82	66.44
TCB03	51.70	60.48
TCB04	50.38	41.21
PQB02	48.66	38.29
PTC03	48.17	32.20
POE01	48.12	33.05
BCU01	47.87	43.16
MND01	45.52	47.60
MAM04	41.51	27.49
MND02	37.82	32.51
CEC01	35.34	26.35
GAC02	15.16	71.12
Total	52.98	49.19

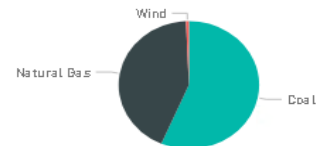
Operator



Technology

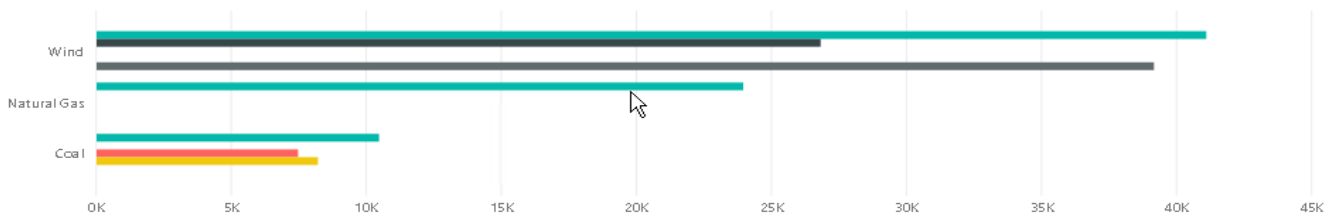


CO2 and Cost by Technology



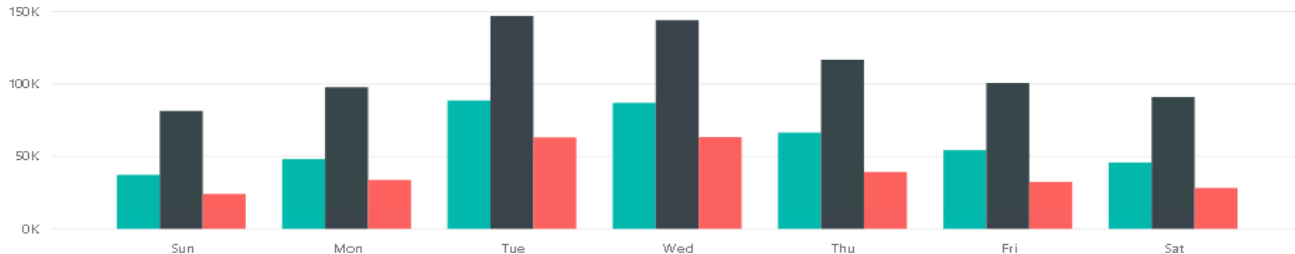
Average of Cost by Technology and Operator

Operator: BSX (teal), COG (black), NOP (red), PEE (yellow), PRT (grey)



Total Hourly Gross Generation by Weekday and Technology

Technology: Coal (teal), Natural Gas (black), Wind (red)



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总结

选择现代化可视化工具跟上不断发展的数据世界

了解您的需求

选择合适的可视化工具

- PI Vision可提供实时的**易使用**，**自助式**，**可扩展**的关键操作视图
- PI DataLink支持Excel功能以进行**报表**和**历史数据分析**。
- BI工具通过使用PI SQL 和PI Integrator将**PI数据**与**业务数据**结合在一起



问题?



THANK YOU

