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**T&D USERS  
GROUP** 2014  
The **Power** of **Data**



DECISION READY IN REAL-TIME

Presented by **Timothy Schwarz, PE**  
**Lead Engineer**

# Agenda

- Pepco Holdings, Inc. Overview
- Asset Framework Design and Importance
- PI Notifications
- EMS Event Storage and Retrieval
- PI Coresight Usage
- PI Web Parts with PI Data Services
- EMS Display Conversion
- Future Plans

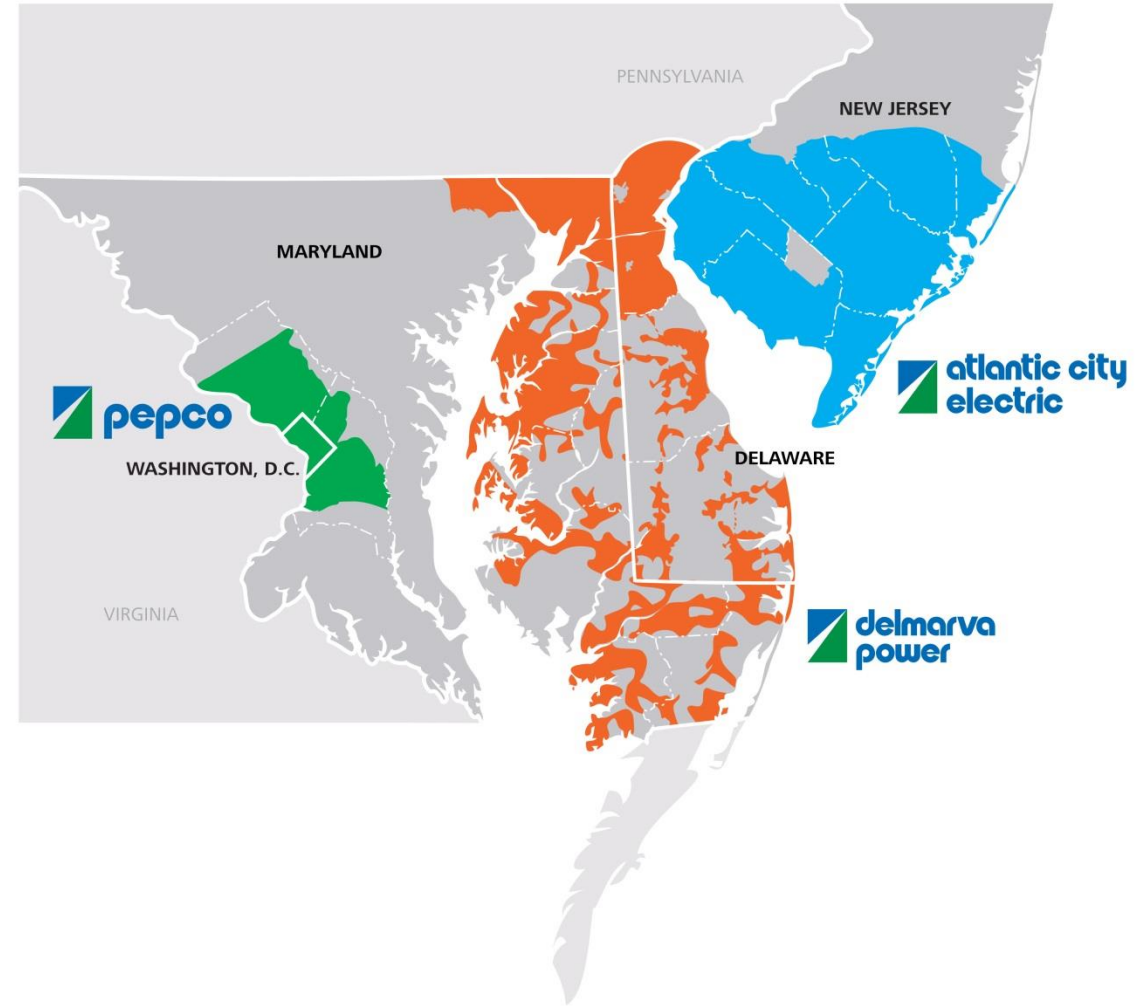
# About Pepco Holdings, Inc.

- Approximately 2 million customers in Delaware, the District of Columbia, Maryland and New Jersey
  - Atlantic City Electric, Delmarva Power and Pepco provide regulated electricity service
    - Delmarva Power also provides natural gas service
  - Pepco Energy Services is a non-regulated subsidiary that provides energy efficiency and renewable energy services



# Pepco Holdings, Inc. Quick Facts

- Incorporated in 2002
- Service territory:  
8,340 square miles
- Customers served
  - Atlantic City Electric:
    - 545,000 – electric
  - Delmarva Power:
    - 503,000 – electric
    - 125,000 – natural gas
  - Pepco:
    - 793,000 – electric
- Total population served:  
5.6 million

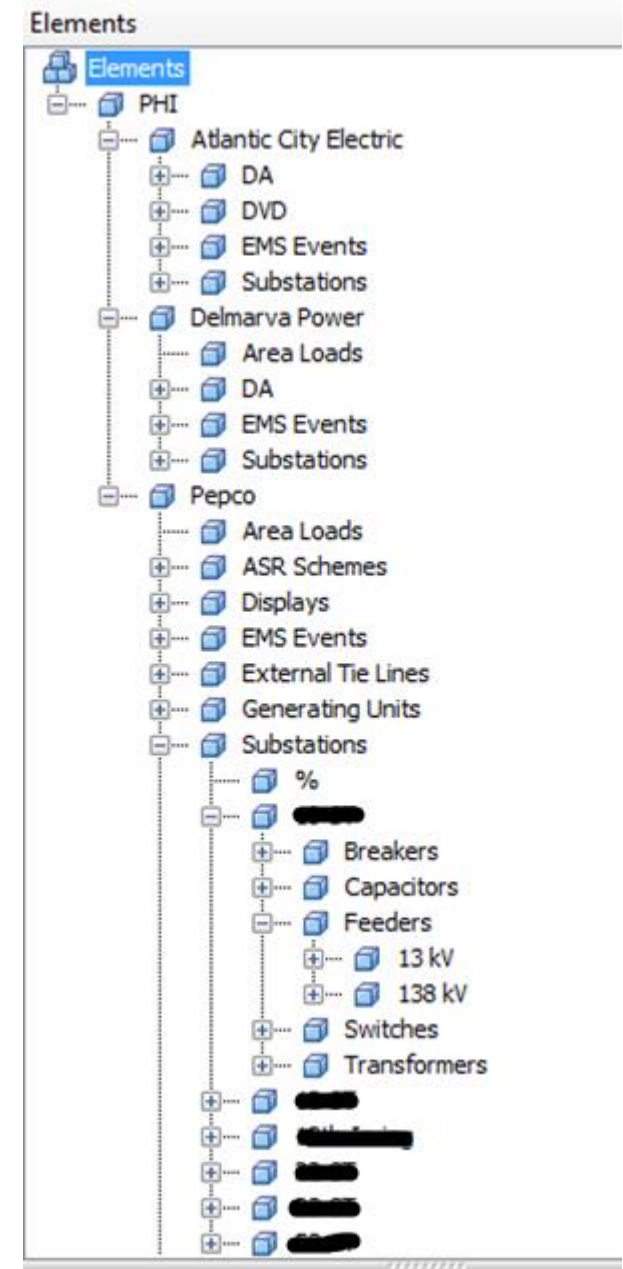


# Asset Framework

- AF is the basis for viewing and analyzing PI data
- Detailed queries and reporting tools utilize either the AF SDK or OLEDB
- Initial burden of building out AF primarily done through use of college interns
- Current counts as of 8/25/14 in our EMS AF Database
  - 27417 Elements
  - 58 Element Templates

# Asset Framework

- Pepco Holdings, Inc. is split into the three operating companies
- There are varying differences among templates and attributes
- Mostly follow the same design from a hierarchical perspective



# PI Notifications

- Having AF is a requirement for generating PI notifications
- Creating these notifications can eliminate phone calls from system operators and alert on certain conditions
- PHI is still in early stages of rolling out notifications
- Notifications are built for State Estimator and Contingency Analysis failures for System Operations Engineering
- Distribution Automation schemes have notifications that get sent out to a wide audience on activation
- Future plans would be to send more notifications to the field based on alarms coming into EMS

# EMS Events

- The three PHI companies combined receive around 60k-70k EMS events on a daily basis
- Previously, this data has been stored in an Oracle database very inefficiently with one giant table containing all the records
- SQL queries against this database take a minimum of 10 minutes due to the large number of records with data going back to 2011



# EMS Events

- The data is stored in PI by using a PI tag for each EMS Station
- The event data such as Station Name, Point Name, Event Description, SCADA Time Stamp, etc. is extracted from the EMS and concatenated together into a string
- Specific delimiters are used to distinguish the individual fields
- Program runs every five minutes to pull the data from the EMS and build the input files for PI
- Batch FL loads the input files into the PI system
- Each EMS station has an AF element with one AF attribute for the event

# EMS Events

- Queries are done through a custom website utilizing AF SDK code to extract the data
- The string value stored in PI is parsed for viewing
- Data can be downloaded to a .csv file for detailed analysis in excel
- Time required to pull 50k events only a few seconds

The screenshot displays the 'PHU ~ SCADA Alarm & Event Log - ACE, DPL, PEPCO' interface. It features a query form with the following sections:

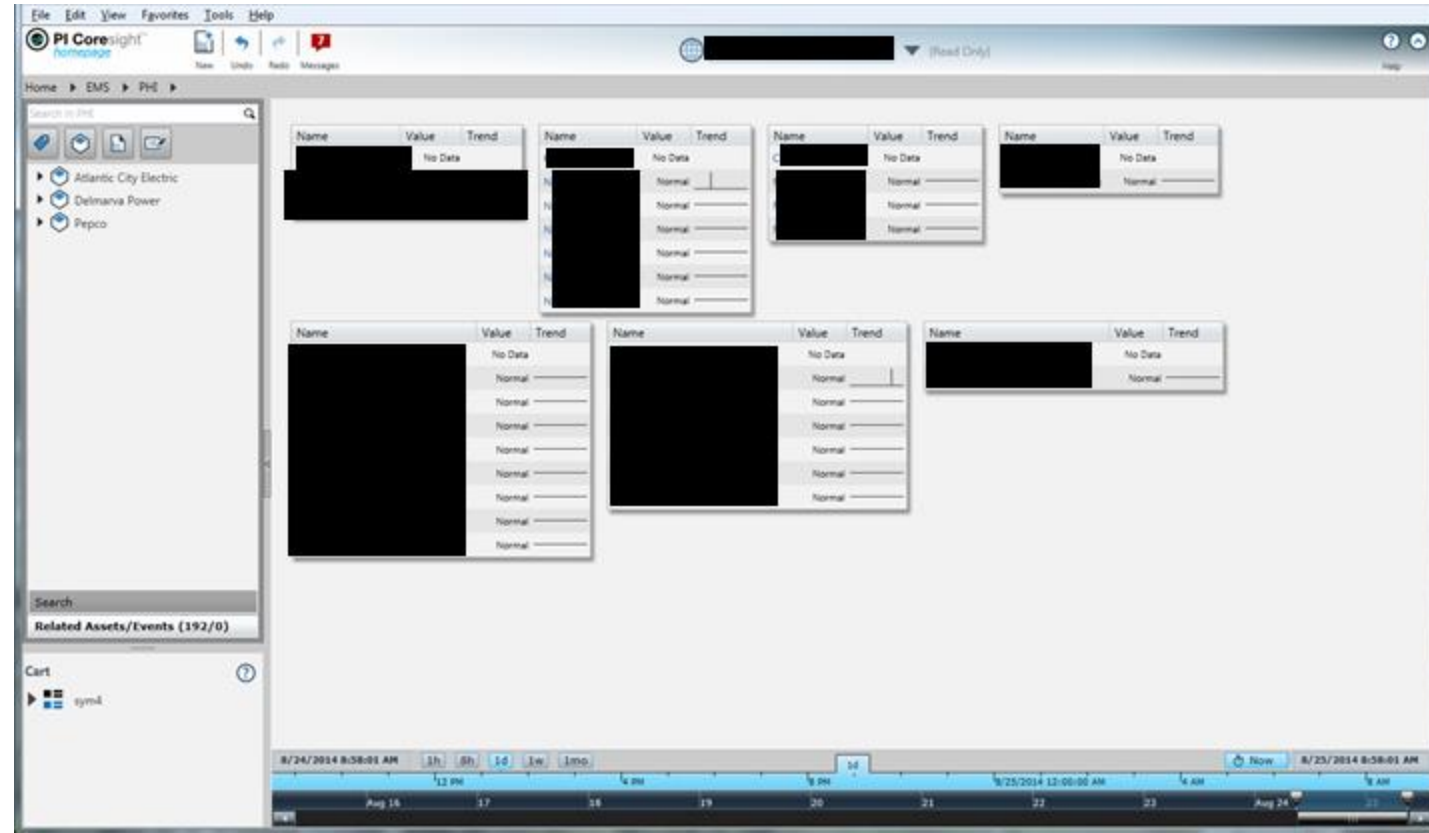
- Regions:** A dropdown menu set to 'Delmarva Power'.
- Station Name:** A text input field with 'Select Station' as a placeholder.
- Time Filters:** 'Starting Date' (08/25/2014 00:00:00) and 'End Date' (08/25/2014 06:00:00) fields.
- Search Filters:** An empty text input field.
- Options:** A checked checkbox for 'All Stations' and a note '\* DCTSta not included'. There are also unchecked checkboxes for 'Status Point' and 'Analog Point'.
- Submit Query:** A button to execute the search.

Below the form, it states 'Search result returned 1596 records, click [icon] to export the data'. A table of results is shown below:

| SCADA Timestamp▲      | Station Name | Point Name | Event Description                | Point # | TLQ  |
|-----------------------|--------------|------------|----------------------------------|---------|------|
| 08/25/14 00:00:45 EDT |              |            | Alarm                            |         | ..N  |
| 08/25/14 00:00:53 EDT |              |            | Alarm                            |         | ..N  |
| 08/25/14 00:00:55 EDT |              |            | Normal                           |         | ..   |
| 08/25/14 00:00:57 EDT |              |            | Normal                           |         | ..   |
| 08/25/14 00:01:49 EDT |              |            | Alarm                            |         | ..AN |
| 08/25/14 00:01:51 EDT |              |            | Alarm                            |         | ..N  |
| 08/25/14 00:02:05 EDT |              |            | Normal                           |         | ..A  |
| 08/25/14 00:02:05 EDT |              |            | Normal                           |         | ..   |
| 08/25/14 00:02:17 EDT |              |            | PS_IN_EXEC COS by Pgm RTCA       |         | ..I  |
| 08/25/14 00:02:17 EDT |              |            | PS_NOT_EXEC COS by Pgm RTCA      |         | ..I  |
| 08/25/14 00:02:31 EDT |              |            | New viols: Case# 176:CEDAR #8 TR |         | ..I  |
| 08/25/14 00:02:32 EDT |              |            | Harmful contingencies in RTCA    |         | ..I  |
| 08/25/14 00:02:33 EDT |              |            | PS_CMPX_VIOL COS by Pgm RTCA     |         | ..I  |
| 08/25/14 00:03:35 EDT |              |            | PS_IN_EXEC COS by Pgm RTNA       |         | ..I  |
| 08/25/14 00:03:35 EDT |              |            | PS_NOT_EXEC COS by Pgm RTNA      |         | ..I  |
| 08/25/14 00:03:35 EDT |              |            | PS_NOT_EXEC COS by Pgm RTNA      |         | ..I  |
| 08/25/14 00:03:41 EDT |              |            | Alarm                            |         | ..N  |
| 08/25/14 00:03:42 EDT |              |            | PS_CMPX_SUCC COS by Pgm RTNA     |         | ..I  |

# PI Coresight

- Has helped users create ad hoc displays for viewing data
- Allow more exposure to navigating AF
- Sharing displays by making it public
- Has brought in users that have never used PI before



# PI Coresight Mobile

- PHI IT has set up a mobile VPN that allows employees to access certain resources through mobile devices like iPad/iPhone
- Having 24x7 access to this data enhances off hours support



# PI Web Parts

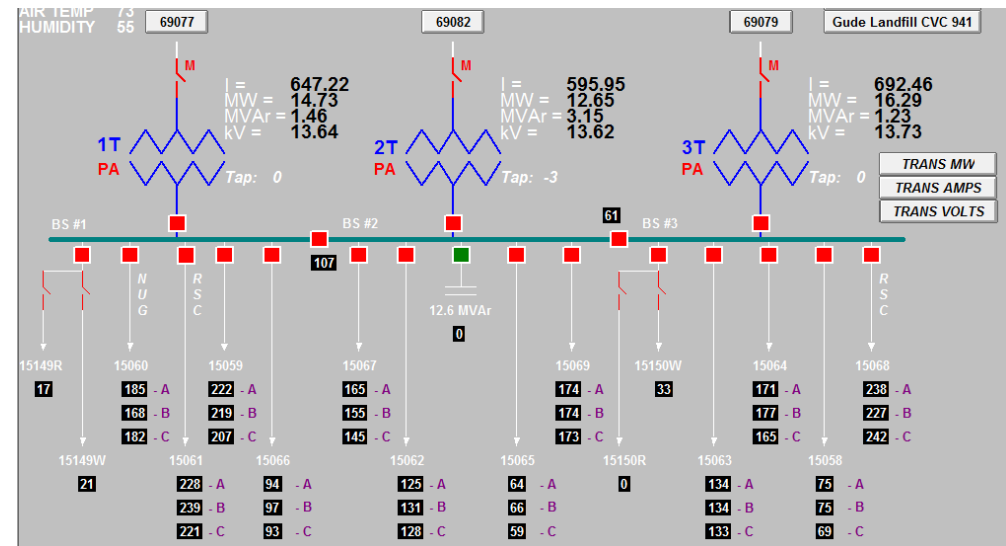
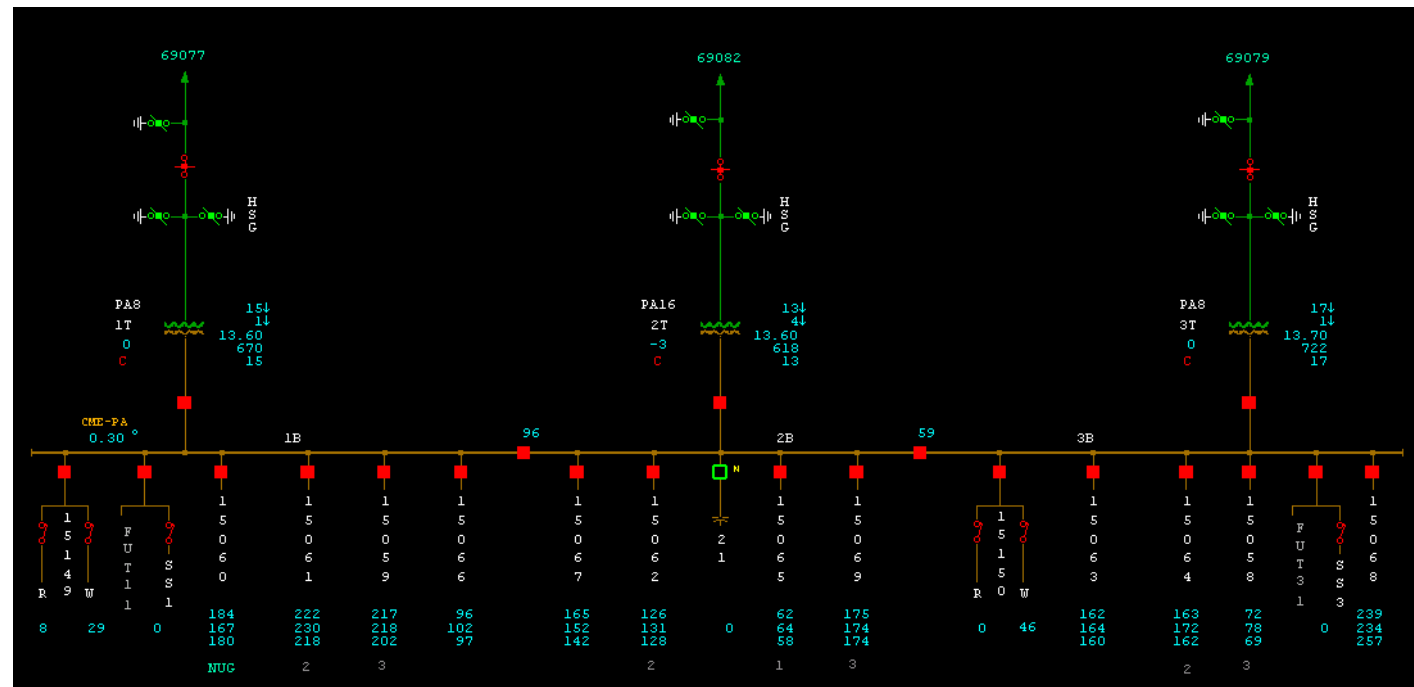
- SharePoint Web Parts have allowed PHI to build custom reports for users
- By utilizing SQL and Relational Datasets, we can query the AF database and extract data

The screenshot displays the OSISOFT PI Data Services Relational Datasets configuration page. The interface includes a navigation sidebar on the left with sections for Data Sources, Datasets, Version Information, PI WebParts, and Back To PI Data Services Administration. The main content area is titled 'Configure relational datasets.' and features a list of 'Configured Datasets' on the left, with 'DA\_Event\_Snap' selected. To the right, there are input fields for 'Data Set Name', 'Description', 'Data Source', 'Cache Interval', and 'Query Timeout'. Below these is a text area for the 'SQL Statement' containing a complex query. At the bottom, there are sections for 'Place Holders' and 'Columns' with corresponding input fields. Action buttons for 'New', 'Copy', 'Delete', 'Preview', 'Open Query', 'Verify SQL', 'Clear', and 'Save' are visible throughout the interface.



# EMS Displays

- EMS single line displays were previously built by hand and maintained manually in PI ProcessBook
- Very tedious and could result in errors or have a delay showing new equipment/data



# EMS Displays

- Wrote custom script to convert EMS display to PI .svg display
- Convert and store displays automatically every week to SharePoint
- Look and feel is the same as EMS displays

