EcoStruxure Integrated Solutions

Integrate with other systems to provide comprehensive energy management

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EcoStruxure Power Monitoring Expert Interoperability

EcoStruxure PME in brief

EcoStruxure is a complete interoperable range of products, applications and services, with innovation at every level offering end-to-end cyber security.

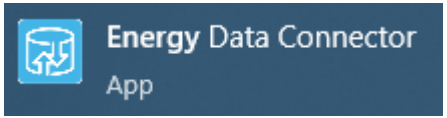
Flexible licensed software modules and subscription based advisory/analytics services

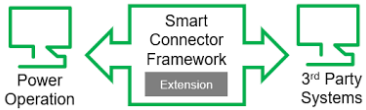
- Protect People and Assets
- Optimize Business continuity
- Maximize Lifecycle Efficiency

EcoStruxure Power Monitoring Expert Interoperability

Various supported methods/protocols for x-platform integration

- Interoperability supported through communications protocols / middleware utilities:
  - OPC DA / UA: Server& Client
  - Modbus/TCP: Master & Slave
- ODBC connectivity
- XML Import
- EDC / ETL
- Web Service: EcoStruxure Web Service (EWS)
- Smart Connector (APIs)





Solution using the Extract Transform Load (ETL) Tool…

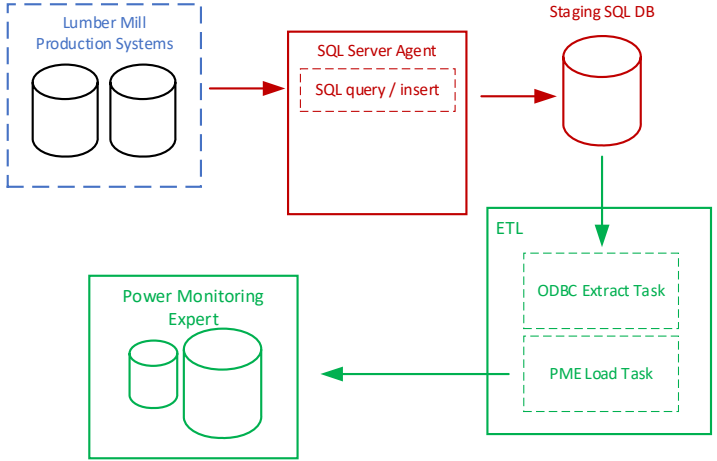
Customer Examples: Lumber Mill

Using ETL to import data from on-premise production systems

Using PME as centralized reporting system to benchmark production data with electrical consumption data

Multiple server-side systems (no client front end)

- Compressed air system
- Dryer system
- Production data
- Gas Consumption data

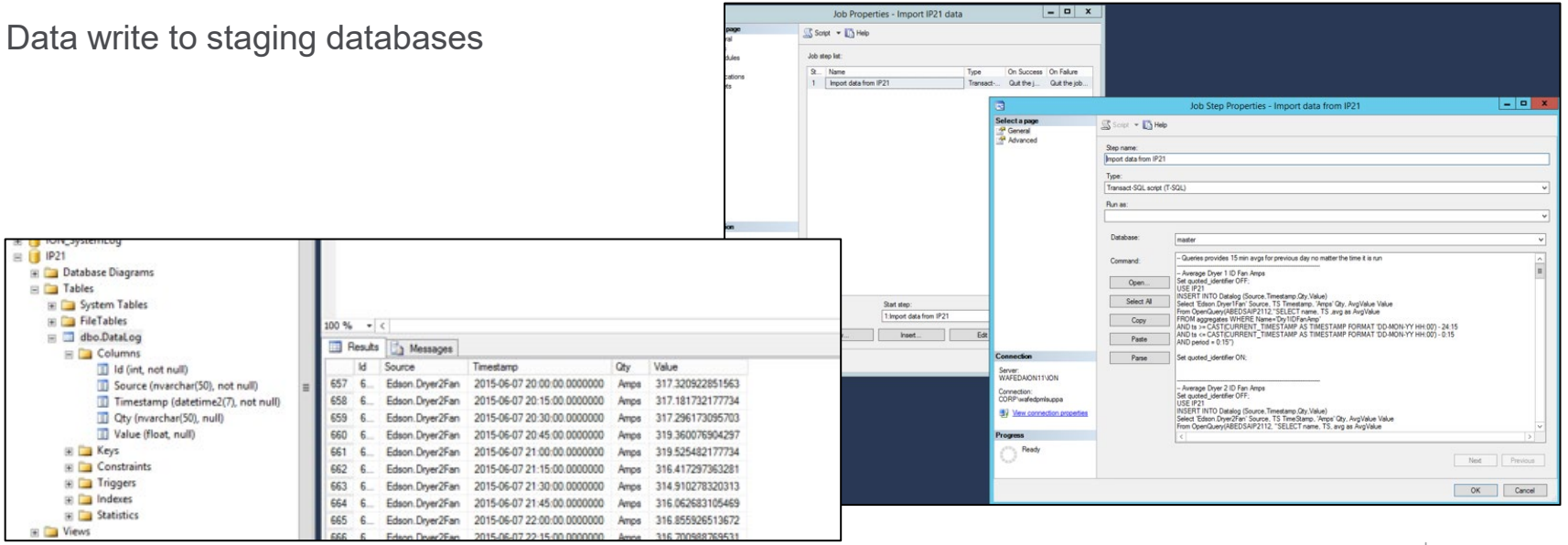


Customer Examples: Lumber Mill

T-SQL query for staging database

Using SQL Server Agent to run T-SQL query to import data from production systems

Data write to staging databases

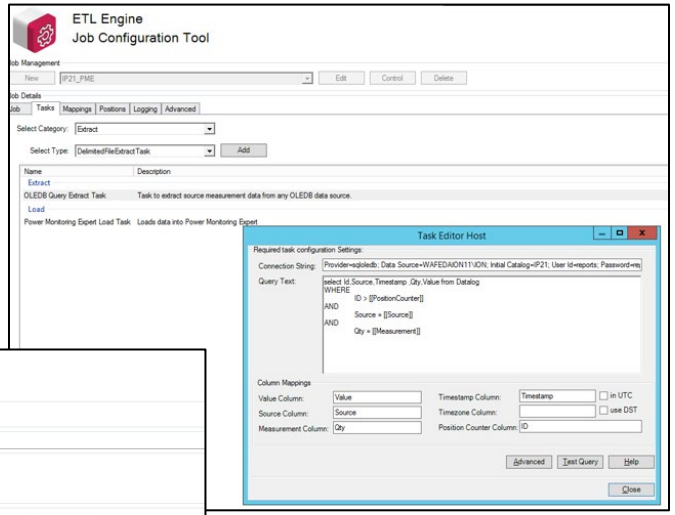


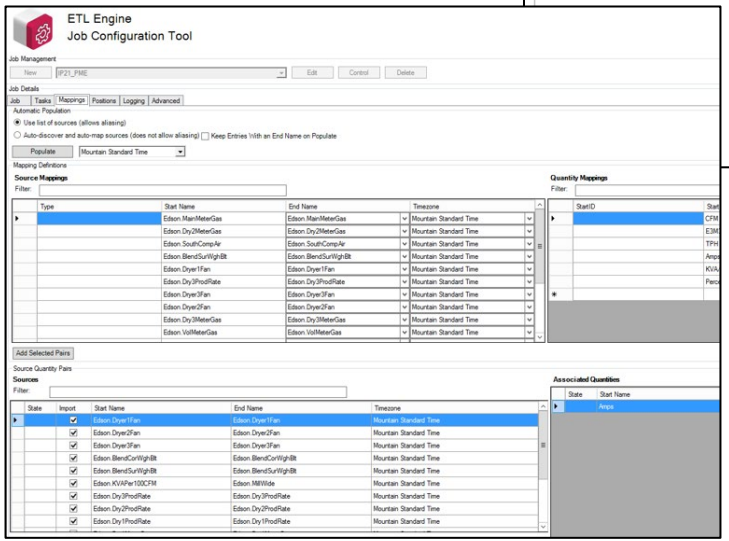
Customer Examples: Lumber Mill

ETL Configuration

ETL Supports OLEDB import task

Simple UI for mapping parameters





Customer Examples: Lumber Mill

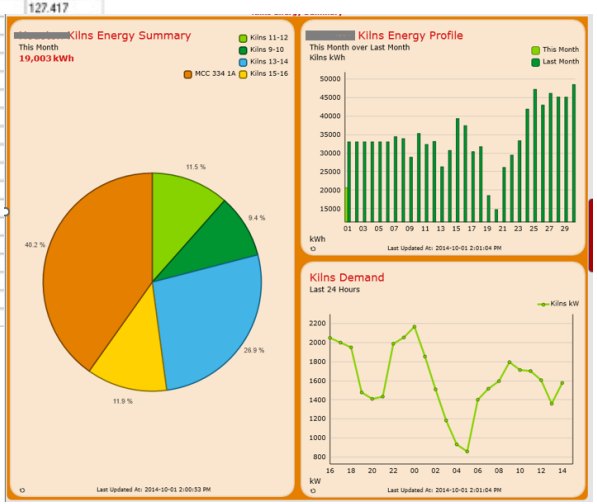
PME Configuration

Create Dashboards and real-time trends to render data

Automated reports generated and email through subscriptions

Customer is able to easily visualize key production data in relation to energy consumption

	Timestamp	Dry1 NatGas [m^3/h]	Dry2 NatGas [m^3/h]	Dry3 NatGas [m^3/h]	Main NatGas [m^3/h]
1	06/24/2015 11:45:00.000 PM	46.968	0	52.514	128.07
2	06/24/2015 11:30:00.000 PM	46.949	0	52.211	127.788
3	06/24/2015 11:15:00.000 PM	46.914	0	52.3	127.2
4	06/24/2015 11:00:00.000 PM	46.819	0.809	52.728	128.081
5	06/24/2015 10:45:00.000 PM	46.918	9.309	53.249	128.366
6	06/24/2015 10:30:00.000 PM	46.939	6.497	53.194	128.278
7	06/24/2015 10:15:00.000 PM	46.906	36.042	53.24	127.417
8	06/24/2015 10:00:00.000 PM	46.792	29.651	53.127	
9	06/24/2015 09:45:00.000 PM	46.545	6.133	53.117	
10	06/24/2015 09:30:00.000 PM	46.346	0	53.114	
11	06/24/2015 09:15:00.000 PM	46.269	0	52.931	
12	06/24/2015 09:00:00.000 PM	46.254	0	52.727	
13	06/24/2015 08:45:00.000 PM	46.201	0	52.524	
14	06/24/2015 08:30:00.000 PM	45.675	0	52.246	
15	06/24/2015 08:15:00.000 PM	45.59	0	52.114	
16	06/24/2015 08:00:00.000 PM	45.668	0	52.246	
17	06/24/2015 07:45:00.000 PM	45.774	0	52.505	
18	06/24/2015 07:30:00.000 PM	46.044	0	52.631	
19	06/24/2015 07:15:00.000 PM	45.978	0	52.774	
20	06/24/2015 07:00:00.000 PM	46.265	0	53.018	
21	06/24/2015 06:45:00.000 PM	46.105	0	53.093	
22	06/24/2015 06:30:00.000 PM	46.166	0	52.871	
23	06/24/2015 06:15:00.000 PM	45.95	0	52.972	
24	06/24/2015 06:00:00.000 PM	46.053	0	53.287	



University: PME integration with BMS

Using EODC to import Siemens Apogee Data

PME system with over 200 metering devices

Siemens Apogee BMS collecting data from numerous sensors

- Chill water
- Heated water
- High pressure steam
- Natural Gas

Energy manager needed centralized system for energy performance monitoring and reporting

Challenges:

- Version of apogee system used at the time did not support direct means of integrations (OPC for example)
- IT constraints involving BMS accessibility
- Apogee system capable of exporting data in CSV format. D
- Data was structured in a non-standard format.
- Required a utility to parse and import the data files

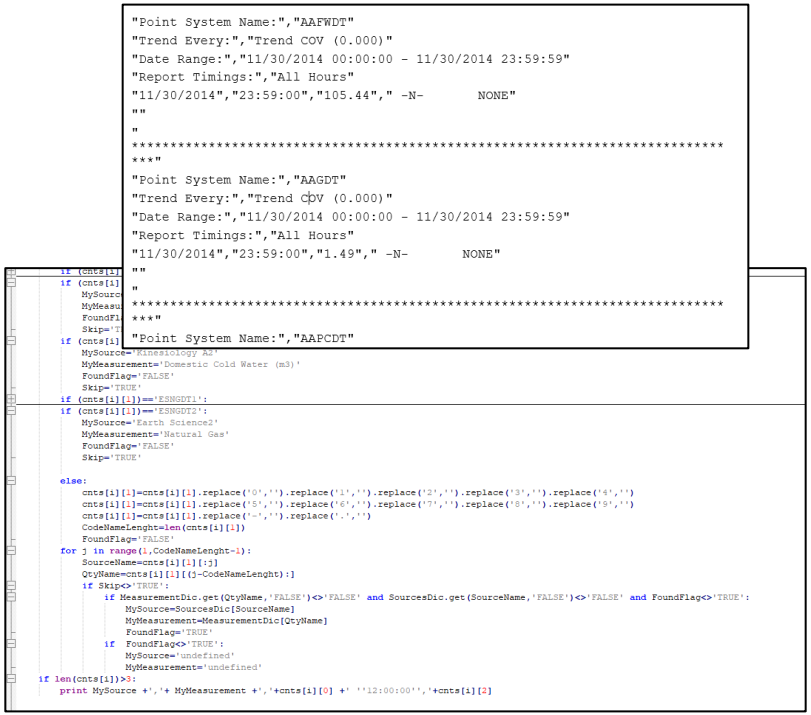
Solution using the Energy Data Connector (EDC)…

University: PME integration with BMS

The solution

Using the EDC…

- PythonScript extract task with custom code written to parse exported reports from Apogee system
- PME load task to process the parsed data and write directly into PME
- Task run daily after scheduled export from Apogee system



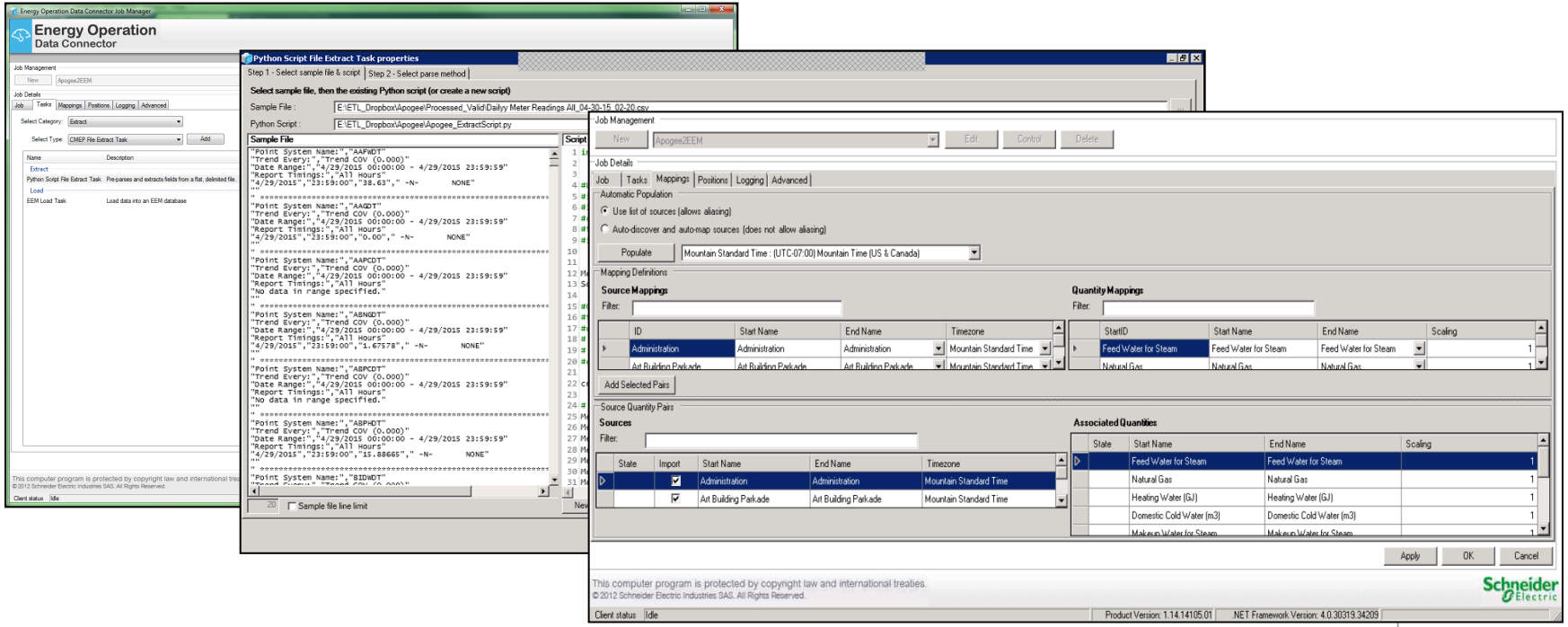
```
"Point System Name:","AAFWDT"
"Trend Every:","Trend COV (0.000)"
"Date Range:","11/30/2014 00:00:00 - 11/30/2014 23:59:59"
"Report Timings:","All Hours"
"11/30/2014","23:59:00","105.44"," -N-       NONE"
""
"
**************************************************************************
***"
"Point System Name:","AAGDT"
"Trend Every:","Trend COV (0.000)"
"Date Range:","11/30/2014 00:00:00 - 11/30/2014 23:59:59"
"Report Timings:","All Hours"
"11/30/2014","23:59:00","1.49"," -N-       NONE"
""
"
**************************************************************************
***"
"Point System Name:","AAPCDT"
```

```
        if (cnts[i]
        if (cnts[i]
            MySourc
            MyMeasu
            FoundFl
            Skip='T
        if (cnts[i]
            MySource='Kinesiology A2'
            MyMeasurement='Domestic Cold Water (m3)'
            FoundFlag='FALSE'
            Skip='TRUE'
        if (cnts[i][1])=='ESNGDT1':
        if (cnts[i][1])=='ESNGDT2':
            MySource='Earth Science2'
            MyMeasurement='Natural Gas'
            FoundFlag='FALSE'
            Skip='TRUE'

        else:
            cnts[i][1]=cnts[i][1].replace('0','').replace('1','').replace('2','').replace('3','').replace('4','')
            cnts[i][1]=cnts[i][1].replace('5','').replace('6','').replace('7','').replace('8','').replace('9','')
            cnts[i][1]=cnts[i][1].replace('-','').replace('.','')
            CodeNameLenght=len(cnts[i][1])
            FoundFlag='FALSE'
        for j in range(1,CodeNameLenght-1):
            SourceName=cnts[i][1][:j]
            QtyName=cnts[i][1][(j-CodeNameLenght):]
            if Skip<>'TRUE':
                if MeasurementDic.get(QtyName,'FALSE')<>'FALSE' and SourcesDic.get(SourceName,'FALSE')<>'FALSE' and FoundFlag<>'TRUE':
                    MySource=SourcesDic[SourceName]
                    MyMeasurement=MeasurementDic[QtyName]
                    FoundFlag='TRUE'
                if  FoundFlag<>'TRUE':
                    MySource='undefined'
                    MyMeasurement='undefined'
    if len(cnts[i])>3:
        print MySource +','+ MyMeasurement +','+cnts[i][0] +' ''12:00:00'','+cnts[i][2]
```

University: PME integration with BMS

The solution

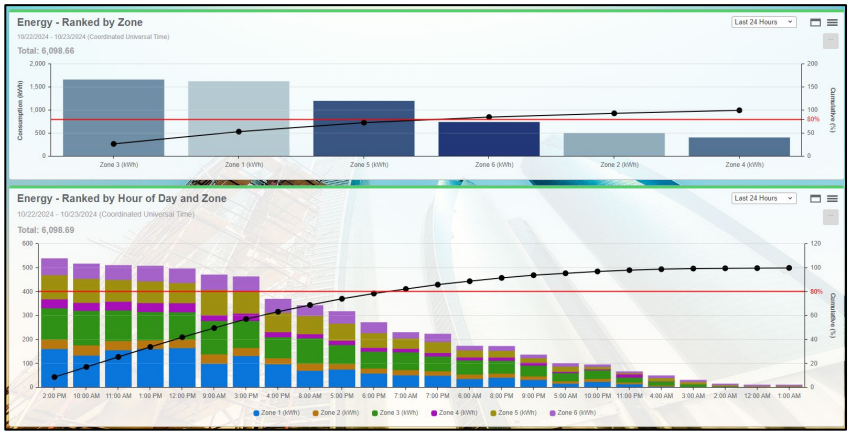


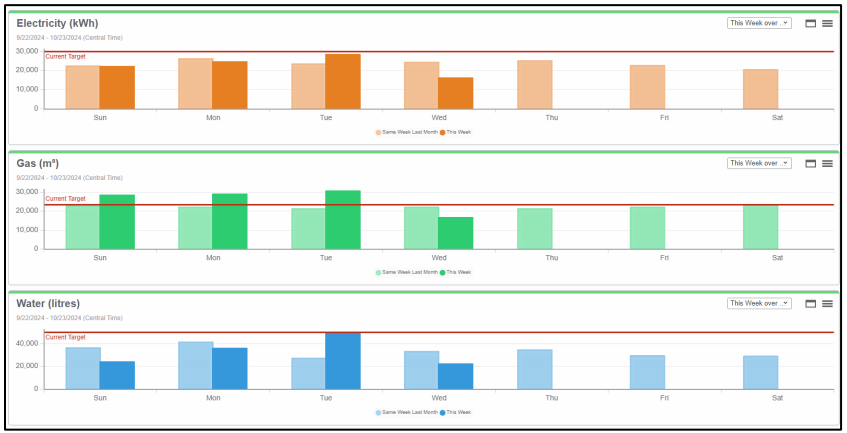
University: PME integration with BMS

The solution

Customer able to visualize energy consumption and energy performance targets

Covert data to common units of energy (GJ / kWh)





Solution using the Smart Connector…

EcoStruxure Smart Connector

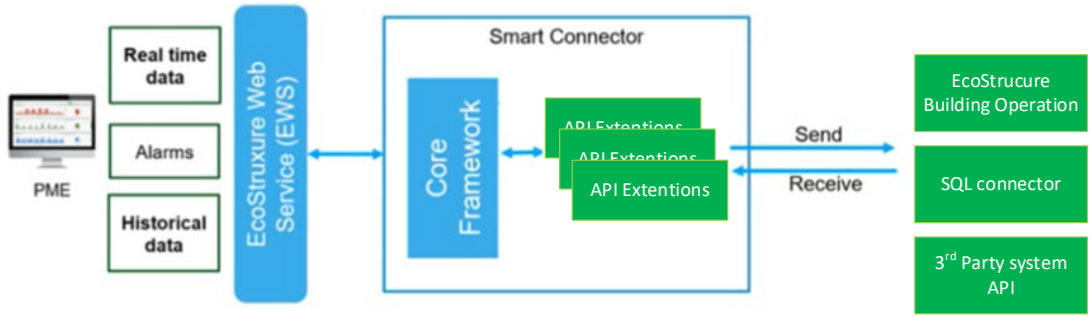
Introduction

Utility to integrate EcoStruxure Edge control as well as other systema

Uses common EWS

Realizable, Scalable, Customizable

Create custom APIs to integrate with other systems



EcoStruxure Smart Connector API Solutions

Port Authority with multiple systems

Port Authority using PME for data acquisition and energy management system.

Number of assets:

- PM8000s
- PM5000s
- 3rd party devices including QMC meters (remotely connected and used for tenant (terminal) metering

Challenges:

- QMC meters not connected to LAN
- Meter data was only available in QMC MeterConnex cloud-based platform
- No direct method of connecting remote metering device to PME
- Needed centralized system for all metering data

Smart Connector API: QMC MeterConnex

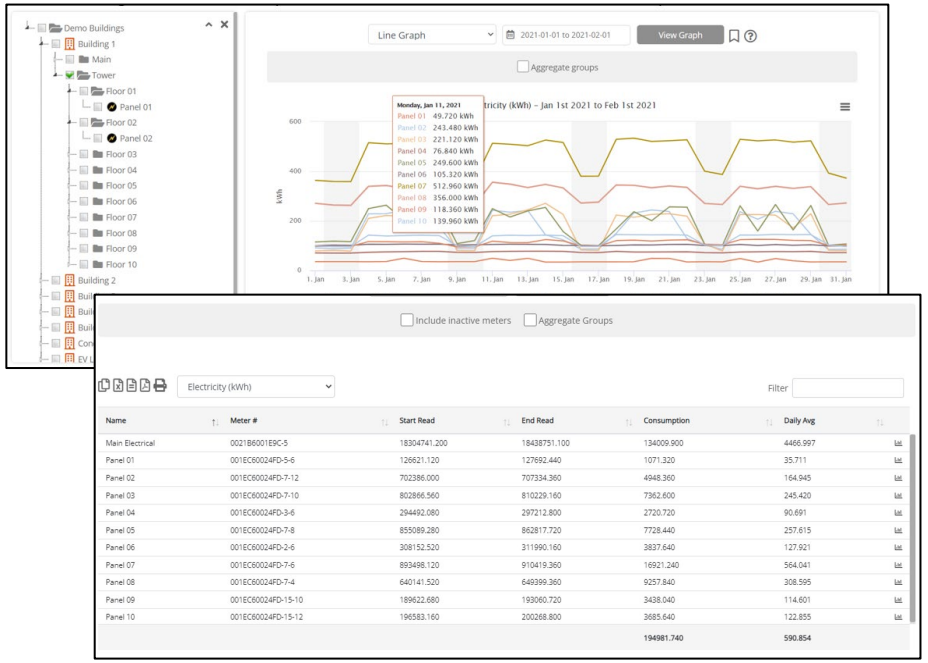
What is Meter Connex?

MeterConnex is QMC's cloud-based meter data management/acquisition platform.

Meters that are remotely connected without did can have their data uploaded to this

Data collected from remote metering devices and stored in cloud servers.

Data is accessible through API and users can access their own meter data using a unique login and password.



Smart Connector API: QMC MeterConnex

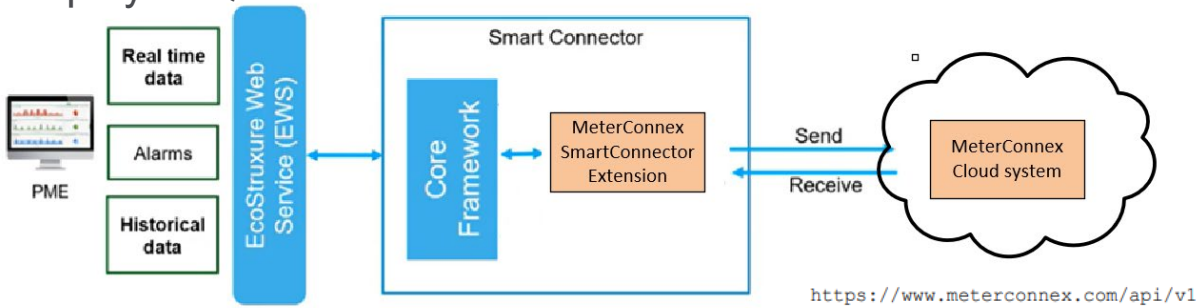
The solution

Development of custom Smart Connector API

EWS client supported as of PME 2023

Customer recently upgrade to PME 2023R2

Smart Connector solution to be deployed Q4



More solutions using the Smart Connector…

Smart Connector API: Energy Star Portfolio Manager

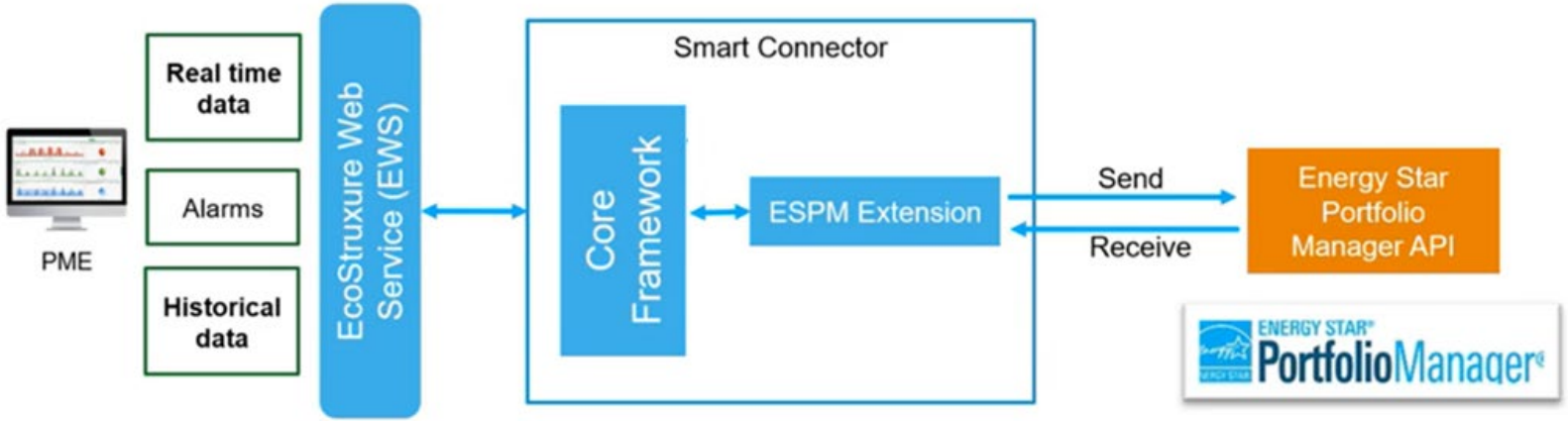
What is it and why use it?

Online web accessible interactive resource management and performance tracking tool for buildings

- Helps identify energy savings opportunities
- Compares measured performance to like facilities
- Provides ENERGY STAR score rating
- Gain recognition through building certification:
  - Canada Green Building Council (LEED)
  - Buildings Owners and Managers Association (BOMA Best)

Smart Connector API: Energy Star Portfolio Manager

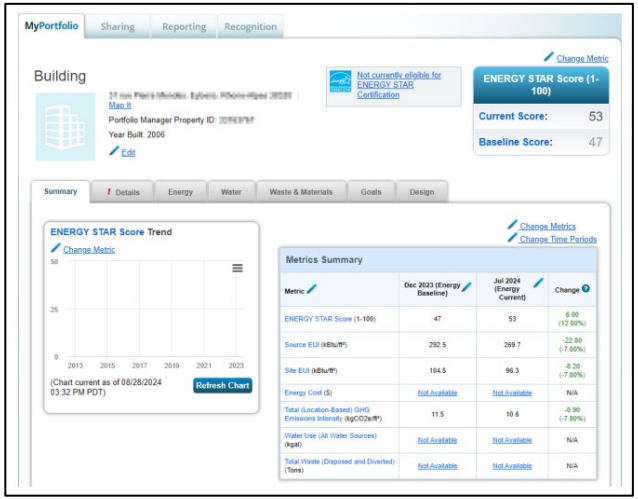
How does it work?



Customer must have ESPM account created with property

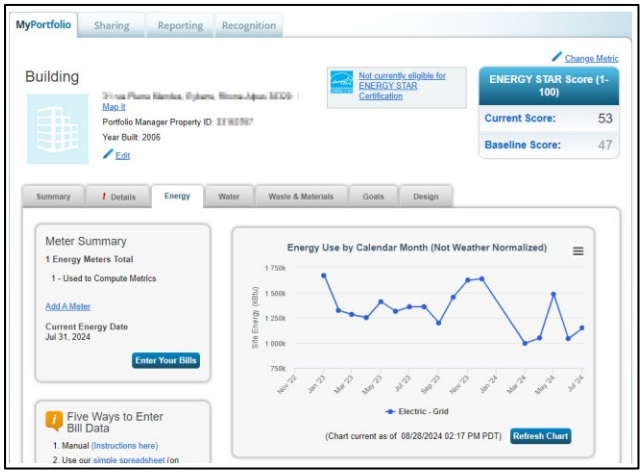
Smart Connector API: Energy Star Portfolio Manager

Data uploaded to ESPM directly from PME



If enough data was uploaded to the property, then the ENERGY STAR Score, and EUI values should be calculated and available.

ENERGYSTAR score can be imported back into PME

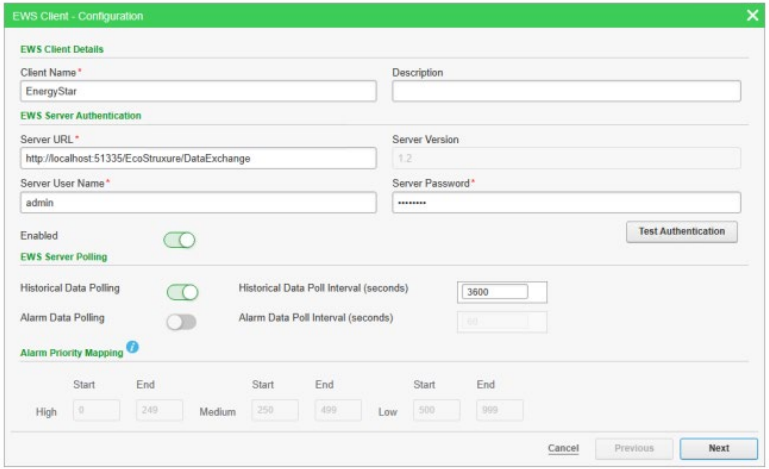


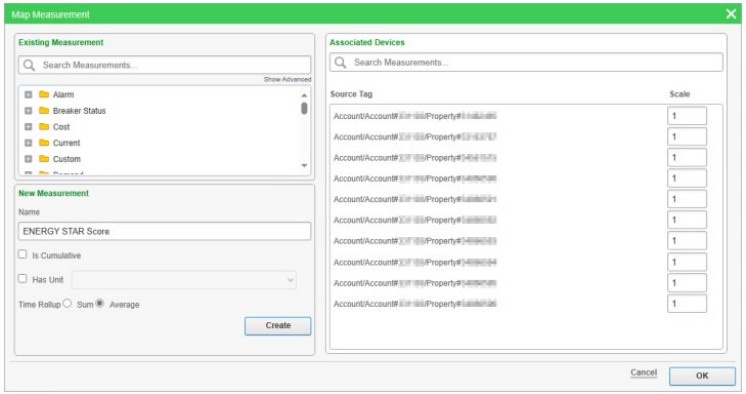
Requires EWS client support (PME2023R2 or newer)

Smart Connector API: Energy Star Portfolio Manager

Map Portfolio Manager Metrics into PME

PME's EWS Client is used to map the metrics from Portfolio Manager, via SmartConnector's EWS Server, into sources and measurements in PME.





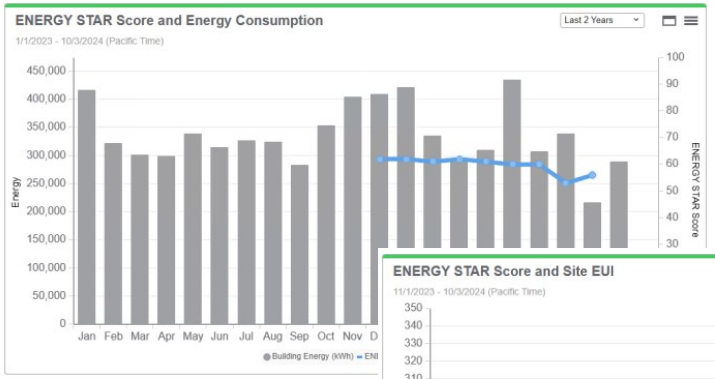
Next step would be to configure PME dashboards to display data

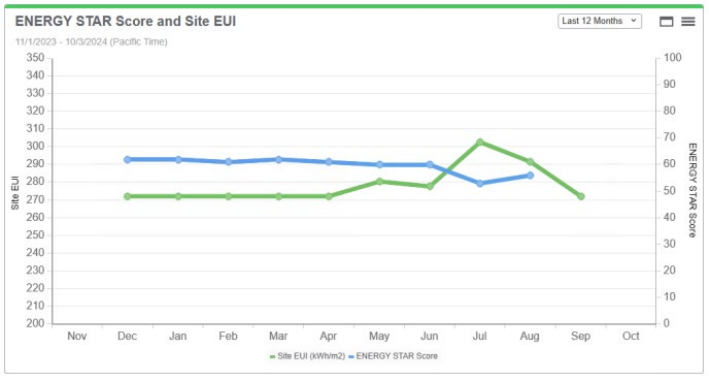
Smart Connector API: Energy Star Portfolio Manager

Data retrieval from ESPM into PME

Example of fed back from ESPM platform to PME

- ENERGYSTAR Score vs energy consumption
- ENERGYSTAR Score vs site EUI





Questions?

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