OSIsoft® UC2010

Real Time Information — Currency of the New Decade

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Leveraging ACE and AF for Plant Condition and Performance Monitoring

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OSI Users Conference

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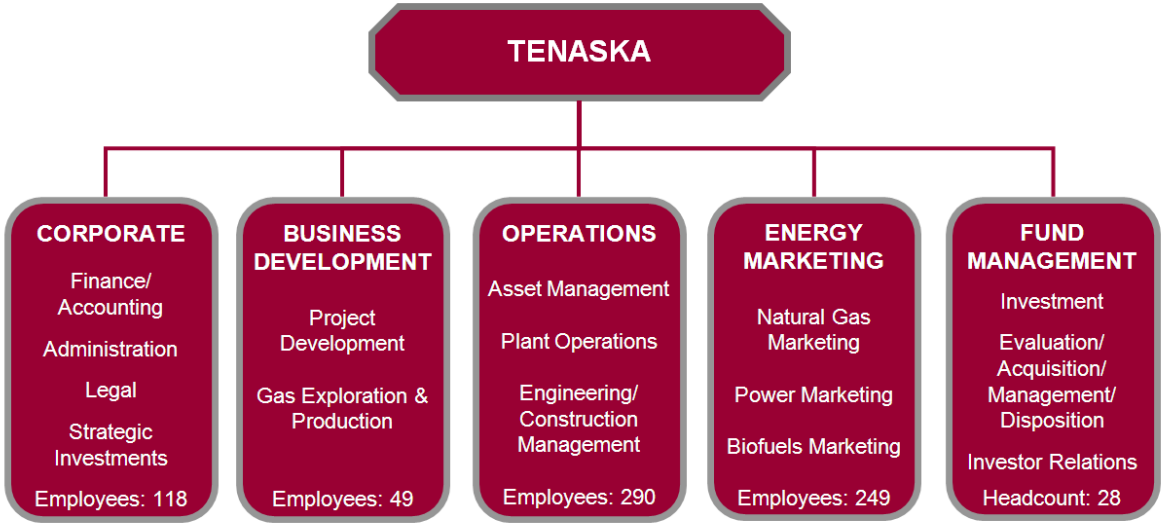
TENASKA

About Tenaska

- Develops, constructs, owns & operates electric generating plants. Has developed 9,000 MW in 15 domestic and international projects
  - Markets natural gas, electric power and biofuels
  - Manages private equity funds totaling nearly $5 billion
- Headquartered in Omaha, Nebraska
- 2009 revenues of approximately $8 billion
- Employee owned
- Forbes #16 – 2009 Privately Held Companies

TENASKA

Structured to Develop, Own and Operate Power Plants



8 power plants owned (6,700 MWs)

Approximately 4,000 MW in pre-financing development 15 power plants developed (9,000 MWs)

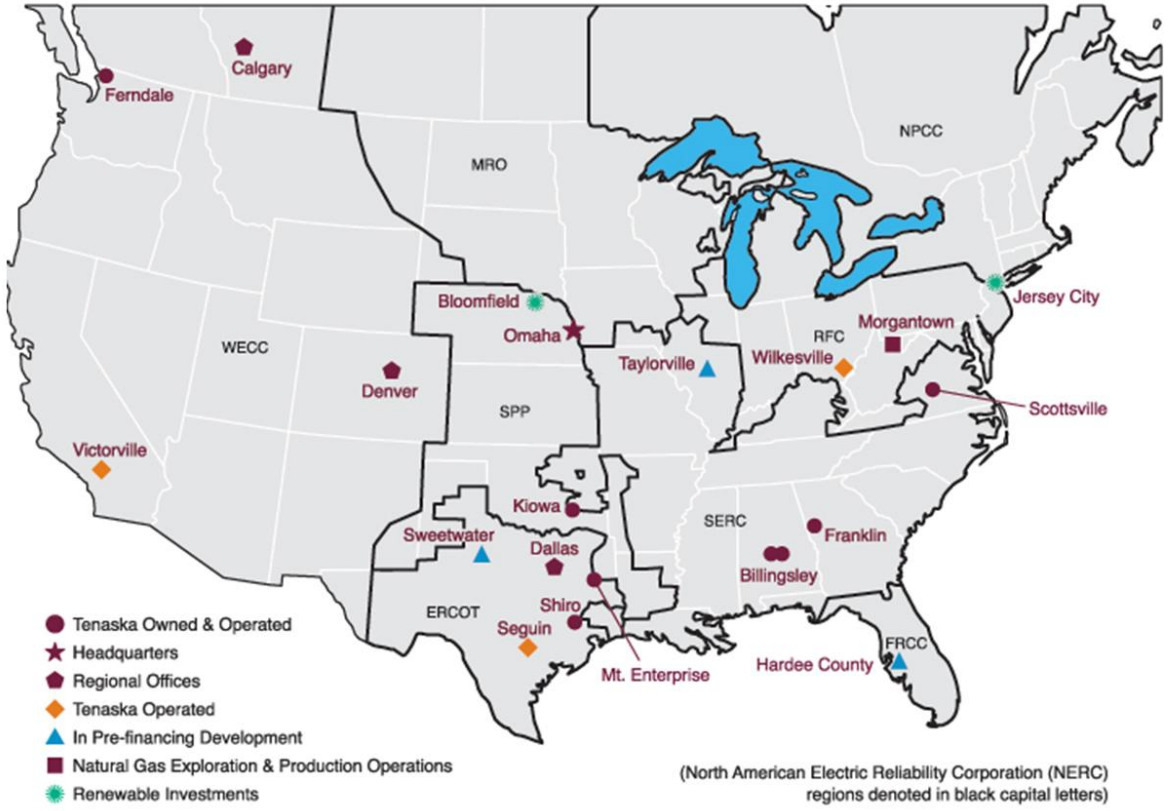
Operate or oversee 17 plants in 11 US states, (12,100 MW)

Energy marketed 19,885 MW 12,118 GWh 2.04 tcf gas

9 power plants owned (5,400 MWs)

TENASKA

About Tenaska



Need to Monitor the Condition and Performance of Turbines

- Turbine reliability and performance is critical to the bottom line.
- There is a wide array of offerings in the market for monitoring and performance but all are third party software.
- Tenaska has a solid foundation of OSIsoft technology in place at all of our plants and needs a solution in PI.

Need to Monitor the Condition and Performance of Turbines

- We wanted a proprietary configuration for our gas turbines and other packages were too restrictive to allow this flexibility and the calculations occurred in a “Black Box” and we wanted to know what was being calculated and how.

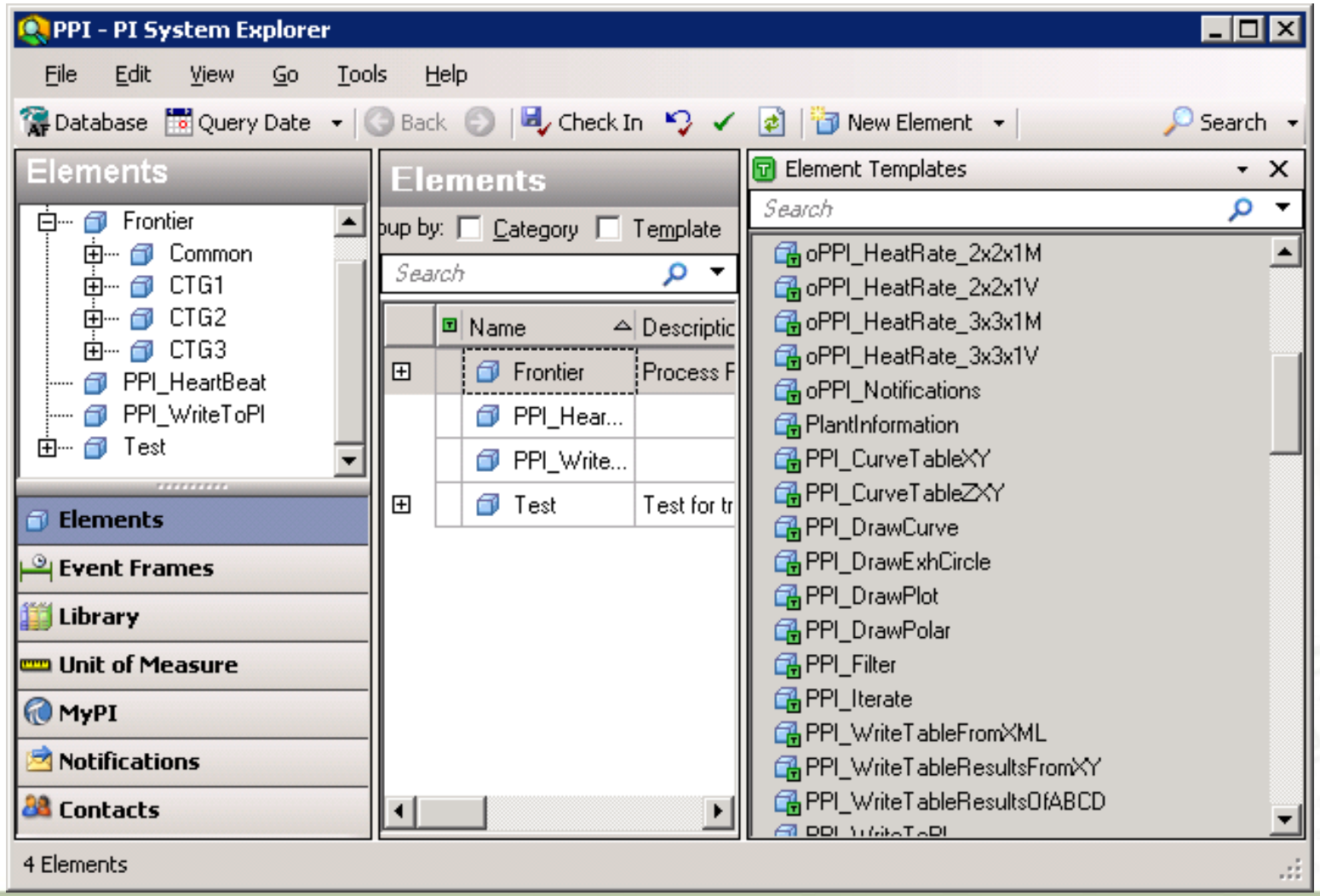
Technology we are using to monitor our turbines

- OSIsoft AF
- Process Plugins with ACE, AF SDK and PI SDK backed AF Templates

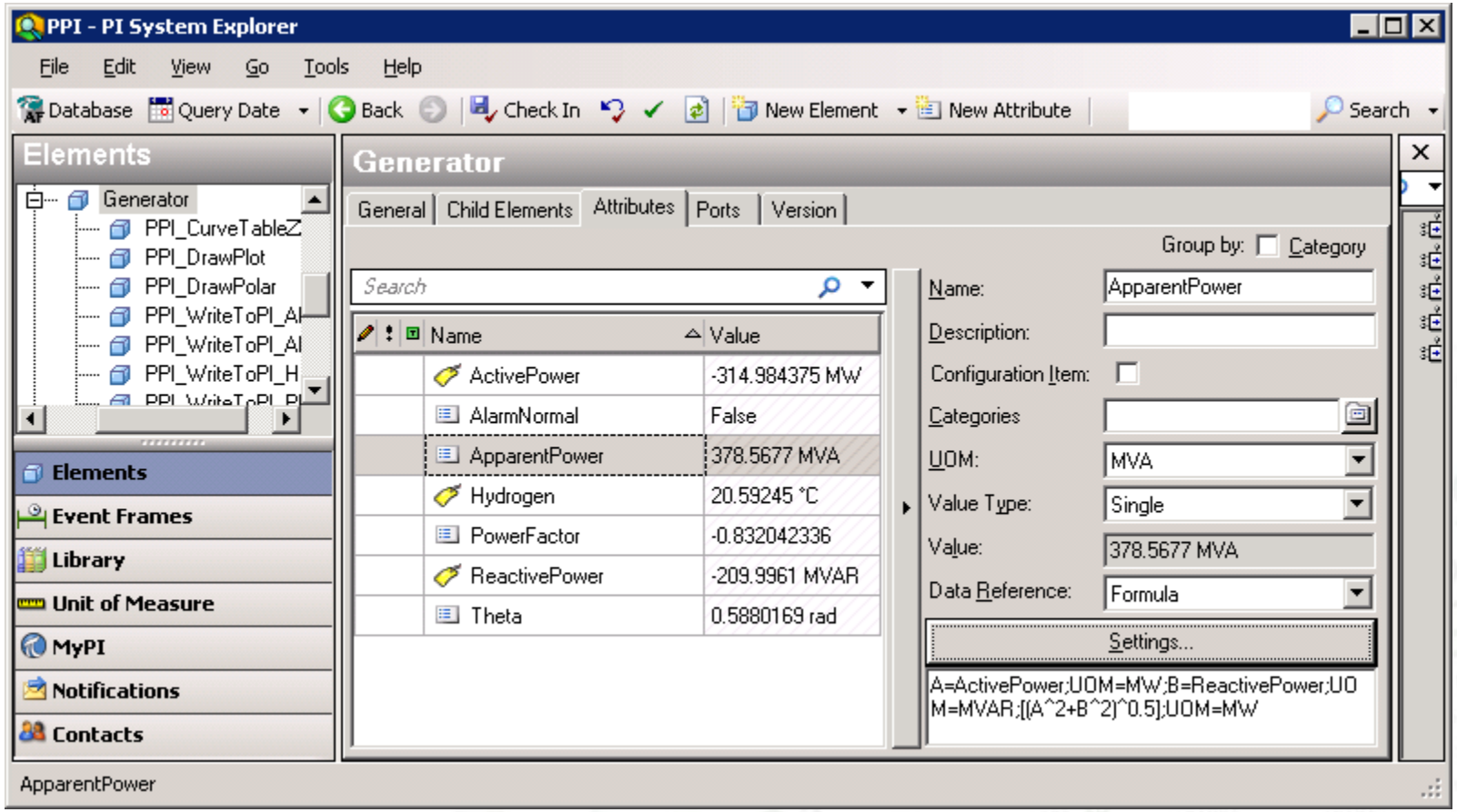
Transitioning from Spreadsheets to Real Time Monitoring

- We have spreadsheet tools now that provide snapshots of performance
- Spreadsheets now provide Data Validation of Process Plugins solution

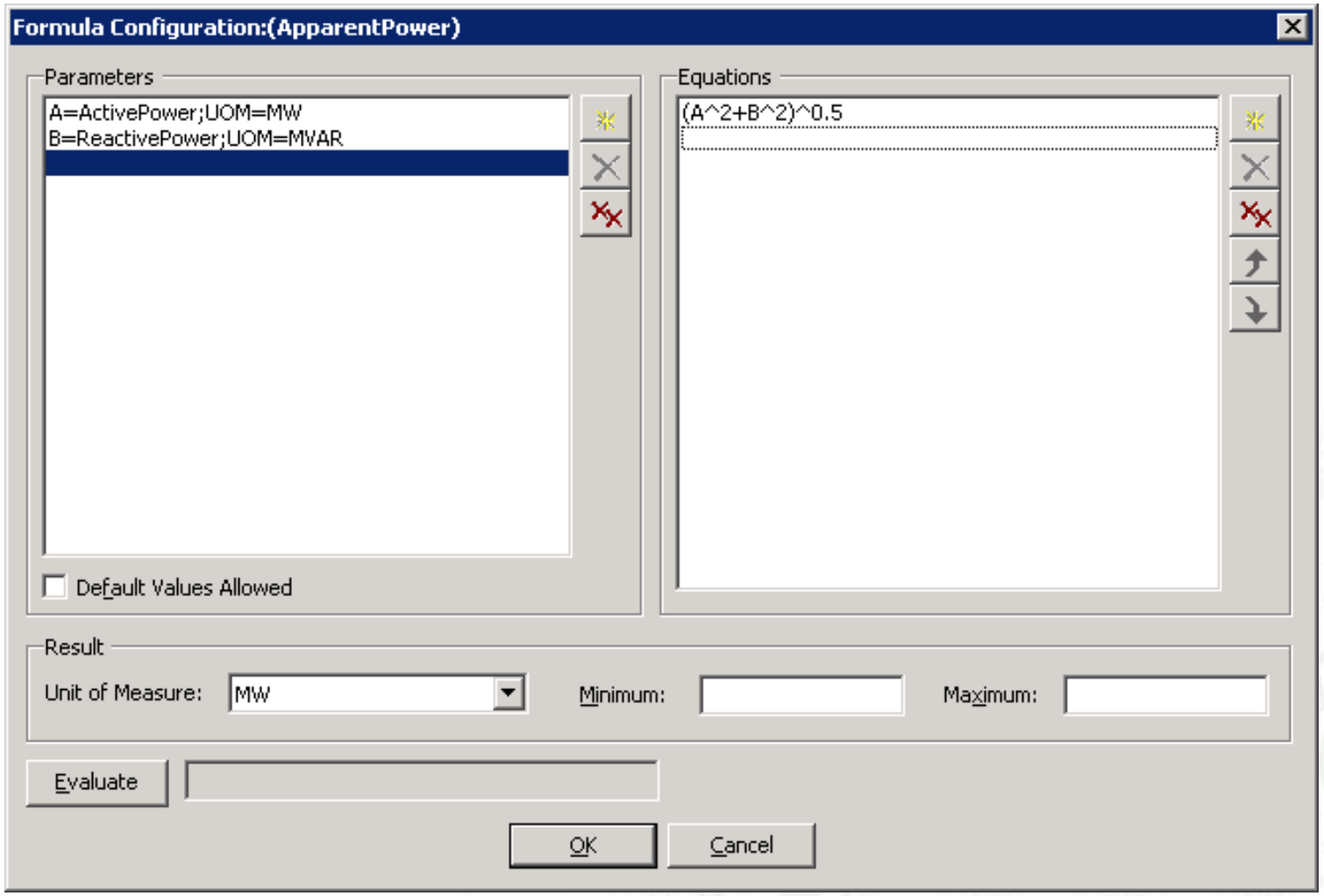
AF Provides Logical Layout



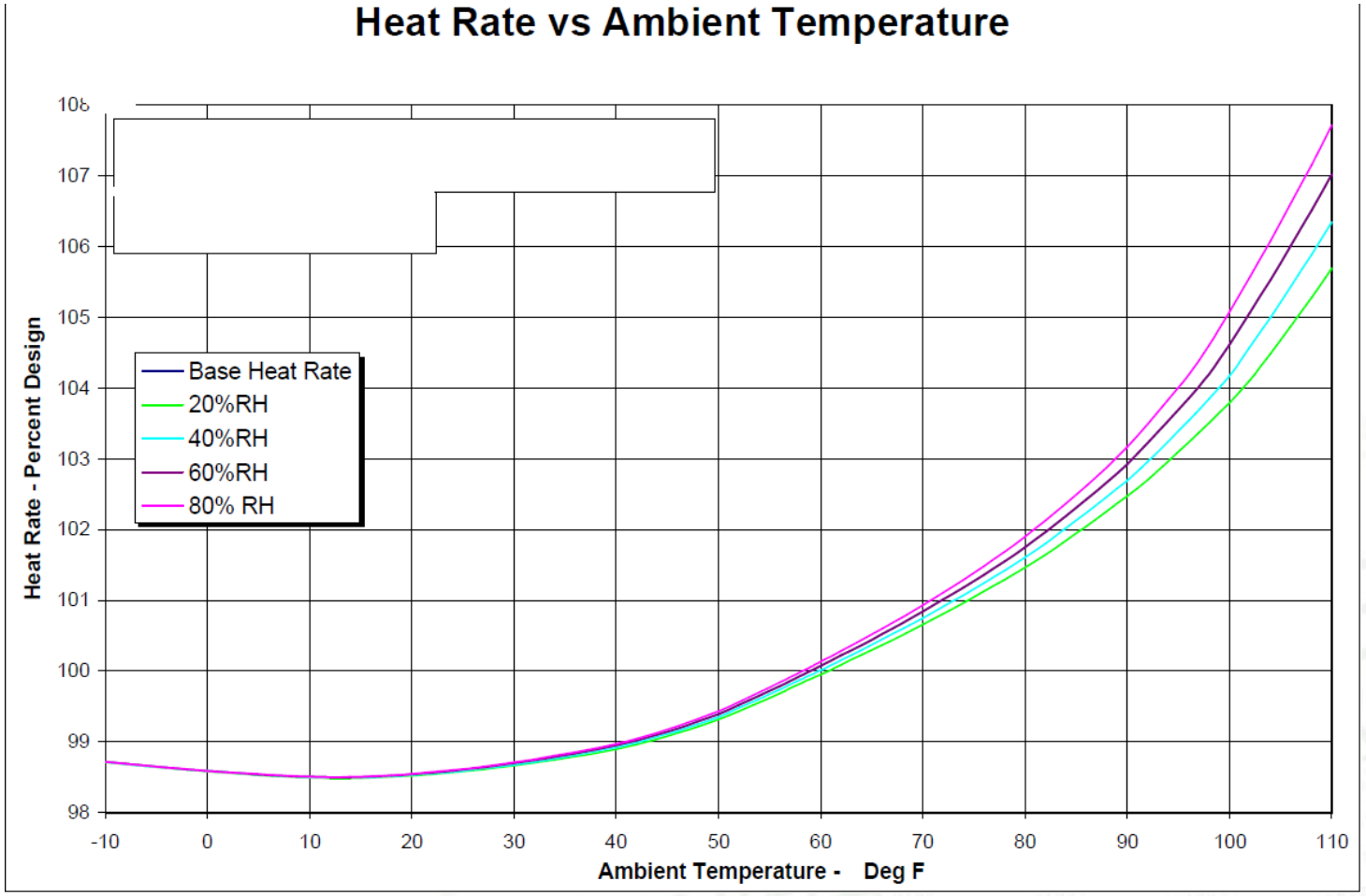
Leveraging AF Functions for Simple in Plain Sight Calculations



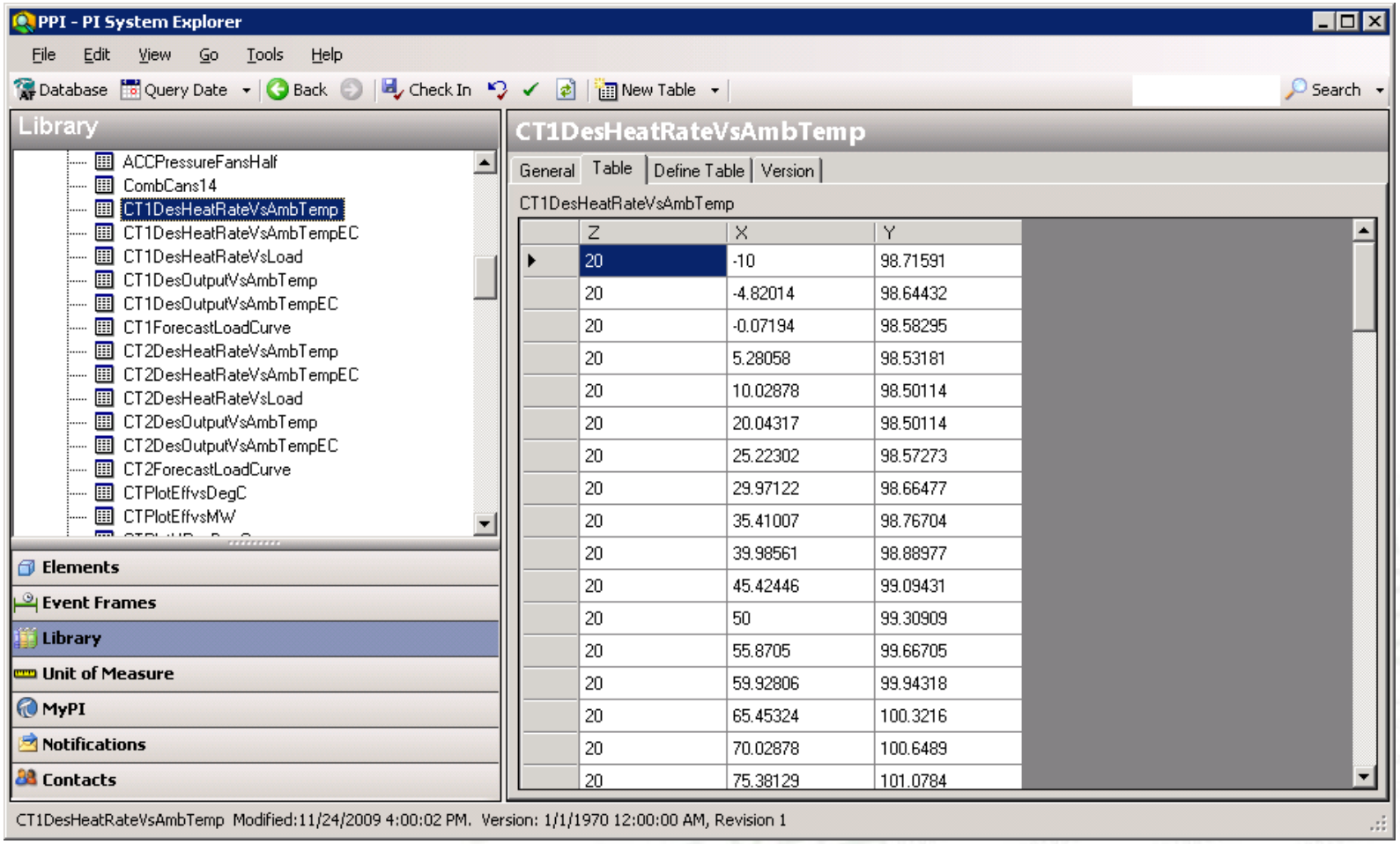
Simple Formulas in Plain View



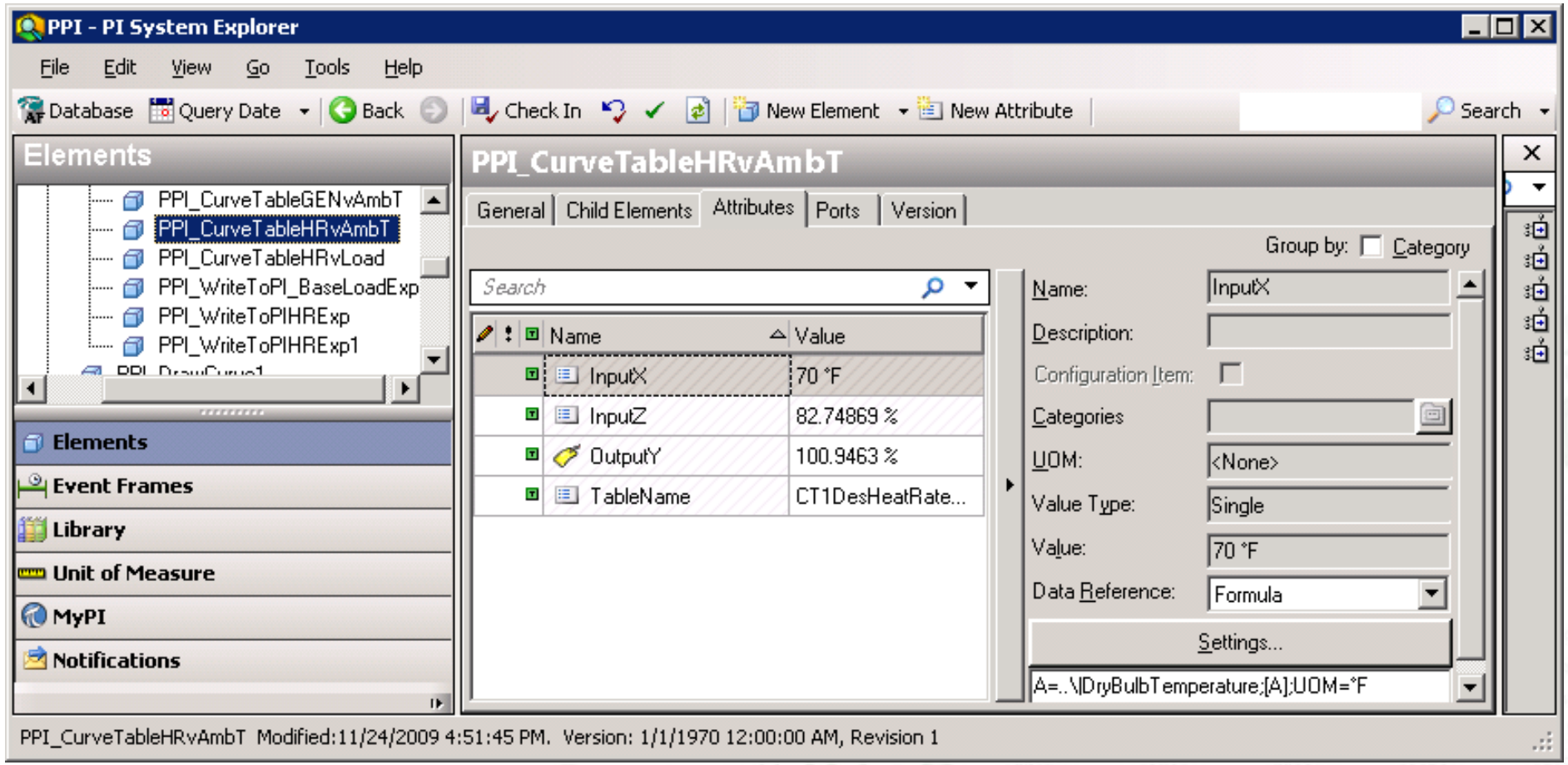
Sample Curve to be is Entered Into AF Tables



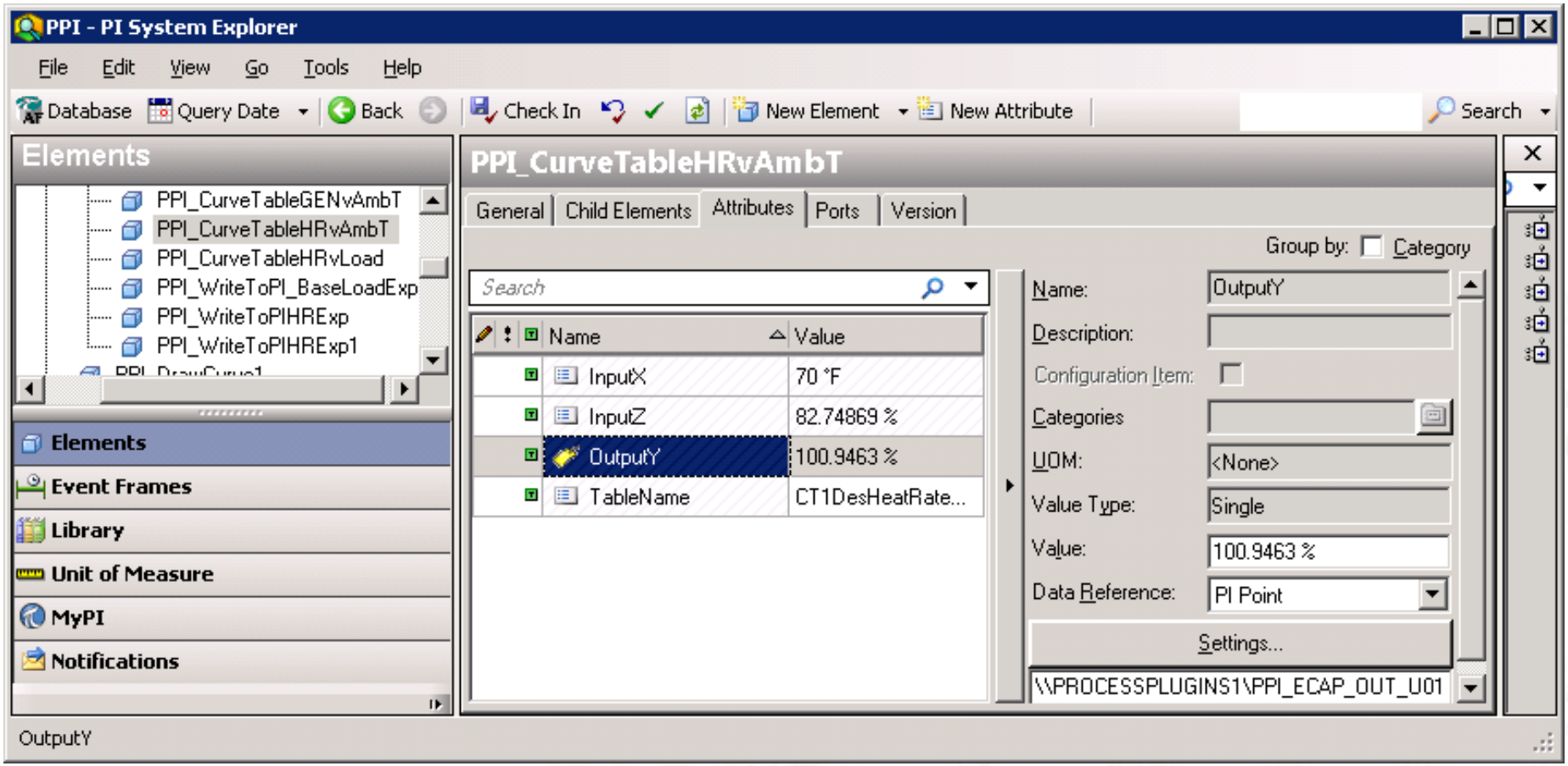
Curve Converted to AF Table Data



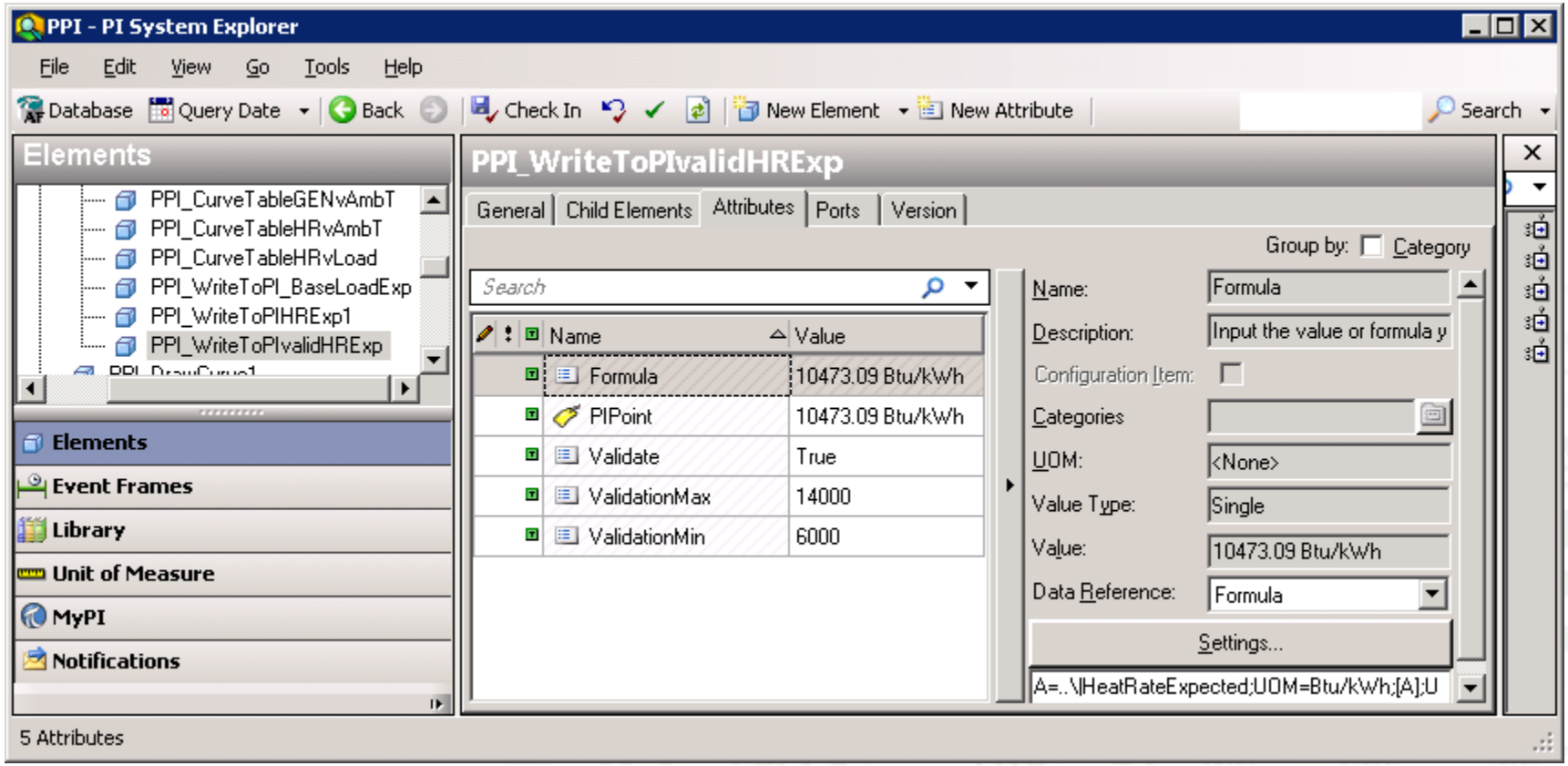
Process Plugins AF Curve Template Backed by Code was Used for Many Curves



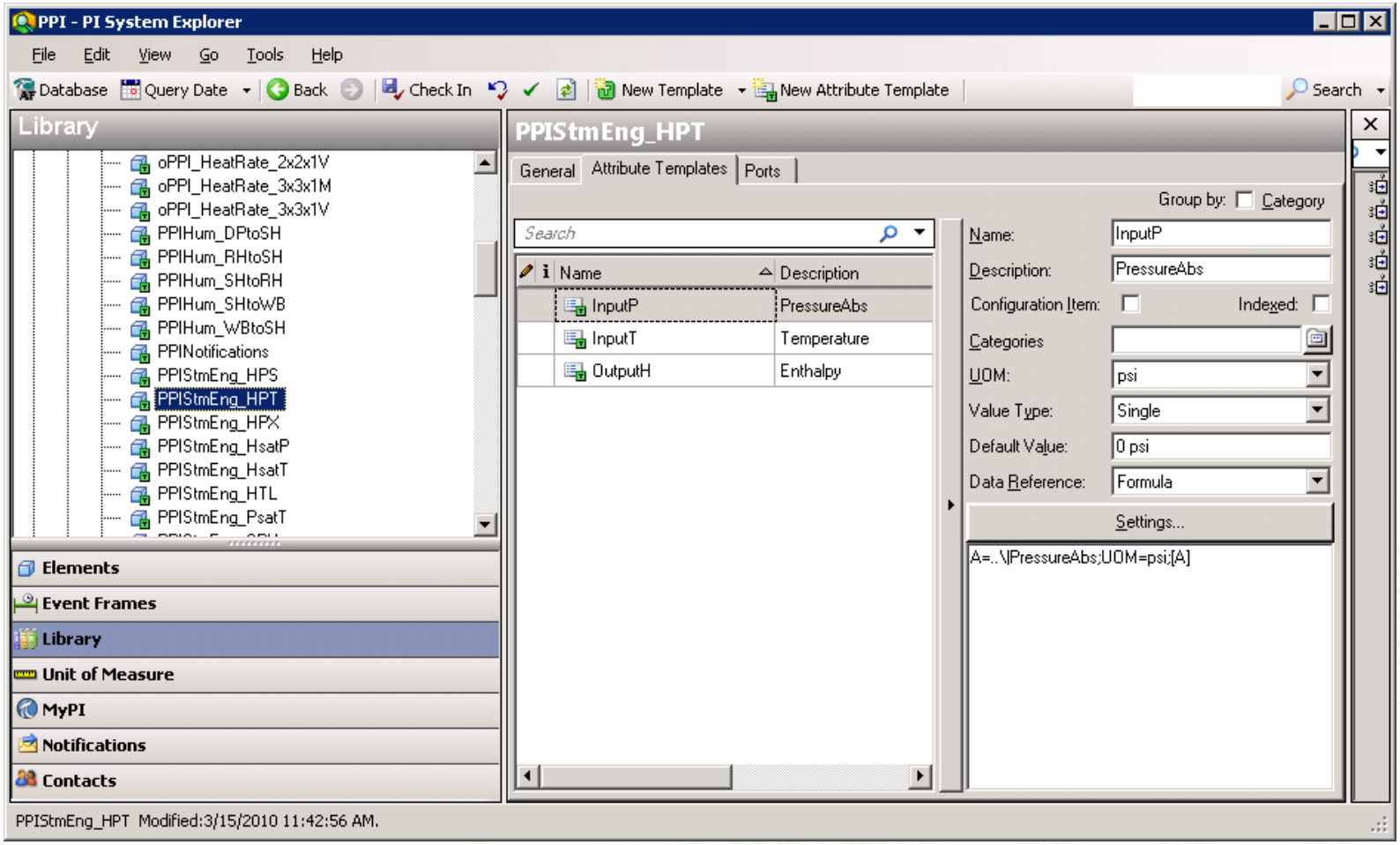
Process Plugins AF Curve Template Writes Result to PI Tag



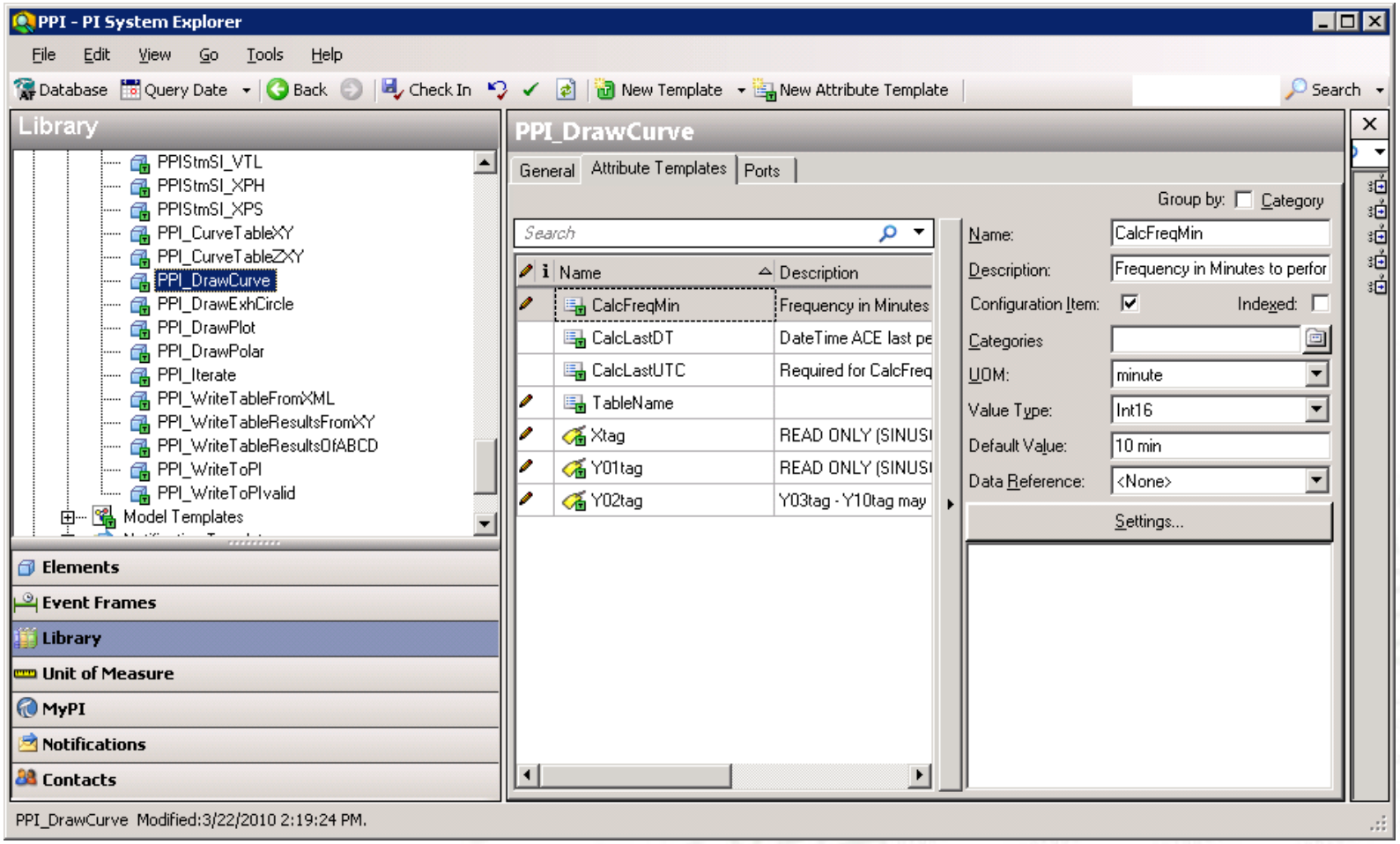
Template for Writing Data to PI Tag with Filtering Used to Write Multiple Calculation Results



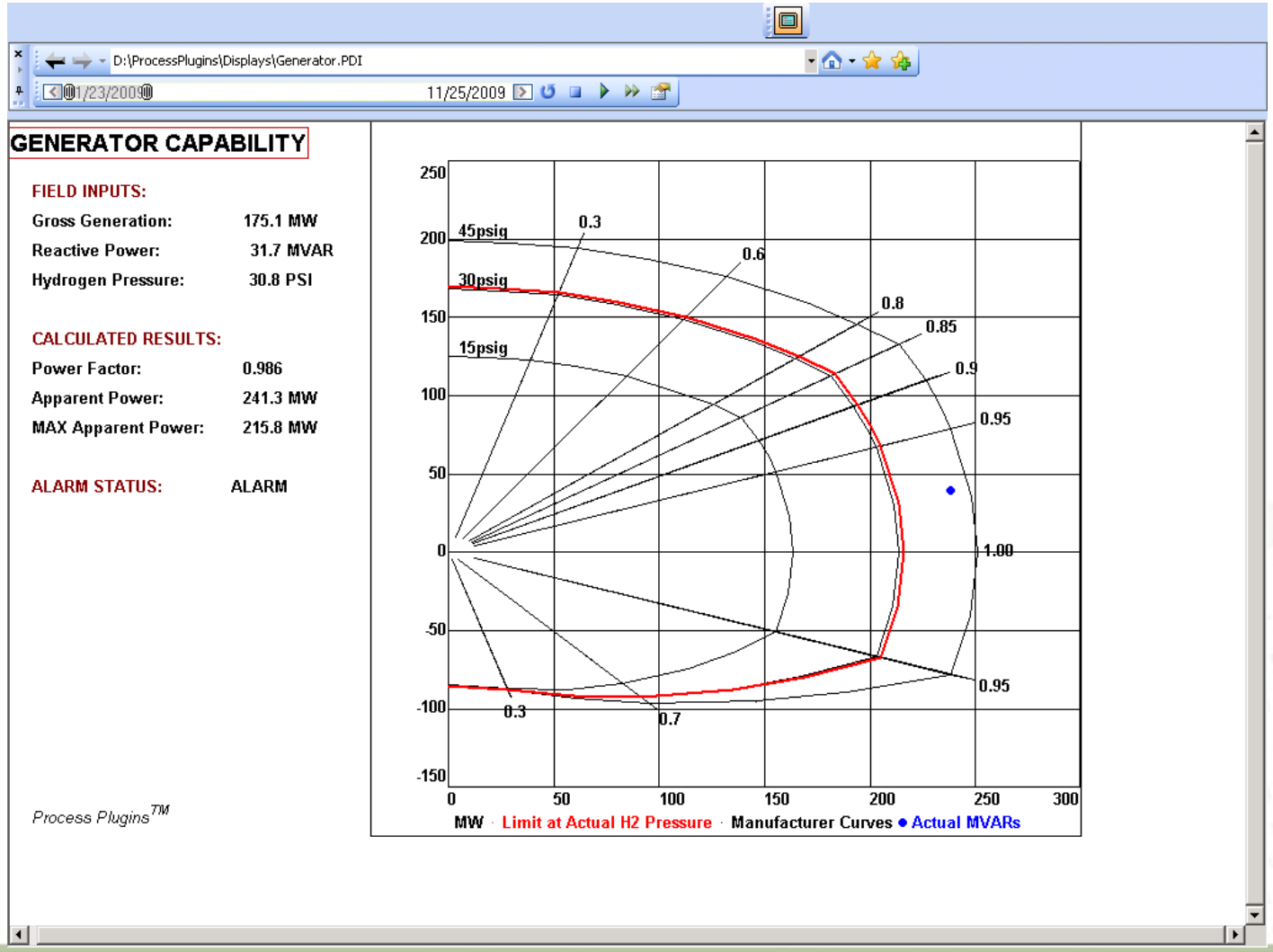
Steam Function Template



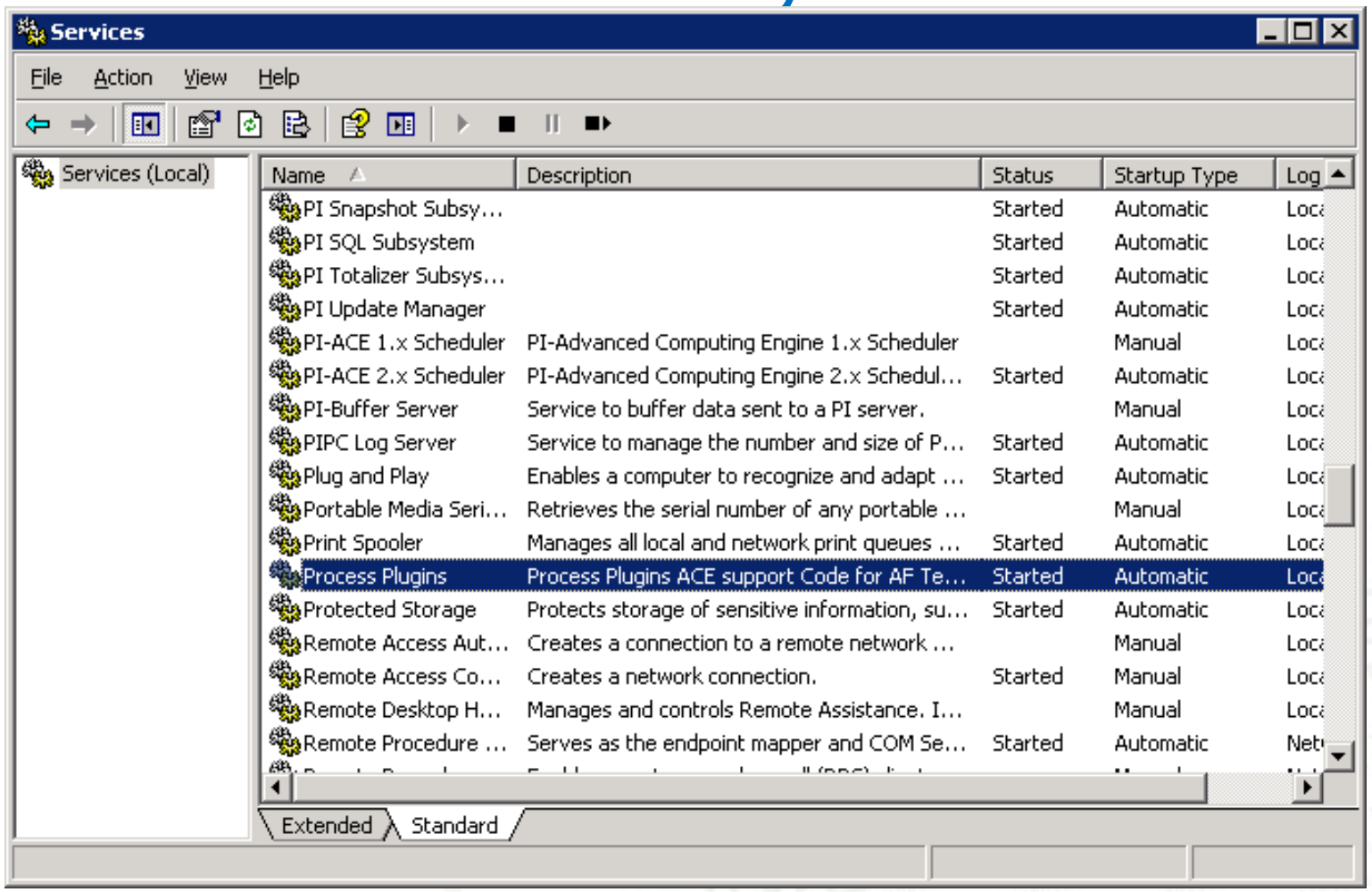
Visualization Template



Visualization Templates in Use



Service Provides Process Plugins Functionality to AF



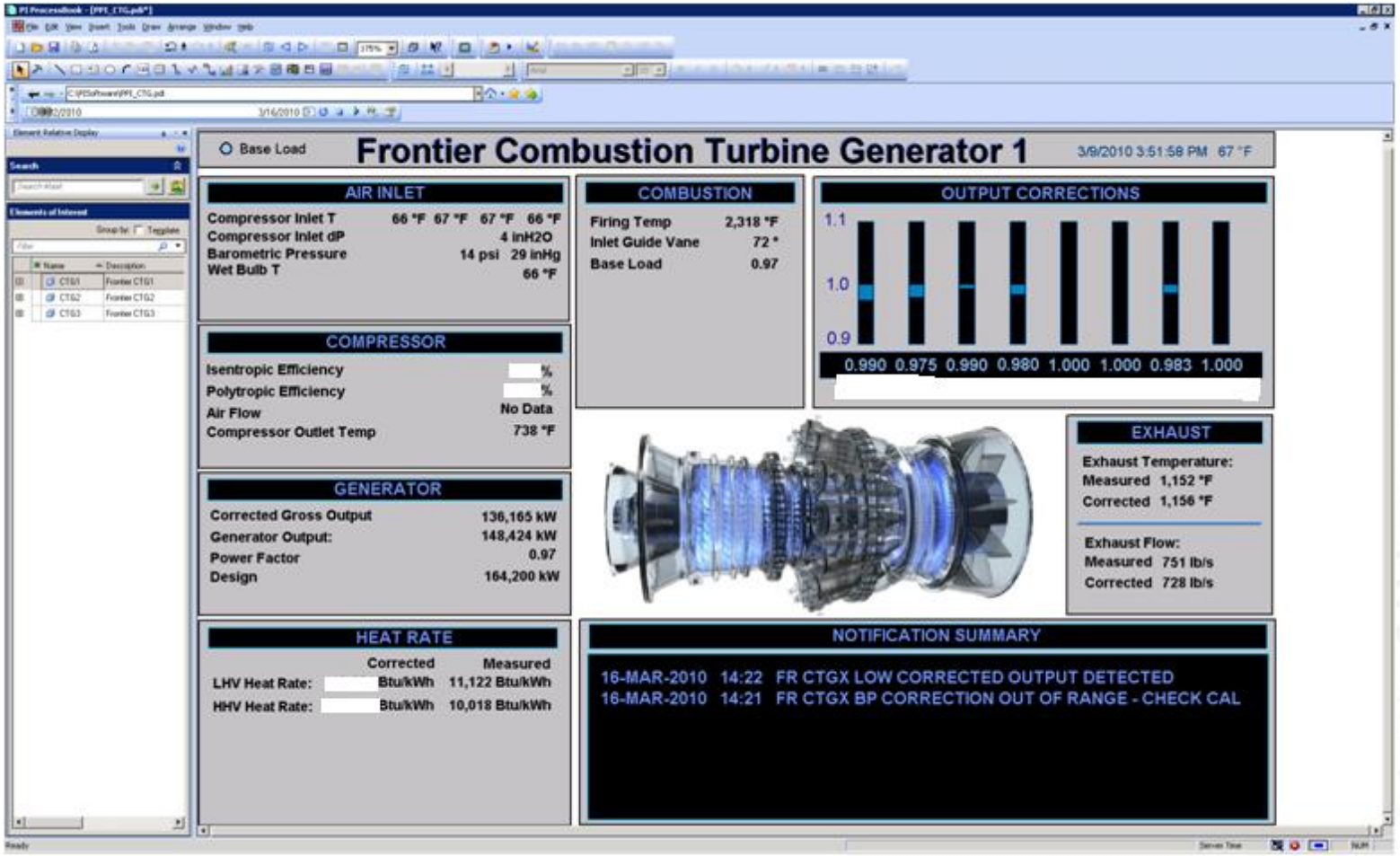
Visualizing with OSIsoft Technology

- With a foundation of PI clients already deployed throughout the Tenaska fleet and an instance of PI WebParts in place we are using tools familiar to everyone.
  - Element Relative Displays to be used
  - PI WebParts Element Relative Displays to be used soon

Getting the Information to the Operator

- Operators need data to act in real time
- They already know how to use the PI tools

Element Relative Display



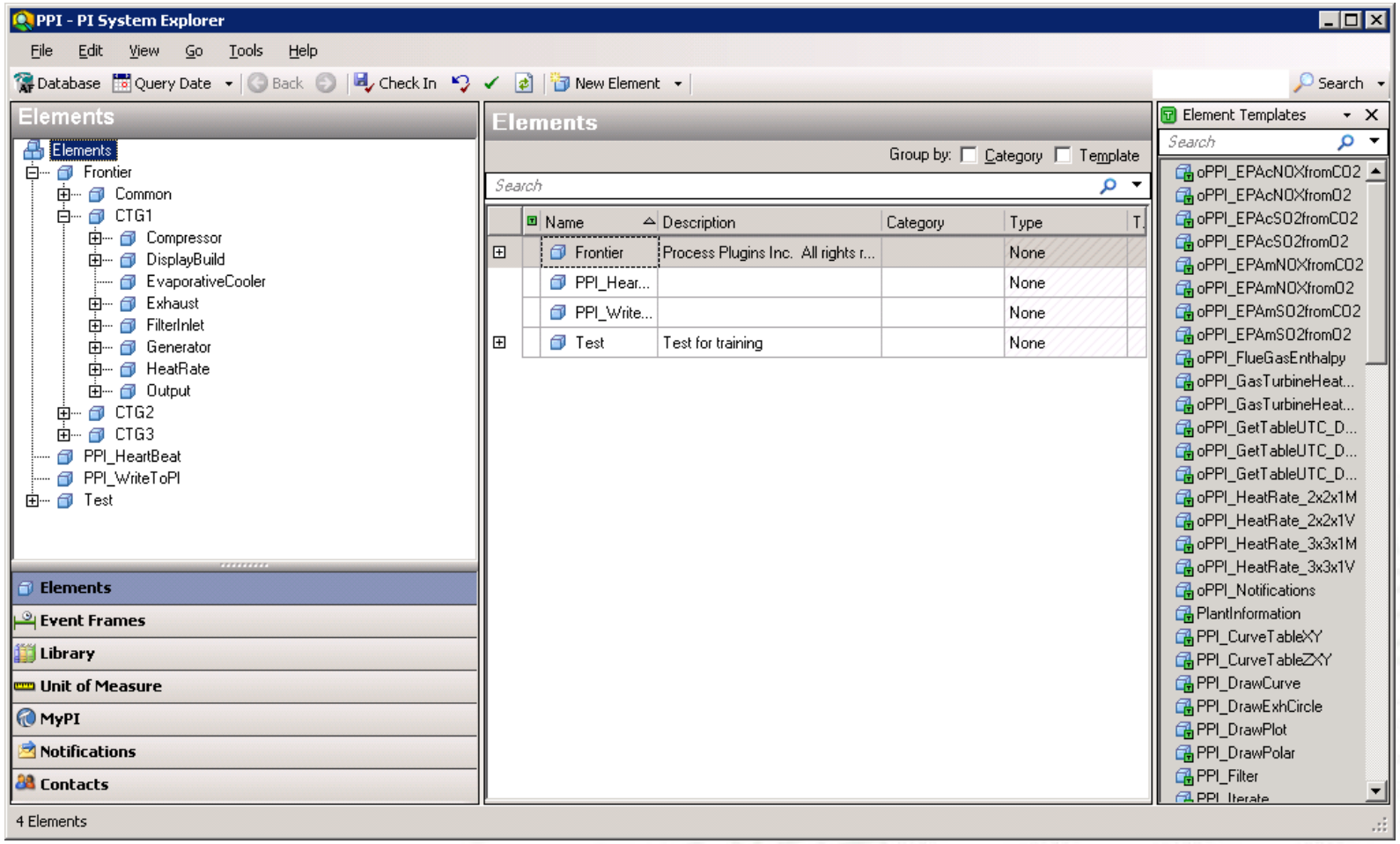
Design Considerations

- Fleet wide deployment needs to be scalable and repeatable
- AF gives us the perfect platform.

Fast Deployment

- Copy and paste for all similar turbines
- Site level deployment can also copy and paste

Once CTG1 was Complete we did a copy and paste for CTG2 and CTG3



Fast Deployment

- All plants to be deployed in Omaha in a single AF database
- Most of the work after the first configuration is with PI tag development and reworking curve table configurations.

Leveraging OSIsoft PI Notifications

- We need the turbines to tell us when something is wrong
- With all configuration in AF Notification is an easy task

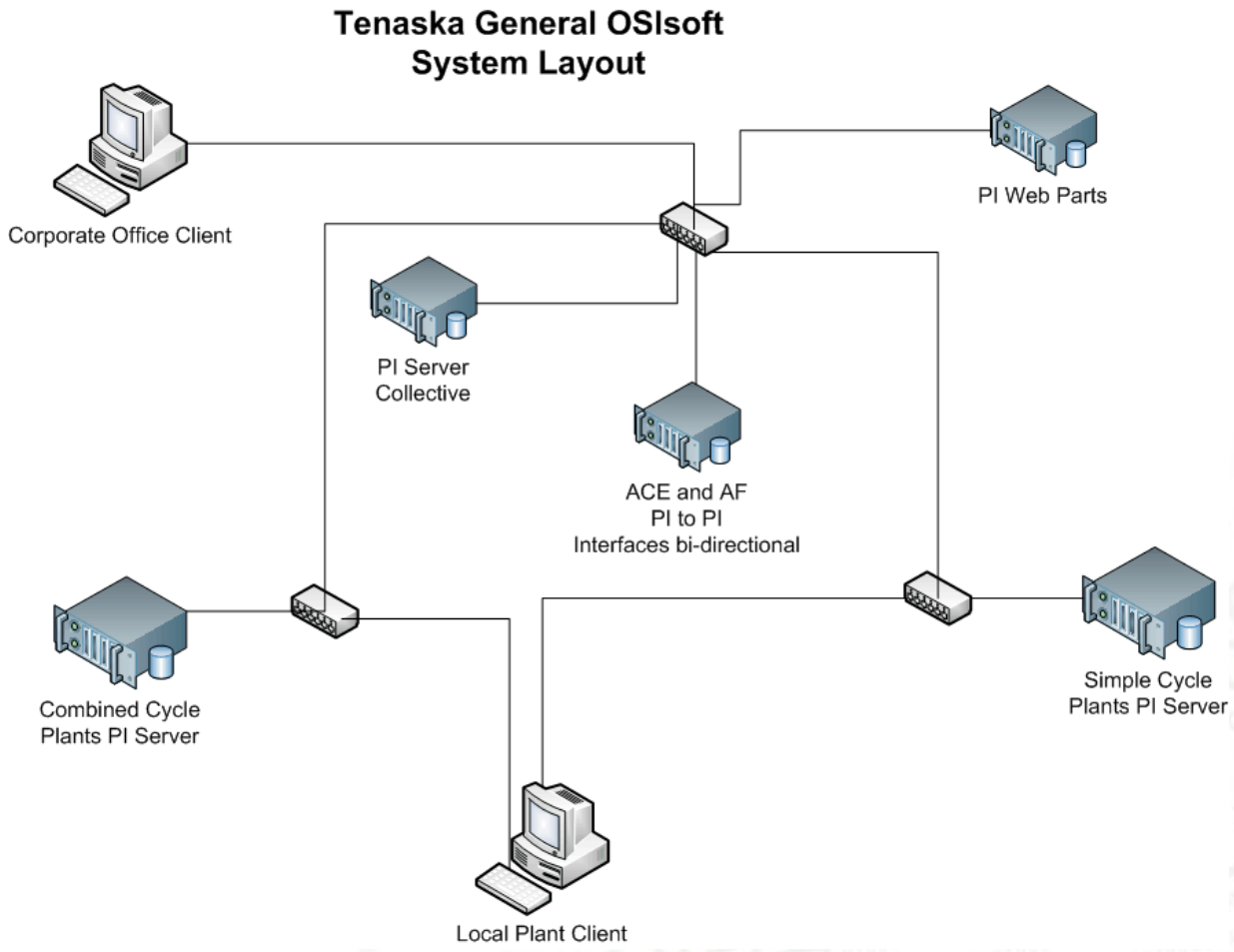
Data Validation

- Part of the Notification process is the validation of data that feeds the monitoring tools.
- For inputs into the model there are limits set for the input upper and lower limit with a constant or formula for substitution of a value with the AF elements

What OSIsoft Products We Use

- ProcessBook
- DataLink
- PI WebParts
- ACE
- AF
- PI Notifications
- Servers and interfaces at each site
- PI to PI to a central system in Omaha

PI SYSTEM ARCHITECTURE



Fast Deployment Results

- We are in the early stages of development of the project. We Started Feb. 23rd and had one plant configured by March 15th. We are in the data validation phase for this plant.

Results of Deployment

- Notifications will tell us when the turbines need attention
- Performance can now be monitored continuously instead of on demand occasionally.
- We are leveraging existing tools so we do not need to switch visualization or reporting from what we already know = Minimal investment for a lot of results

Tangible Results

- Minimal investment for Process Plugins provides more value for OSIsoft AF
- Catching one issue with continuous monitoring and notification will repay our investment

FUTURE PLANS / NEXT STEPS

- Continue our fleet deployment of the monitoring and performance tools.
- Build additional reporting and visualization
- Add other equipment monitoring beyond our turbines

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Thank you
Questions?