PI Vision: Beyond the Basics

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Introduction

This course is designed for people who have already used PI Vision. Students should already be familiar with how to create displays in PI Vision and understand how PI Vision is able to leverage AF Templates.

Exercises can be solved using PI Vision and PI System Explorer. If you have not used PI Vision before that's okay. Just try and follow the solution guide that's at the end of the workbook and is after each exercise.

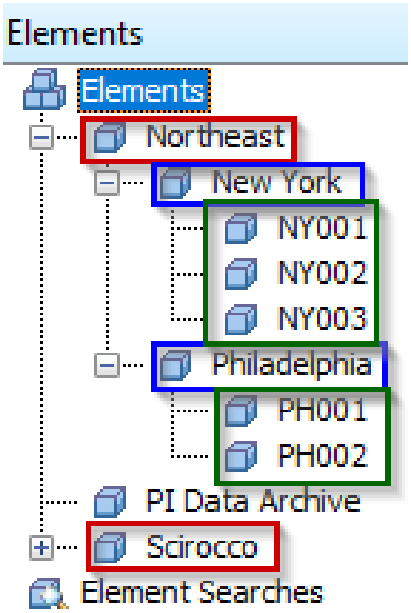
Approach

Specific questions or scenarios will be presented to solve primarily using PI Vision as your visualization and analysis tool. More advanced features of PI Vision will have a strong reliance on AF so you will also need to use PI System Explorer (PSE). Each exercise can be completed with PI Vision and PSE.

The scenario for this course is that you have just been hired as a consultant for energy management solutions. Your first client is a wind farm energy company, and you are tasked with creating some advanced PI Vision displays that employees can use to monitor their turbines.

Scenario: Energy Management Solutions

You have just been hired as a consultant for Energy Management Solutions. Your first client is a Wind Farm energy company, and you are tasking with creating some advanced PI Vision displays that employees can use to monitor their turbines. Luckily, the company has just completed a project building out an AF database that has correctly templatized their AF Assets. Their AF structure features three main levels, Region, Farm, and Turbine.



Red – Region
Blue – Farm
Green - Turbine

Within AF, the customer has configured Event Frames to monitor Turbine downtime. These Event Frames are set to trigger whenever the turbine is in a status other than “Run”.

You know that this structure will make it possible for you to utilize template dependent features within PI Vision which can save you time when building out displays.

Exercises

Exercise 1: Creating a Turbine Information Display

Exercise Objectives:

- Create a display showing Turbine level information
- Utilize a multi-level collection to navigate through their AF database

Scenario:

Your first assignment is to create a Turbine Information Display. The client would like to have a display that shows Power and Production information for each Turbine that is selected. The client has 22 turbines in total. With your knowledge of PI Vision, you know if you make a display using attributes from the same template you can use the Asset Drop Down box to make a reusable display that can be applied to all turbines. The client informs you though that they do not want to have users using the Asset Drop Down box. They would like to have an on-screen symbol that they can select to change the context of the display at various levels and only be able to see Turbines in the selected Region and Farm.

Approach:

1. Use the shortcut on the desktop to launch PI Vision using Microsoft Edge.

    a. Alternatively, start Microsoft Edge and navigate to https://pisrv01.pischool.int/pivision

2. Click New Display in PI Vision.

3. Create three collections, one for each level of the hierarchy that contain the asset name. There should be one for **Region Name**, **Farm Name**, and **Turbine Name**.

Hint: On the AVEVA PI System Learning YouTube Channel there is a video called: PI Vision Alternative Context Switching with Collections and Multiple Filters (https://www.youtube.com/watch?v=_QlyKSJyy9o&t=387s)

4. Configure the collection's navigation link to change the root context of the current display

5. Create symbols in PI Vision that can be used to monitor Power and Production of the Turbines. Specifically, the **Active Power, Apparent Power,** and **Lifetime Production** attributes will be useful.

6. Once finished, select the drop-down arrow on the right hand side of the Asset Drop Down box and click the gear icon. Then in the Configure Context Switching pane on the right select the option for "Do not show".

7. Save the display as *Windfarm Turbine Overview_Your initials.*

Questions:

What is the **Hourly Lifetime Production** for Turbine GE004 in Santaella?

What is the difference in **Active Power** and **Apparent Power** for Turbine RB009 in Finisterre?

Exercise 2: Turbine Events Display

Exercise Objectives:

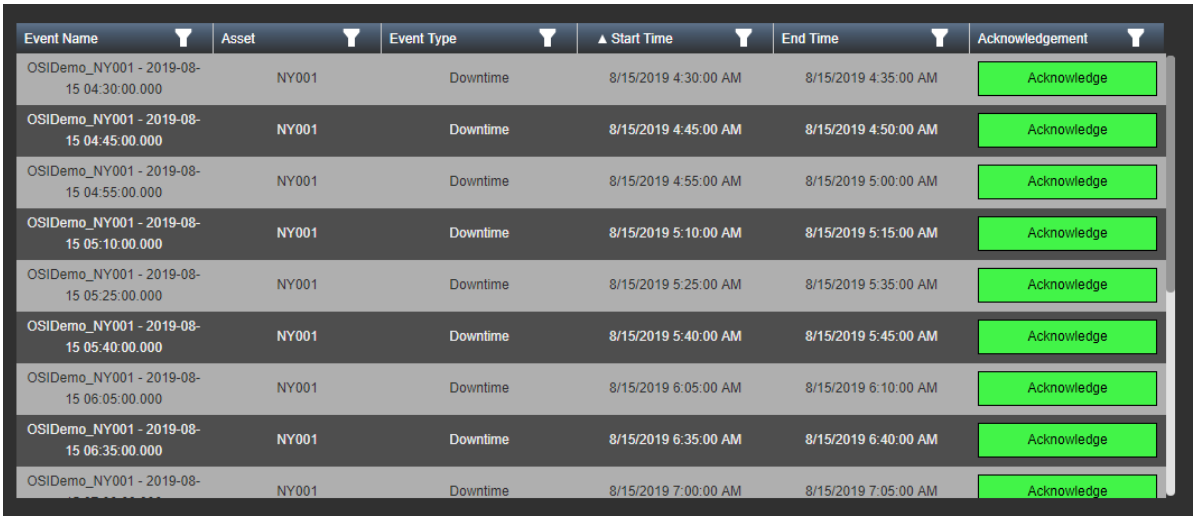
- Use the Events Table to see recent Event Frames
- Analyze Event frames with the Details page

Scenario:

Your client loved your Turbine information display, but they would also like to see a display they can use to better track their Event frames. Currently they are monitoring turbine downtime events and would like a display to visualize that. They would like the display to contain all the most recent events from the selected turbine.

Approach:

1. Create a new display in PI Vision. Save the display as *Windfarm Turbine Detail_Your initials.*
2. Create symbols on the display showing the Turbine name and status.
    a Only create the display using data from one turbine.
3. Add an Events Table show Event Frames for all assets on the display.
    a Hint: This can be done by selecting the Events tab and using the Create Events Table button



Event Name	Asset	Event Type	▲ Start Time	End Time	Acknowledgement
OSIDemo_NY001 - 2019-08-15 04:30:00.000	NY001	Downtime	8/15/2019 4:30:00 AM	8/15/2019 4:35:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 04:45:00.000	NY001	Downtime	8/15/2019 4:45:00 AM	8/15/2019 4:50:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 04:55:00.000	NY001	Downtime	8/15/2019 4:55:00 AM	8/15/2019 5:00:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 05:10:00.000	NY001	Downtime	8/15/2019 5:10:00 AM	8/15/2019 5:15:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 05:25:00.000	NY001	Downtime	8/15/2019 5:25:00 AM	8/15/2019 5:35:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 05:40:00.000	NY001	Downtime	8/15/2019 5:40:00 AM	8/15/2019 5:45:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 06:05:00.000	NY001	Downtime	8/15/2019 6:05:00 AM	8/15/2019 6:10:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 06:35:00.000	NY001	Downtime	8/15/2019 6:35:00 AM	8/15/2019 6:40:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-	NY001	Downtime	8/15/2019 7:00:00 AM	8/15/2019 7:05:00 AM	Acknowledge

4. While in run mode, single click the Event to open the Details display.

5. Save the display as *Windfarm Turbine Detail_Your initials.*

Questions:

When was the last time turbine PH002 in Philadelphia had a downtime Event?

What was the approximate peak **Lost Revenue Rate** in that time range?

What was the approximate minimum **Apparent Power** for that time range?

Exercise 3: Linking the displays

Exercise Objectives:

- Use AF to dynamically build URLs to the Event Details display.
- Create an Asset Comparison table to display those URLs in PI Vision.

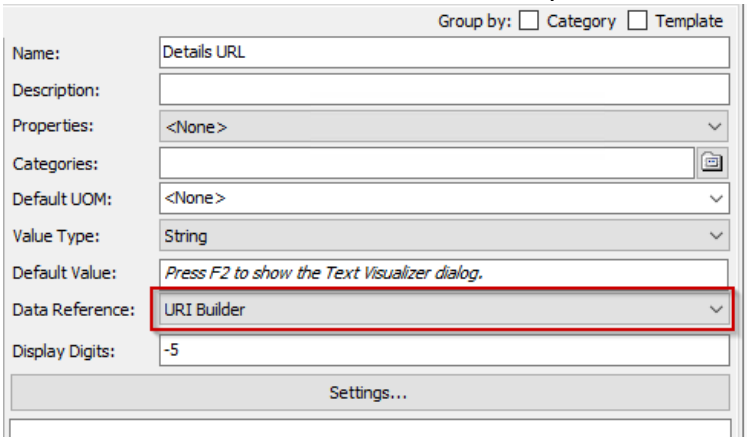
Scenario:

Again, your latest display was well received by the client. As you already know they do not like to have their users go through the Asset Drop Down box to change the context of the display, so they are looking for an alternate solution. What they would like to have is a way to navigate from the Information display to the Events display and have that link provide the context for the Events display.

Approach:

1. Open PI System Explorer and select the Wind Farm Database
2. Navigate to Library and under Templates > Element Templates > Turbine
3. Modify the Details URL attribute so it will take you to the Turbine Events Display

Hint 1: The URI builder data reference may be of use here



Hint 2: URL parameters can be used to set the context of the display
https://docs.aveva.com/bundle/pi-vision/page/1009424.html

Hint 3: Substitution parameters can be used to quickly build out the path to the element.

i. **%System%** - Gets the name of the AF Server the attribute is on

ii. **%Database%** - Gets the name of the database the attribute is on

iii. **%ElementPath%** - Gets the path to the element the attribute is on (not including server and database)

4. Create an Asset Comparison table in PI Vision and pull in the URL attributes

5. Modify the Details URL Yesterday attribute in AF to also change the time context of the display and add those attributes to your Asset Comparison Table as well. For the time context use “y” as the start time and “t” as the end time

Questions:

What does the time range of start time “y” and end time “t” correspond to?

Try to use another URL parameter in System Explorer.

Exercise 4: Ad Hoc Trending in PI Vision

Exercise Objective:

- Analyze an existing display using the Ad Hoc functionality of PI Vision

Scenario:

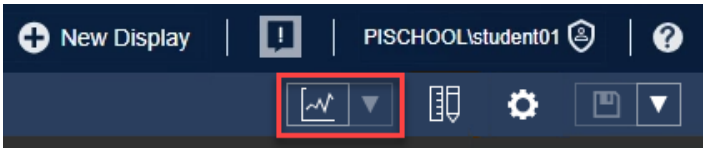
After seeing the advance displays you have been making your client has taken it upon themselves to make a display of their own. They created a display called Wind Farm Overview but are having trouble analyzing the display to answer specific questions about their operations.

Approach:

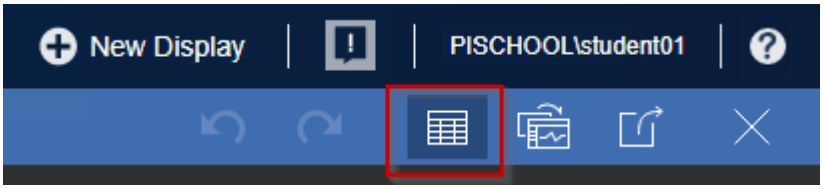
1. Open the display called Wind Farm Overview.

2. While in Run mode, hold the CTRL key and select the Wholesale Price attributes and Lost Power attributes.

3. Click the New Ad Hoc trend button:



4. Ensure the summary table is being shown:



What was the maximum **Wholesale Price** over the last 8 hours for both regions?

What was the **Wholesale Price** for the Northeast region yesterday at 1 PM?

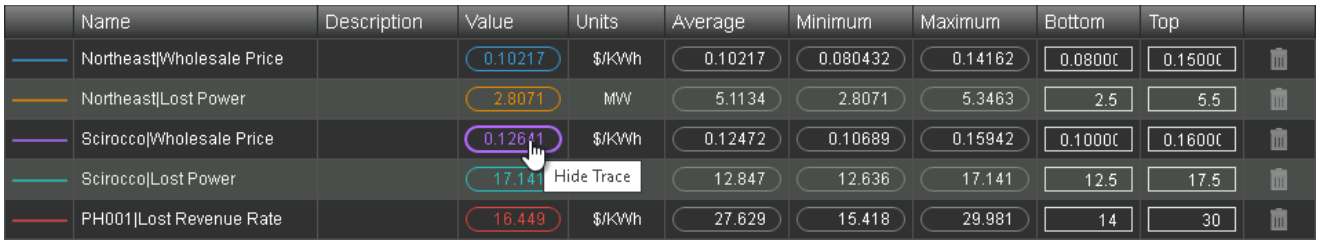
5. Close the Ad Hoc display workspace and add the **Total Revenue** attributes which are shown in the trend symbols to the Ad Hoc Trend workspace.

6. On the same display drill down to the **Lost Revenue Rate** attribute for PH001.

7. Right Click the attribute and select “Add Data Item to Ad Hoc Trend.

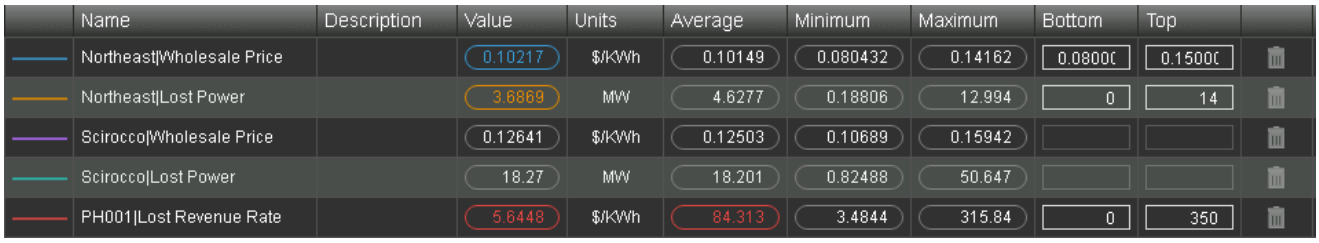
8. Open your Ad Hoc display workspace and hide the trends for **Wholesale Price** and **Lost Power** for the Scirocco region.

   Note: In the solution video you will see a check box to show/hide traces as it is used in PI Vision 2019. In PI Vision 2024 you can click the value field in the summary table to hide a trace.



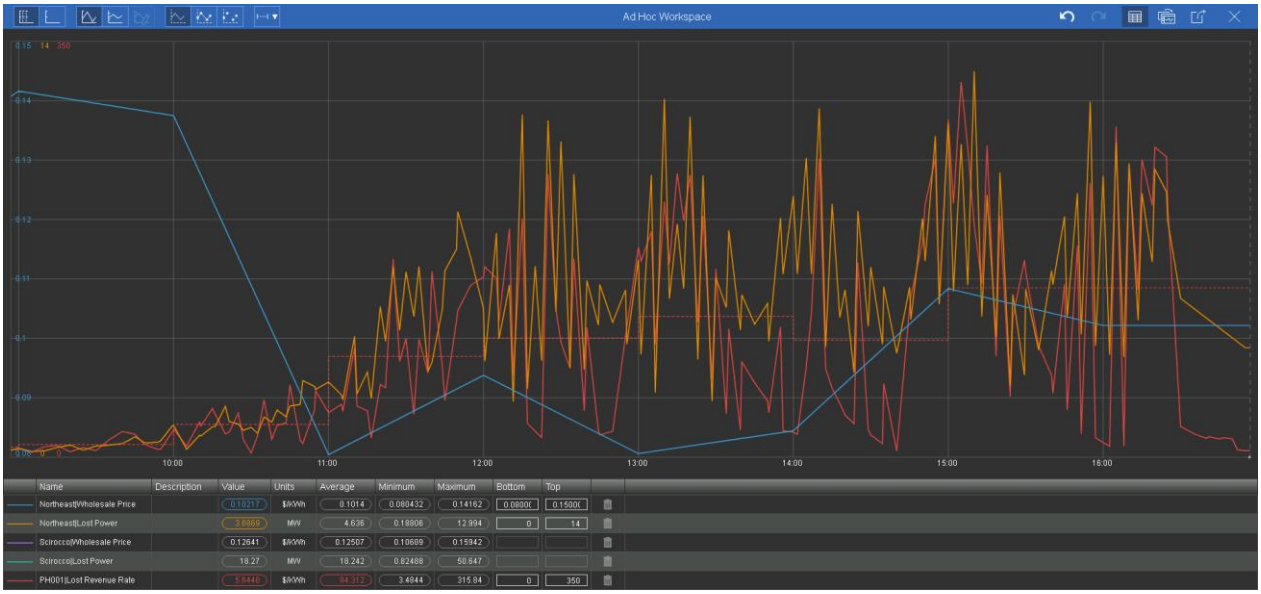
Is there a correlation between the **Lost Revenue Rate** of PH001 and the entire Northeast region?

9. Beginning with PI Vision 2020 you can add Minimum, Maximum, and Average summary traces with customizable intervals to the trend in the ad hoc workspace. Click on the Average for the **Lost Revenue Rate** of PH001 in the summary table to get the Average value shown on the trend. The Average value in the summary table gets highlighted in the color corresponding to the trend line.



10. Click the Summary Intervals drop-down menu.

11. Select the Step option with an interval of 1 hour.



Exercise 5: PI Vision Advanced Calculations

Exercise Objective:

- Create a PI Vision Calculation
- Understand the Advanced Options within the PI Vision Calculation

Scenario:

After seeing the Ad Hoc analysis performed in the previous exercise the client now has some additional on-demand type analysis they would like you to perform. They would now like to see what percentage of total Wholesale Price the Scirocco region comprises. Furthermore they would like to see this percentage calculated each hour and plotted clearly on a trend.

Approach:

1. Open the Wind Farm Overview display.
2. Create a calculation to represent the percentage of **Wholesale Price** the Scirocco region comprises and configure it to calculate on the hour.
    a. Hint 1: The calculation will be as follows
        *i. 'Wholesale Price'/('Wholesale Price' + '\Northeast|Wholesale Price')*100*
3. Plot the calculation Value in a trend and enable data markers on the trend.

Questions:

What is the current percentage of Wholesale Price for the Scirocco region?

What was the percentage 4 hours ago?

Exercise 6: XY Plot with Reference Curve

Exercise Objective:

- Create an XY Plot in PI Vision.
- Add a Reference Curve to the XY Plot

Scenario:

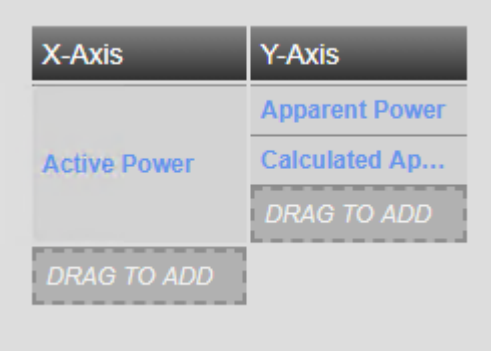
The client has now informed you that they would be interested in visualizing the relationship between Active Power and Apparent Power on each of their turbines in the Turbine Events Display. On the customer's side they have set up an AF Analysis that is calculating a value for their Apparent Power.

Approach:

1. Open your Windfarm Turbine Detail Display and drill down to the Turbine currently on the display.

2. Create an XY plot with **Active Power** on the X axis and **Apparent Power** on the Y axis.

3. For the Y axis column add the **Calculated Apparent Power** attribute.



4. Configure the second set of markers to serve as a reference curve.

Hint: https://customers.osisoft.com/s/knowledgearticle?knowledgeArticleUrl=KB01580

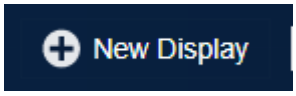
Solution Guide

Solution for Exercise 1: Creating a Turbine Information Display

1. Use the shortcut on the desktop to launch PI Vision using Microsoft Edge.

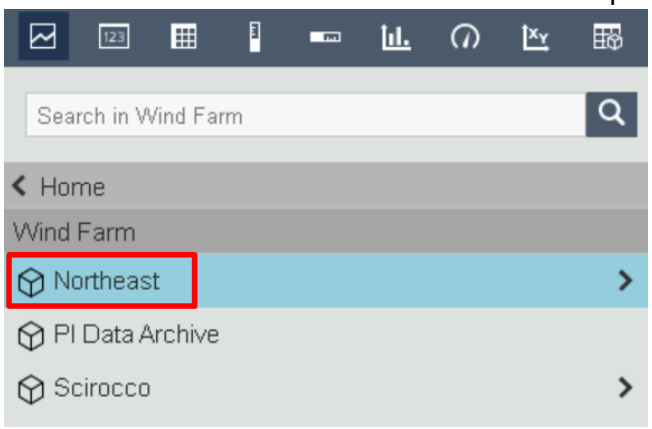
    a. Alternatively, start Microsoft Edge and navigate to https://pisrv01.pischool.int/pivision

1. Click the New Display button.

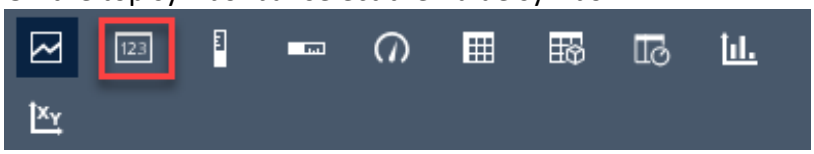


2. On the left hand tree select the Wind Farm database.

3. Drill down to the Northeast level in the Assets pane.

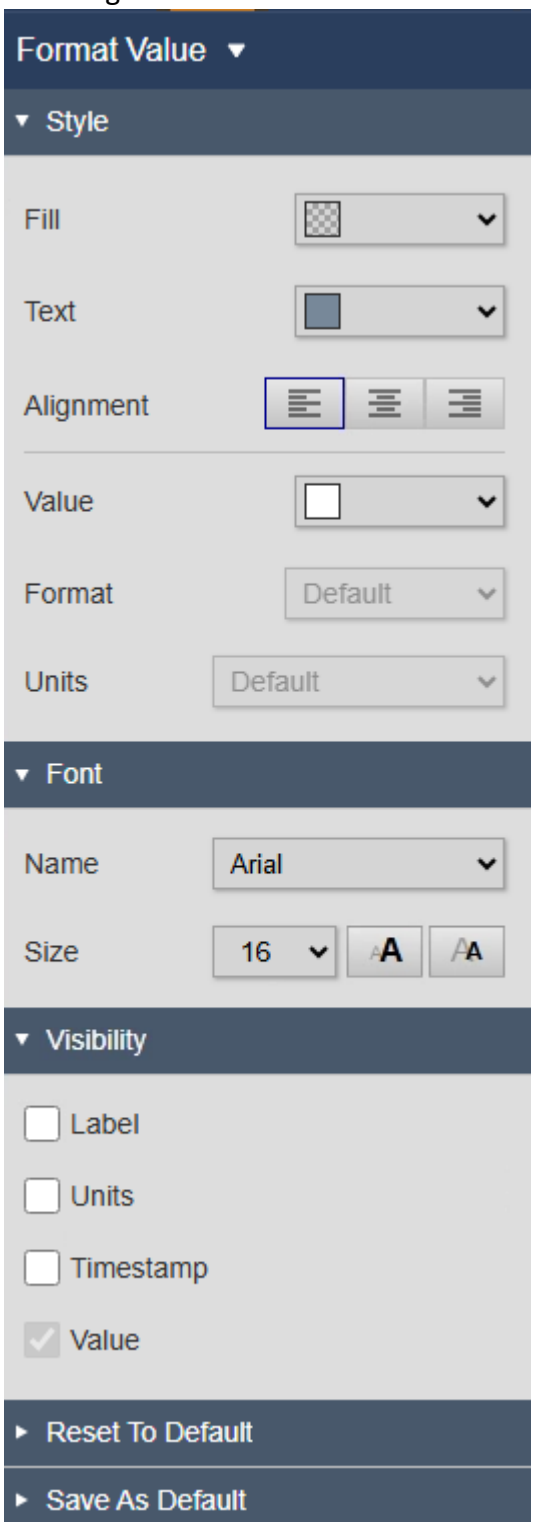


4. On the top symbol bar select the Value symbol.



5. From the Attributes pane select the **Region Name** attribute and drag it onto the display.

6. Format the Value symbol to only show the Value by right clicking the symbol and selecting "**Format Value…**"



7. Increase the font size to make the symbol larger.

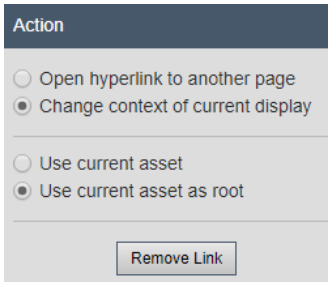
8. Once finished formatting click back in the display space.

9. Right click the symbol and select "**Convert to Collection…**"

10. Click back in the display to close the Configuration pane. Then select the collection and click "**Modify Collection**"

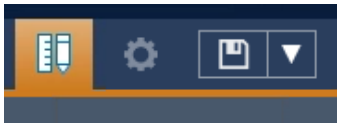
11. Then right click on the Value symbol and select "**Add Navigation Link**"

12. Under the Action section select "**Change context of current display**" and "**Use current asset as root**"

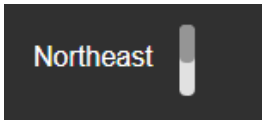


13. Click back onto the display and click the Exit Modify Mode button.

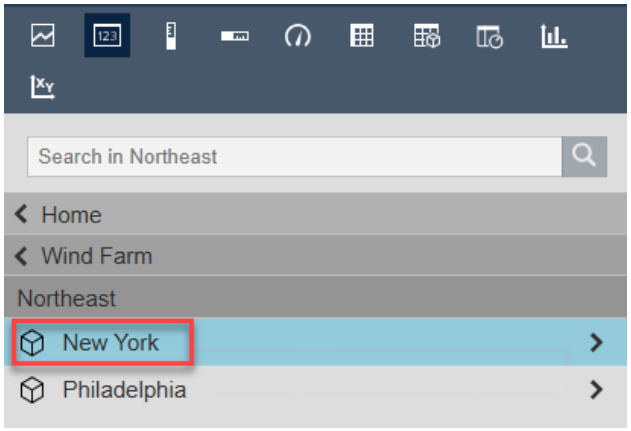
14. Ensure you are in build mode.



15. Format the collection so only one item is showing.



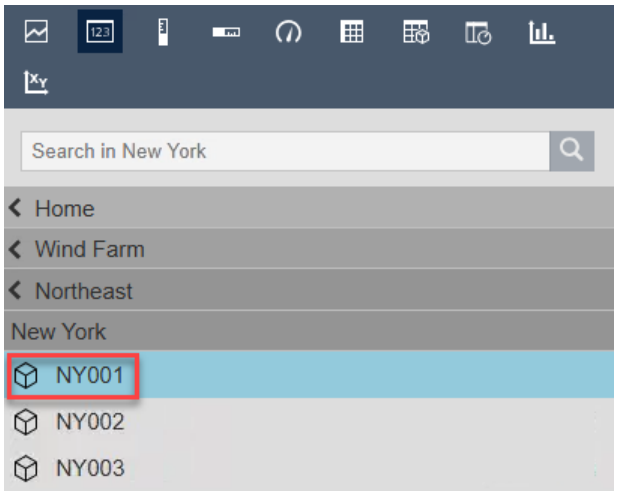
16. In the Assets pane drill down to the **New York** Element.



17. Confirm the Value symbol is still selected, find the **Farm Name** attribute, and drag it onto the display.

18. Repeat steps 7-15 to format the symbol, create a collection, and configure the navigation for the symbol.

19. Drill down to the **NY001** Element



20. Confirm the Value symbol is still selected, find the **Turbine Name** attribute, and drag it onto the display.

21. Repeat steps 7-15 to format the symbol, create a collection, and configure the navigation for the symbol.

22. Add text symbols to the display and format the collections as desired. An example can be seen below:

Note:

PI Vision 2024 introduces new display editing features.

- **Font and font sizing**

You can set the font and font size on all PI Vision symbols including the trend, table, and gauge symbols.

- **Bulk edit symbols**

You can select multiple symbols and edit them at the same time.

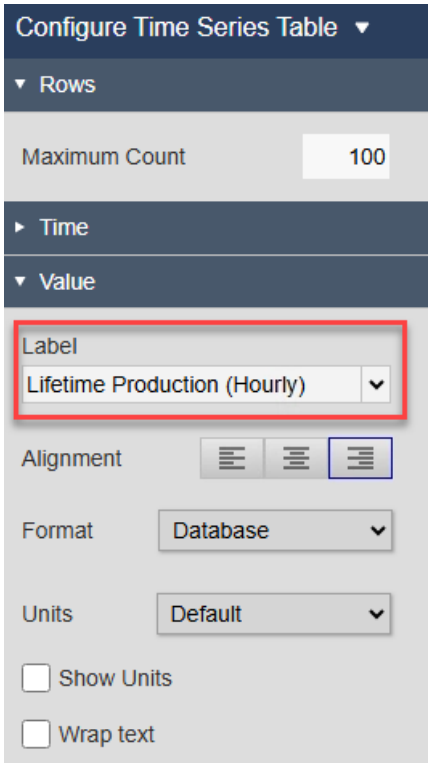
23. While still on turbine NY001 create another value symbol to show the **Turbine Name.** This will not be made into a collection and can be used to show which turbine is selected.

24. Select the horizontal gauge symbol and find the **Lifetime Production (Hourly)** attribute. Drag it onto the screen to create the symbol.

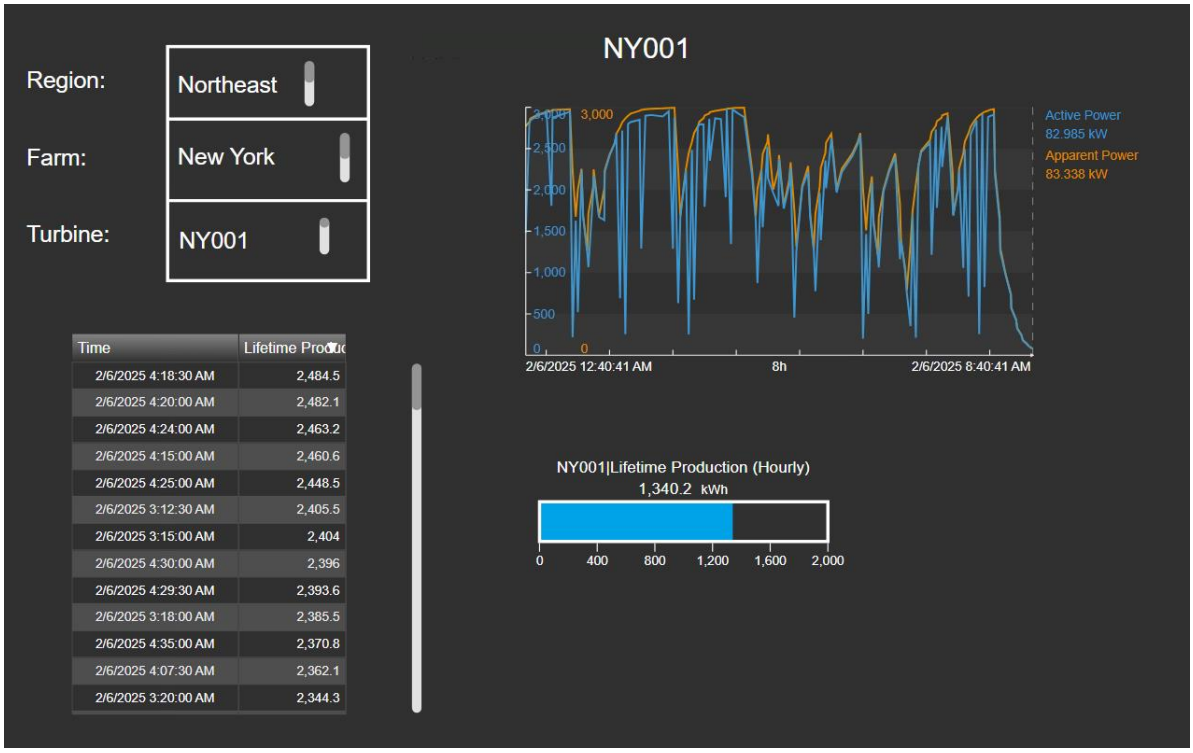
25. Select the trend symbol and select the **Active Power** and **Apparent Power** attributes. Drag those onto the display to make a trend symbol.

26. Select the Time Series Table symbol and select the **Lifetime Production (Hourly)** attribute. Drag it onto the screen to create the symbol.

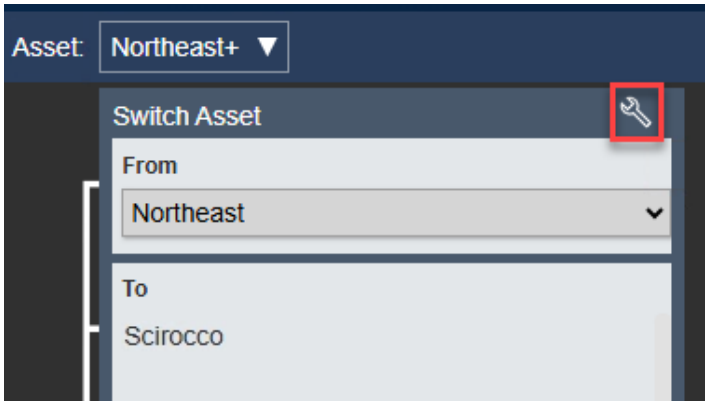
27. Right click on the Time Series Table symbol and select **Configure Time Series Table**. Under Value, change the **Label** to show only the attribute name:



28. Select all the symbols on the display, right click and select **Format Symbols**. Explore different symbols editing options and format the symbols as desired.
29. Format the display as desired. An example display can be seen below:



30. Select the drop-down arrow on the right-hand side of the Asset Drop Down box and click the Configure asset context switching icon.



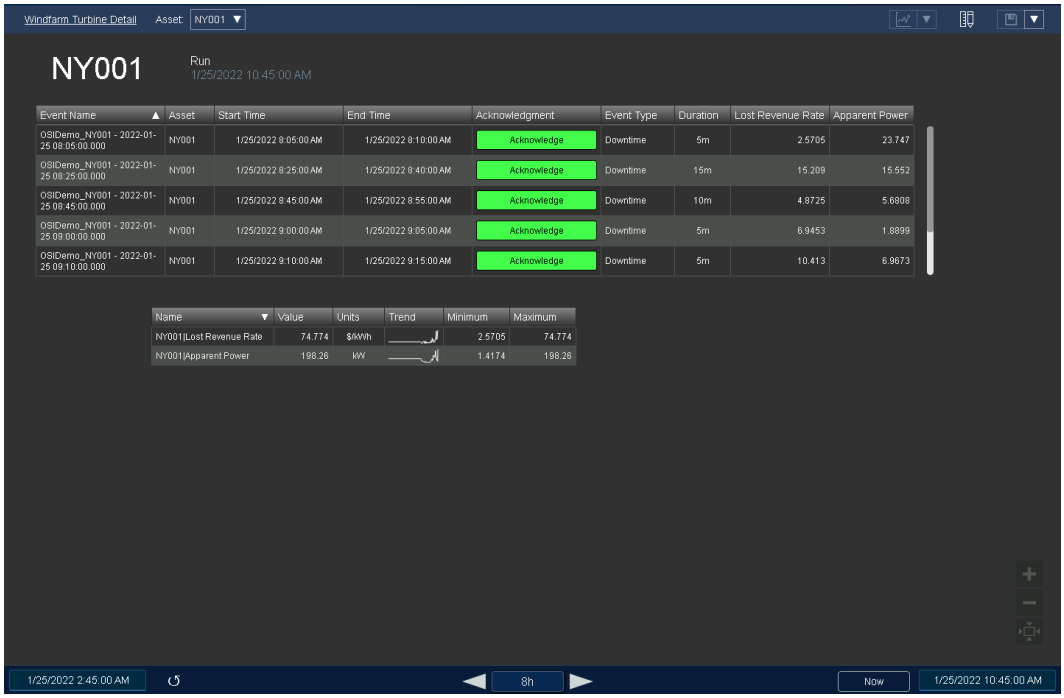
31. In the Configure Context Switching pane on the right select the option for "**Do not show**".

32. Ensure your display is in run mode and select the collections to change the display.

33. Save the display in your **Student01** folder as *Windfarm Turbine Overview_Your initials* and answer the exercise questions.

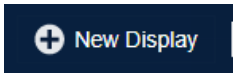
Solution for Exercise 2: Turbine Events Display

Example of a display that we will create in this exercise:

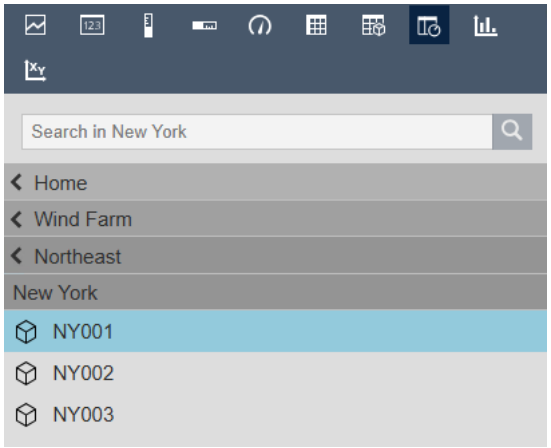


1. Connect to PI Vision by clicking the PI Vision shortcut on the desktop.

2. Click the New Display button.



3. Drill down to the Turbine **NY001** in the Assets pane.



4. Select the Value symbol and drag over the **Turbine Name.**
5. Configure the symbol to just show the turbine name.

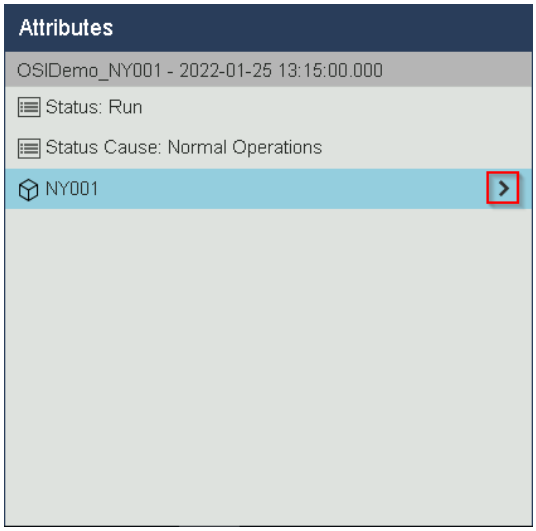
6. Add a value symbols for the **Status.**

7. On the left side of the screen select the Events icon to explore Event Frames.

8. Verify that Event Frames have populated in the Events Pane and select the "**Create Events Table**" button. If no Events are present ensure the "*Automatically refresh the list*" option is checked.

9. Right-click on the event table and select the **Configure Table…** option and use the arrow button to move **Event Type** and **Duration** from Additional Attributes up to Current Columns.

10. Use the arrow next to the asset name in the Attributes pane to see the list of asset attributes. Drag and drop the attributes **Lost Revenue Rate** and **Apparent Power** on the Events Table. The table will display the attribute values at the end time of the event frame.



11. Save the display as *Windfarm Turbine Detail_Your initials*.

12. Put the display in Monitor mode and click on an Event in the table. This will open the details display and you can answer the exercise questions. If you need to change the context of the display you can use the Asset drop down box.

Tipps to find the solution to the questions:

When was the last time turbine PH002 in Philadelphia had a downtime Event?

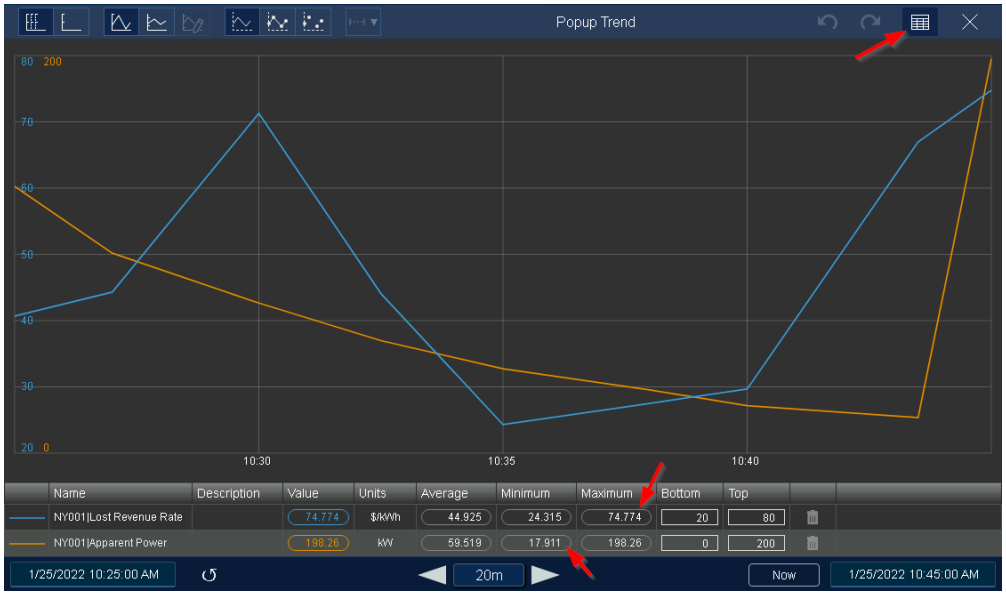
Scroll through the event table to find the newest event at the bottom of the table or use the arrow at the **Event Name** or **Start Time** column header to have the column sorted in descending order.

Event Name	Asset	Start Time	End Time
OSIDemo_NY001 - 2022-01-25 10:25:00.000	NY001	1/25/2022 10:25:00 AM	1/25/2022 10:45:00 AM
OSIDemo_NY001 - 2022-01-25 09:50:00.000	NY001	1/25/2022 9:50:00 AM	1/25/2022 9:55:00 AM
OSIDemo_NY001 - 2022-01-25 09:10:00.000	NY001	1/25/2022 9:10:00 AM	1/25/2022 9:15:00 AM
OSIDemo_NY001 - 2022-01-25 09:00:00.000	NY001	1/25/2022 9:00:00 AM	1/25/2022 9:05:00 AM
OSIDemo_NY001 - 2022-01-25 08:45:00.000	NY001	1/25/2022 8:45:00 AM	1/25/2022 8:55:00 AM
OSIDemo_NY001 - 2022-01-25 08:25:00.000	NY001	1/25/2022 8:25:00 AM	1/25/2022 8:40:00 AM
OSIDemo_NY001 - 2022-01-25 08:05:00.000	NY001	1/25/2022 8:05:00 AM	1/25/2022 8:10:00 AM

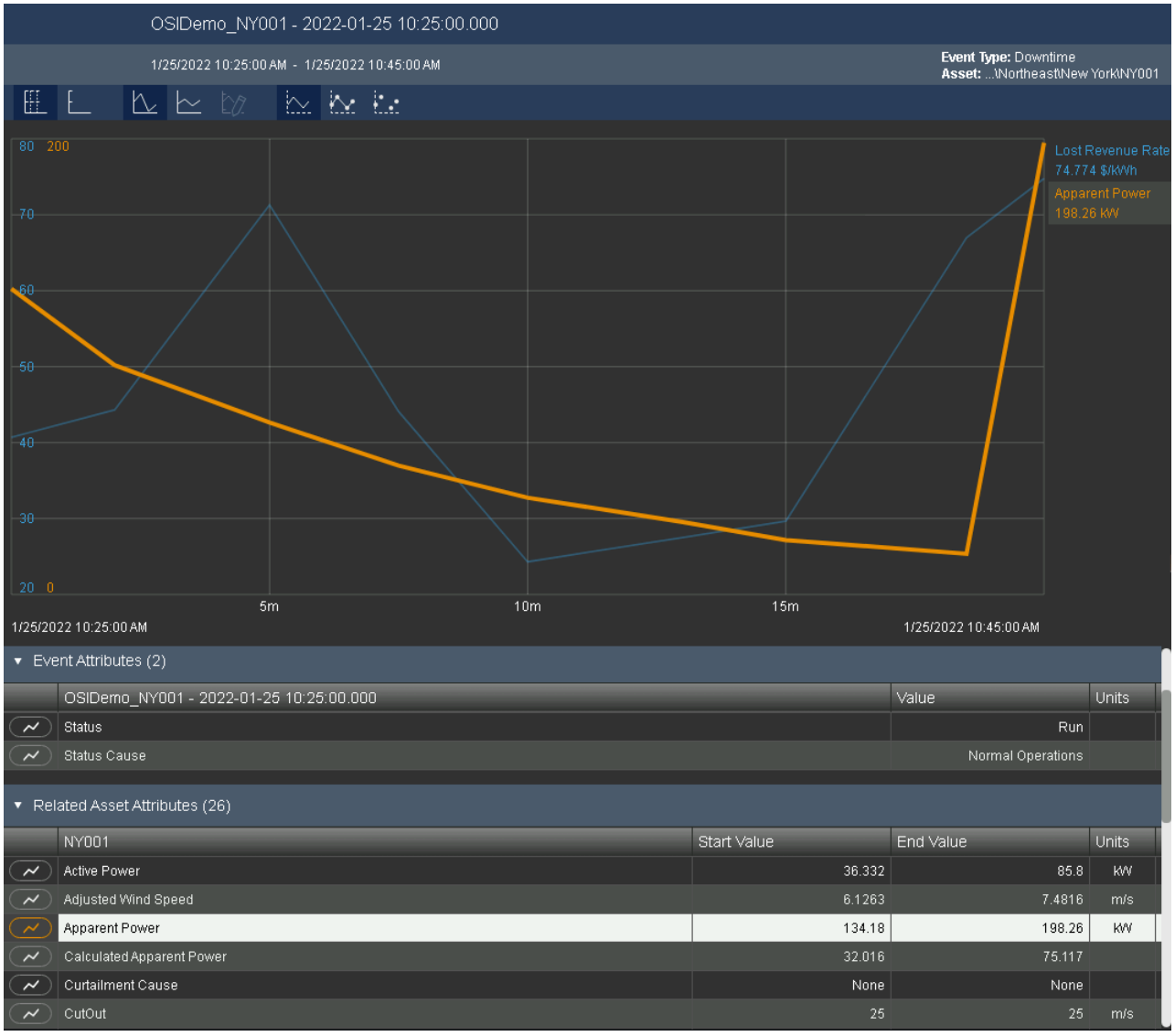
Finding maximum and minimum values to answer the questions:

- **What was the approximate peak Lost Revenue Rate in that time range?**
- **What was the approximate minimum Apparent Power for that time range?**

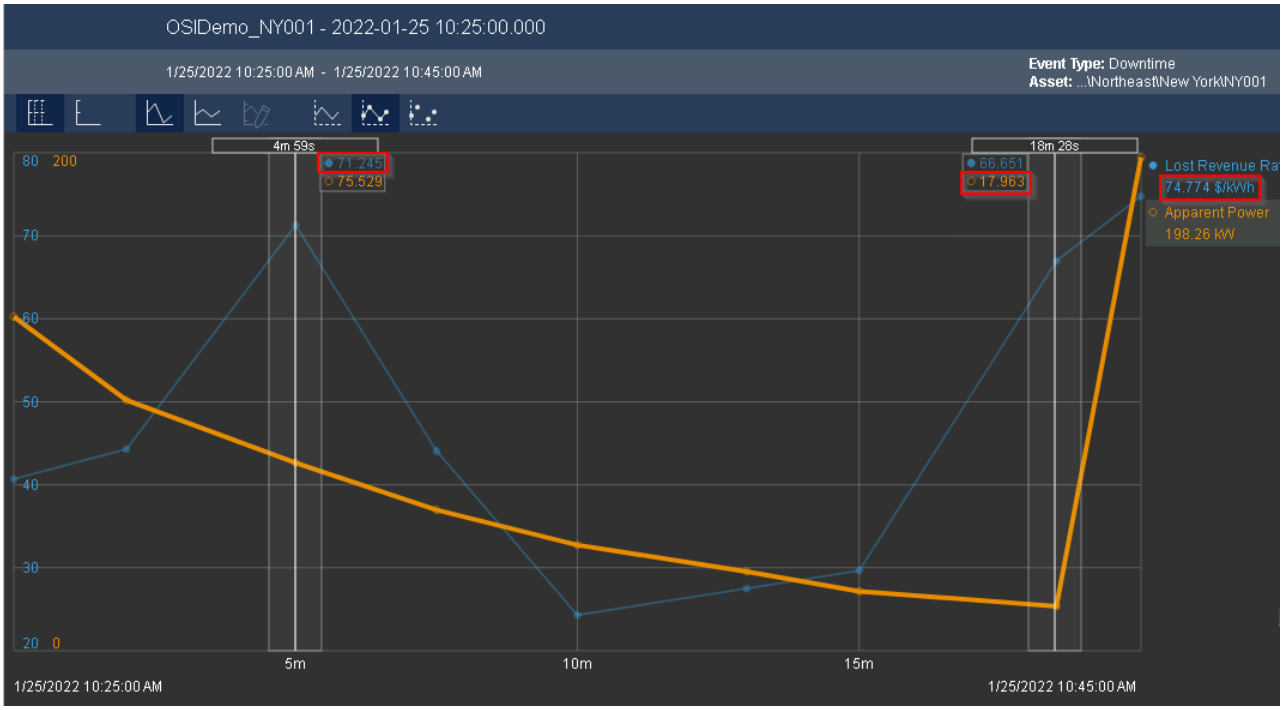
Option 1: Right click on the latest Event Frame in the Events Table and select Open Popup Trend From Row. In the Popup Trend, click on Show Summary Table in the upper left. The summary table will appear below the trend and displays the minimum and maximum values for the attributes in the trend.



Option 2: Click on the latest Event Frame in the Events Table while in Monitor Mode or right click and select Event Details. To bring the attributes onto the trend pane, click the line symbol to the left in the Related Asset Attributes list for Lost Revenue Rate and Apparent Power.

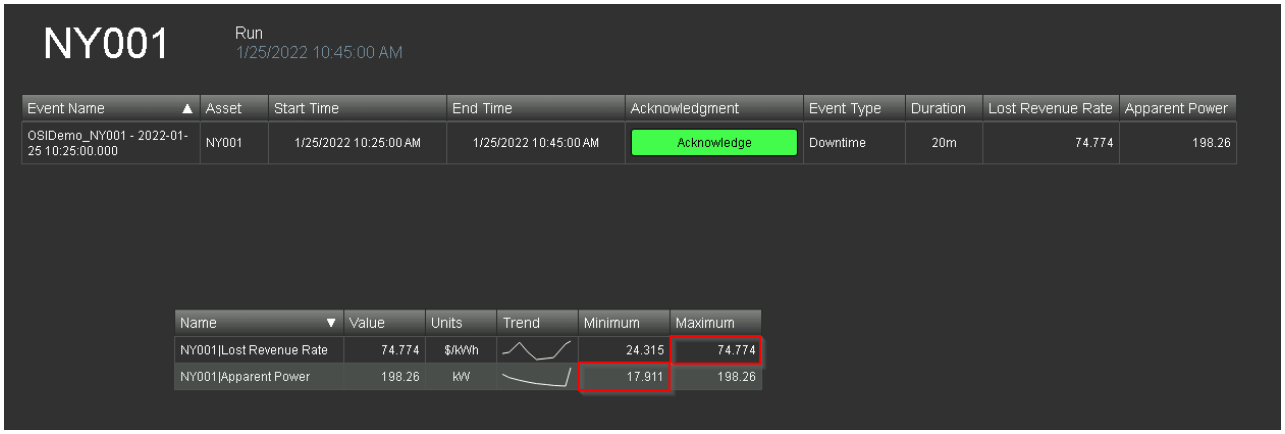


At the top you can change the appearance of the lines. For example, you can active Data Markers to easily see where the archived values are. To find the maximum and minimum values for the attributes, you can use a trend cursor by clicking on the trend at the timestamp of the minimum or maximum, respectively. The trend cursor can be moved by holding down the mouse button if you have not hit the maximum or minimum exactly. Still, it might be difficult to find the exact spot and get a precise value. Multiple cursors can be used simultaneously, simply click again on the trend.



In the example, I selected the peak at approximately 5 min as the maximum of the **Lost Revenue Rate**. Looking more carefully, you will notice that the trend is going higher at the end of the time range. The end time value is shown in the legend at the right.

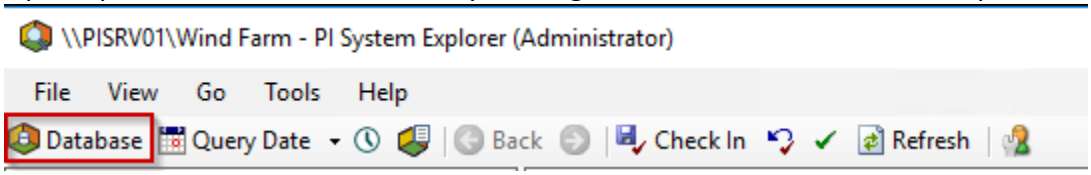
Option 3: Create a Table symbol on the Windfarm Turbine Detail display with the two attributes Lost Revenue Rate and Apparent Power. Make sure to show the Minimum and Maximum columns. Right click on the event in the Events Table and select Apply Time Range.



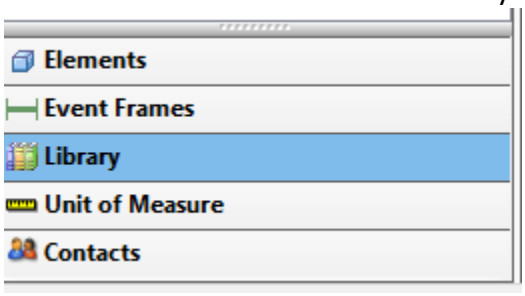
Solution for Exercise 3: Linking the displays

1. Open up PI System Explorer by clicking the PI System Explorer shortcut on the desktop.

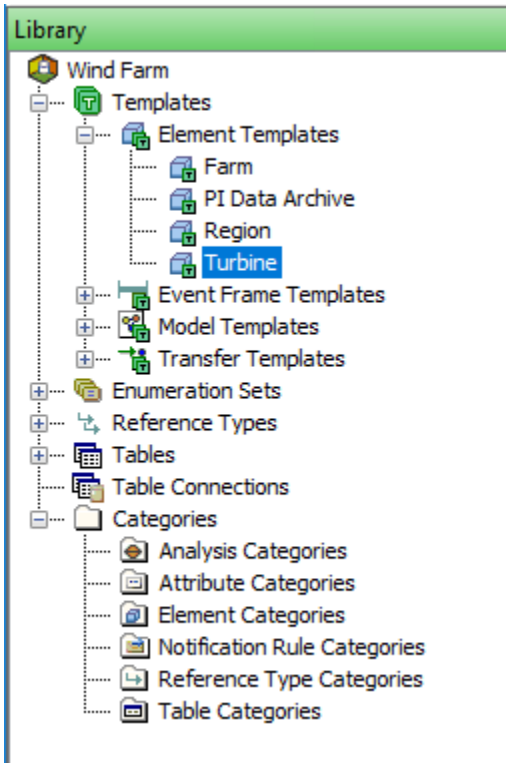
2. Open up the Wind Farm database by clicking the Database icon near the top left.



3. Once in the database select the Library tab in the bottom left.

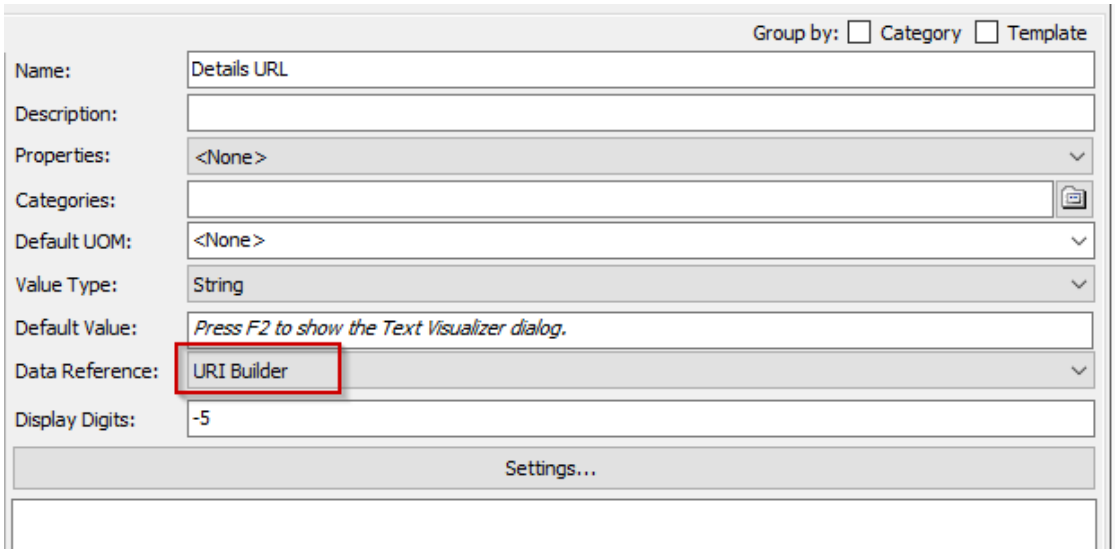


4. Expand the Templates section of the hierarchy and then expand the Element Templates section.



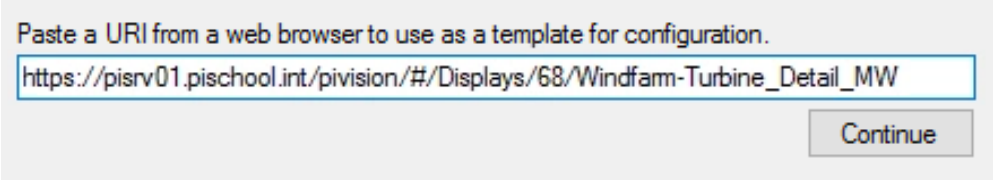
5. Select the Turbine Template then select the Attribute Templates tab as that is where we are going to configure the Details URL.

6. Select the Details URL attribute and change the Data Reference to URI Builder.



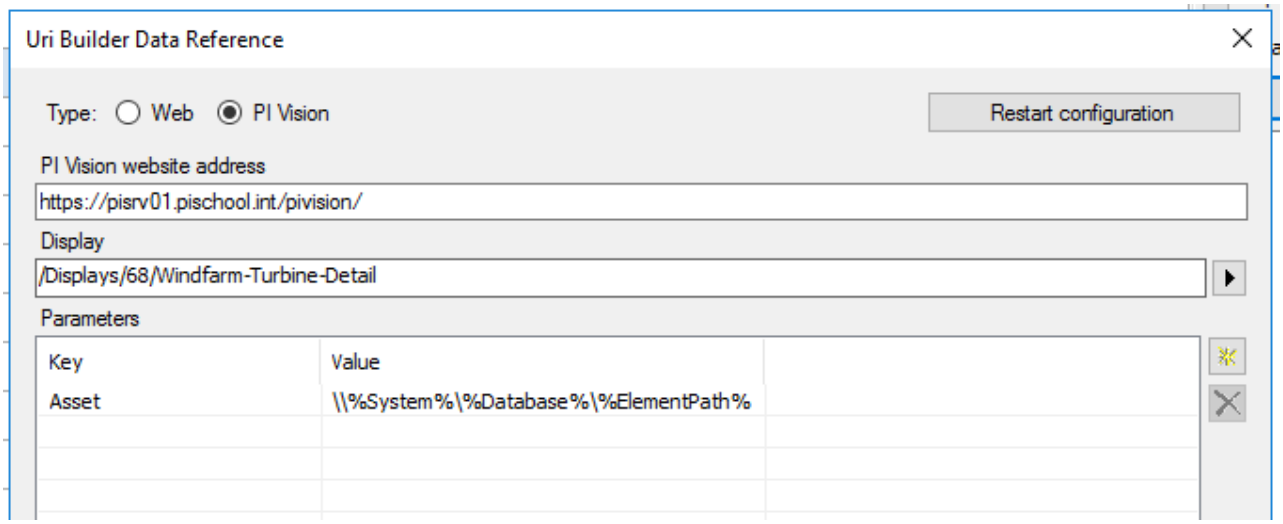
7. Click the “Settings…” button.

8. In the box copy and paste in the URL for the display you created in Exercise 2 and click Continue.



9. For the Type select PI Vision.

10. Click the * icon to add a new key.



11. For the key select Asset and for the value type \\%system%\%database%\%elementpath%

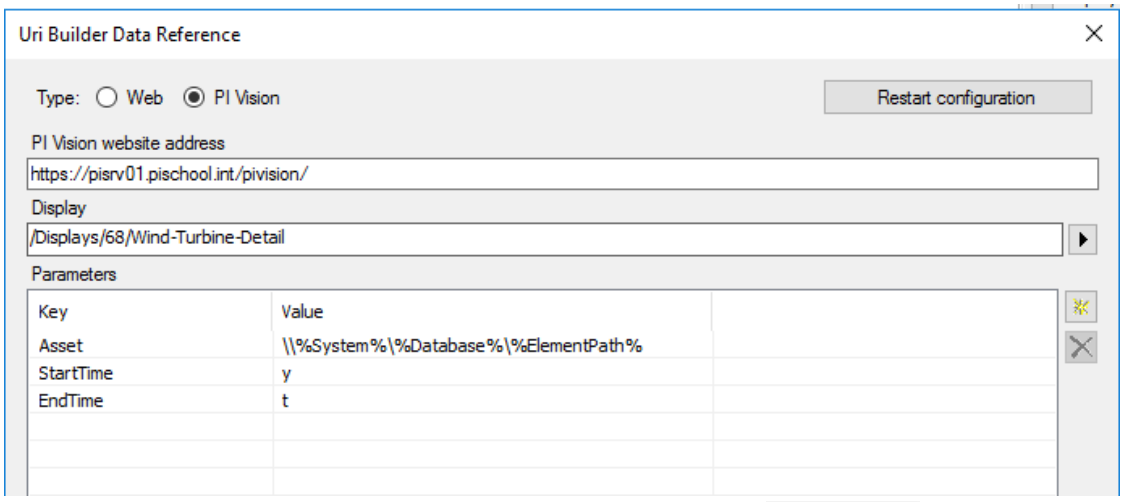
12. Click OK.

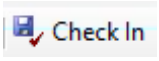
13. Select the Details URL Yesterday attribute.

14. Repeat steps 6-11 for the new attribute.

15. In addition to the Asset key, create a StartTime key and set its value to “y”

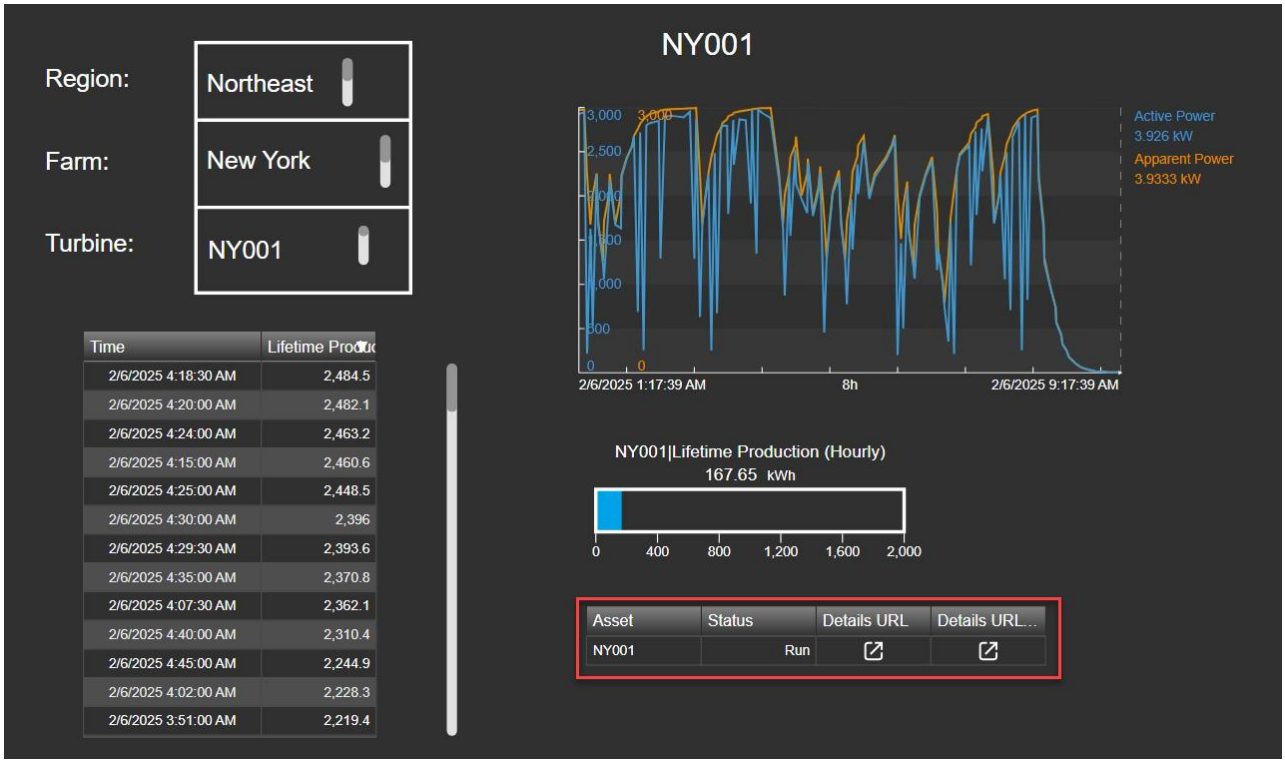
16. Create an EndTime key and set its value to “t” and click on OK.



17. When finished making changes be sure to Check In 

Changes in PSE.

The display that was created in exercise 1 will be expanded by an asset comparison table with the URI Builder attributes created before. Example:



18. Return to PI Vision and open the *Windfarm Turbine Overview_Your initials* display you created in Exercise 1.

19. Create an Asset Comparison Table Symbol on the display that includes the following attributes:
    a. **Status**
    b. **Details URL**
    c. **Details URL Yesterday**

20. Save the display and test the links by using Run mode and clicking on them.

21. For question 2, you can modify the Details URL Yesterday attribute by adding a new key.

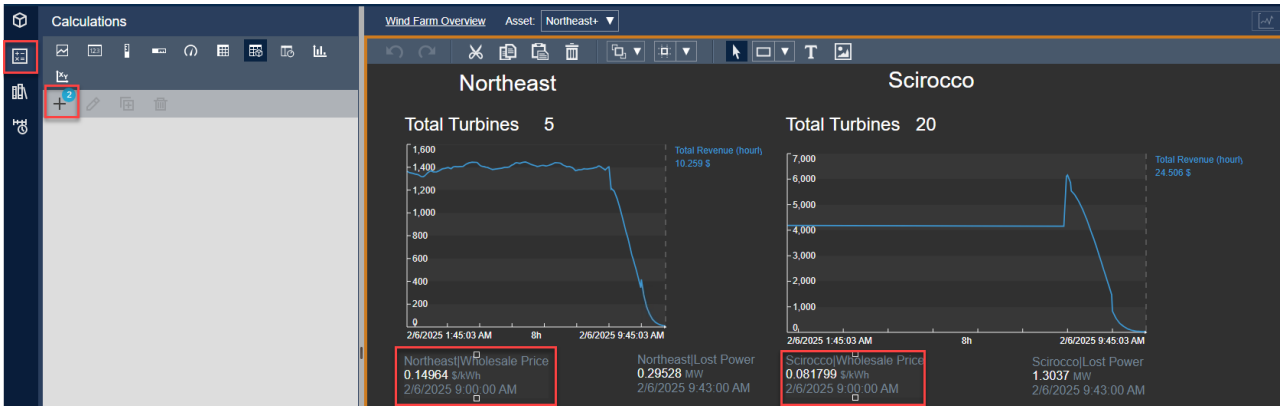
Solution for Exercise 4: Ad Hoc Trending in PI Vision

This Exercise was written to already provide step-by-step instructions.

Solution for Exercise 5: PI Vision Advanced Calculations

The *Wind Farm Overview* display that was used in Exercise 4 will be expanded to include an additional trend of calculated data.

1. In PI Vision open the Wind Farm Overview Display if not already opened.
2. Place the display in Design mode.
3. Select the Calculation tab and select the value symbols for the Northeast and Scirocco Wholesale Price attributes. Note that the parent element of the attribute that was selected first is used as the root element. In the following we show the steps when the Wholesale Price attribute of Scirocco is selected first. Click the '+' to create a new calculation.



4. Name the new calculation **Scirocco Wholesale Price Percentage**

5. The Expression box will show the following (with asset Scirocco selected as root):

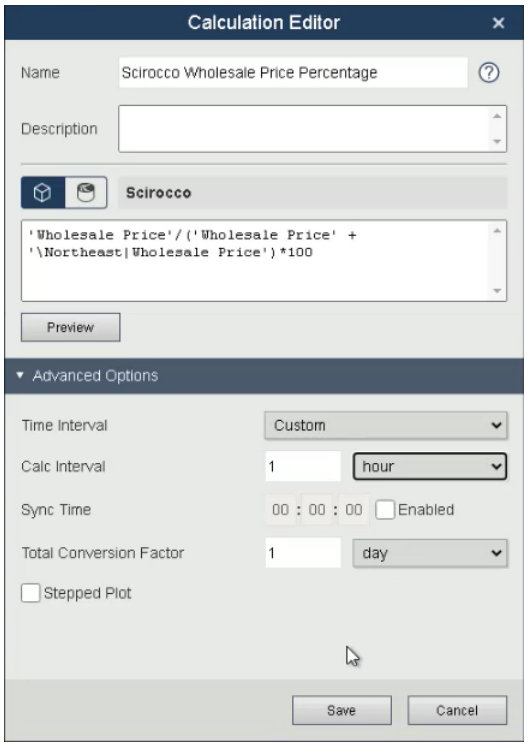
   'Wholesale Price' + '\Northeast|Wholesale Price'

6. Modify the Expression to the following:

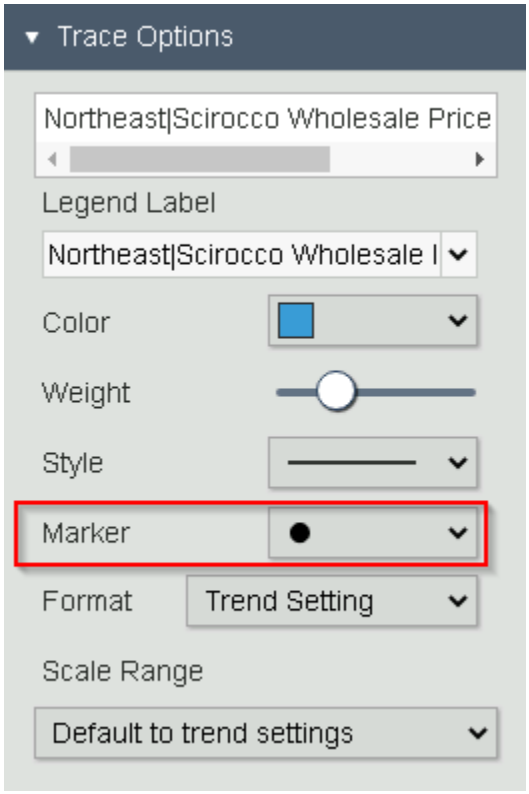
   *'Wholesale Price'/('Wholesale Price' + '\Northeast|Wholesale Price')*100*

7. Expand Advanced Options and change the Time Interval to Custom

8. Adjust the Calc Interval to **1 hour**



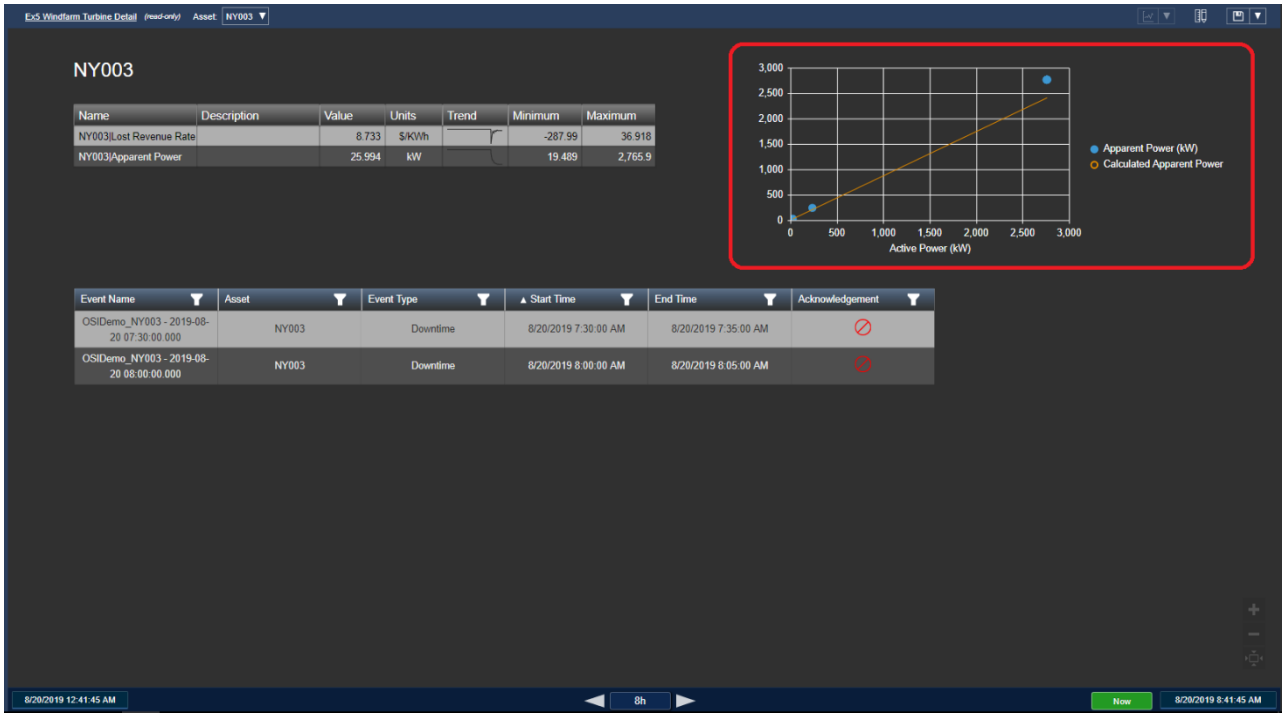
9. Save the calculation.
10. Select the Trend symbol in the PI Vision symbol tray.
11. Drag the Value Column of the calculation onto the display space to make a new trend.
12. Right click the trend and hit Configure Trend.
13. Expand Trace Options and make a selection for the Marker setting



14. Place the display in Run mode and use your trend and trend cursors to answer the exercise questions

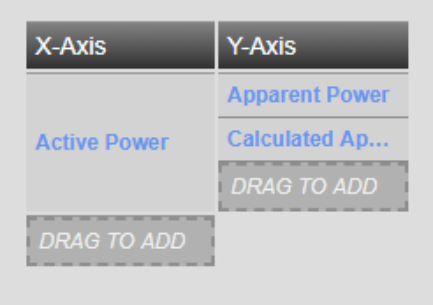
Solution for Exercise 6: XY Plot with Reference Curve

The *Windfarm Turbine Detail* display that was created in exercise 3 will be expanded by an XY plot. Example:



1. In PI Vision open the Wind Farm Turbine Detail display you created in Exercise 2
2. Drill down in the Assets pane to whatever Turbine is currently shown on the display
3. Select the XY Plot symbol
4. In the Attributes pane select both the **Active Power** and **Apparent Power** attributes. You can select multiple attributes in PI Vision by holding the Ctrl key. Drag those on to a blank area in the display to make the XY plot
5. Right Click the XY Plot and select "**Configure XY Plot…**"

6. From the attributes pane find the **Calculated Apparent Power** attribute and drag it to the Y-axis of the XY Plot configuration



7. Under the Format section select the second row that has the **Calculated Apparent Power** attribute
8. Click the check box for Connecting Line and uncheck the box for Markers
9. Now click back in the display space and save your display.

PI Vision Security

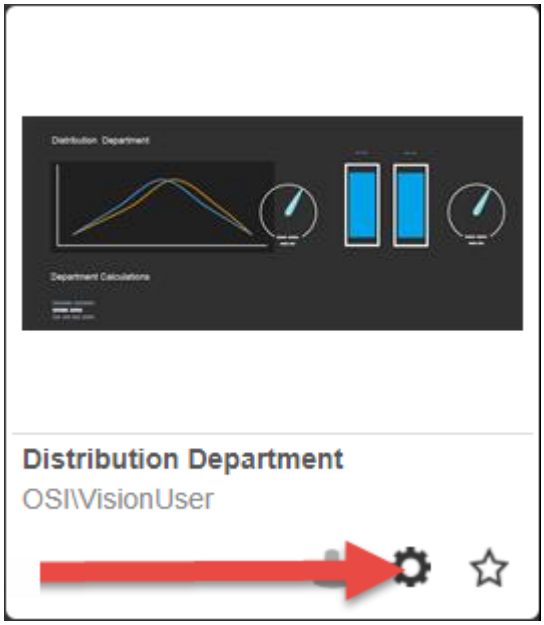
By default, any new display you create in PI Vision is private. Meaning that only you can view and edit it. You can however share it with other users and even grant them access to edit and save new versions. Let's see how PI Vision 2024 streamlines the process of granting users read and write access to displays.

Share Displays and Edit Access

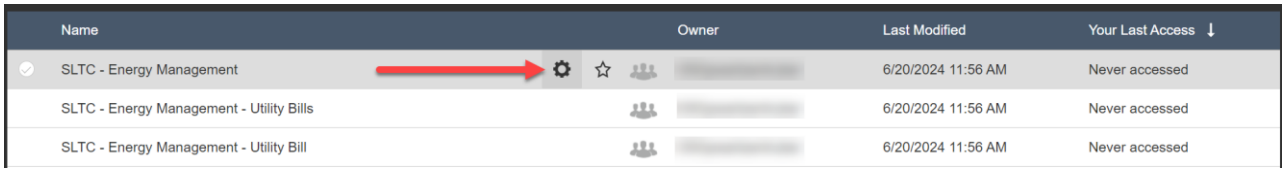
The Display Settings window allows you to control a display's visibility and ownership. You can access the display settings from the Home page or from within a display:

- From the Home page, select **Edit display settings** for the display you want to edit.

In thumbnail view:

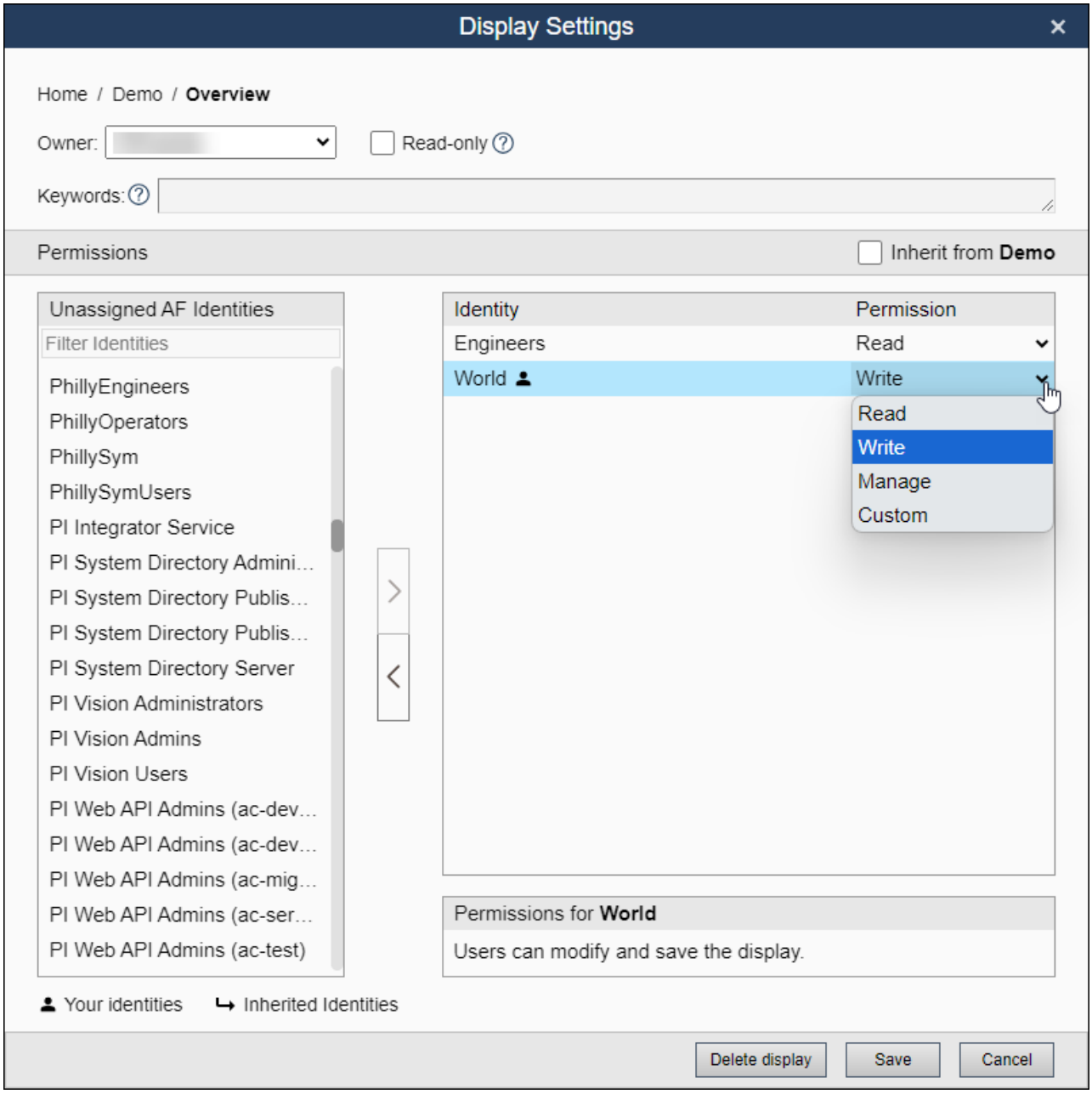


In table view:



- From an open display, select **Edit display settings** near the top right of the page.

The **Display Settings** window opens:



The options available on the Display Settings window depend on your PI Vision user role. Administrators have access to all Display Settings. Display Owners may only access some options. The Keywords setting allows you to provide keywords separated by semi-colons. This makes it easier for someone to search and find this display. Checking the Read-only box disables saving any changes to the display by any user, including yourself. You must save the display under a different name to make changes. If you are an administrator, you can change the owner for the selected display. The display owner can make changes and save new versions of the original display. You

can remove displays by clicking on the delete button. You cannot undo this action so make sure you are certain before you proceed.

- **Owner**

Click **Owner** to change the display's owner to a different user. The user who is designated as the owner is able to view the display and change its Display Settings even if that user is not assigned a PI AF identity that is granted those permissions.
Note: This option is available only if you are a PI vision administrator or you are granted the Administrator permission on the display's folder or any of its parent folders.

- **Read-only**

Select **Read-only** to not allow any users to save any changes to the display, including the display's owner and administrators. If you apply this option then later find that you want to make changes to the display, a user with the necessary permissions needs to first unselect Read-only.
Note: If you want to make changes to a display that is read-only, you can open that display and save a copy under a different name.

- **Keywords**

Keywords are like tags, allowing you to label the display with any attributes that are relevant to you and your organization. On the home page, you can filter your available displays based on keywords, so that keywords can make it easier to find specific displays and they also allow you to show a list of available displays that all share a common keyword.
Enter keywords in the **Keywords** field. If entering multiple keywords, separate them with semicolons. If existing matching keywords are found, they are suggested as you type.

- **Permissions**

By default, when you create a display, you are the only user who can view it (along with PI Vision administrators). Apply permissions to allow other users to view and edit the display. AVEVA PI Vision grants permissions based on PI AF identities. When permissions are granted to an identity, all users assigned to the identity receive those permissions.

Keep in mind that permissions are separately applied to your folders where displays are stored.

There are different approaches to setting up permissions overall, for example you can:

- Allow numerous users to view/modify a certain folder but use display permissions to limit which of those users can view/modify each display that is contained in the folder.
- Allow the same set of users who can view/modify a folder to view/modify all the displays that are contained in that folder (by choosing to have displays inherit their permissions from their folders).

- Allow users to view/modify a certain display, even though they are not granted access to view that display's folder. In that scenario, those users can access the display without navigating through its folder, such as by viewing All Displays.

To set the display's permissions:

- Select **Inherit from [folder name]** if you want to apply the same user permissions as those that are applied to the folder in which this display is stored. For example, you can choose to inherit permissions if you want all the same users who are allowed to view the display's folder to be able to view the display. Note the following:
    - You can grant additional permissions to what is inherited from the folder, as well as modify the inherited permissions. To change the inherited permissions for an identity, select **Custom**.
    - If permissions are changed on the parent folder, the display's permissions update automatically with the new permissions. Any non-inherited permissions that were manually applied are retained.
    - If the display is moved to a different folder, inherited permissions are not retained, but any non-inherited permissions that were manually applied are retained.
    - If you have multiple levels of subfolders, permission inheritance may be chained across the folder levels, then chained to displays. For example, changing the permissions on a top-level parent folder will change the permissions of a display that is in a sub-folder three levels down when **Inherit from** is enabled on the display as well as on all those folders.
- To give an identity permissions on the folder, select the identity in the **Unassigned AF Identities** list, then select the arrow to move it to the list of identities with permissions. Once it is moved, the identity is given Read access by default, which you can change as needed in the next step. Continue to move all the identities that you want to grant permissions to. Any identities that remain unassigned on the left side of the window will not have any permissions for the display, so that those identities do not have permission to view the display.
- Set the permission for the identities as appropriate. The options are described below.

- **Read**

The identity's users can:

- View the display.
- Save a copy of the display.

- **Write**

Provides all Read permissions, plus the identity's users can:

- Edit and save changes to the display.

- **Manage**

Provides all Write permissions, plus the identity's users can:

- View and modify the display's permissions.
- Rename the display.
- Move the display.
- Delete the display.

- **Custom**

Allows you to set custom permissions for the identity. This option may be used for two main reasons. First, if you are working with a display that inherits its permissions from its folder, you can select **Custom** to modify an identity's inherited permissions. Second, for any display, you can select **Custom** if you want to explicitly deny permissions for an identity. Explicitly denying a permission differs from not granting the permission in that it:

- Ensures that the permission is denied for all users who are assigned the identity even if permissions are inherited from the parent folder which would otherwise grant that permission to the identity.
- Ensures that the permission is denied for all users who are assigned the identity even if any of those users are also assigned other identities that would otherwise grant the permission.

- **Delete display**

If you no longer need a display and want to remove it, select **Delete display**.

Note: You cannot undo this action. Make sure you are certain before you delete a display.

Save your changes

If you make any changes on the **Display Settings** window, click **Save** to confirm and apply them to the display. If you do not want to save your changes, click **Cancel**.

Collaborate on Your Displays

Users can access the same display at the same time. If one of them modifies the contents of the display, these changes will be automatically applied to the displays of the other users within 2 minutes. The user who made the changes would need to save the display and exit edit mode.

If another user attempts to also make changes to the display before it updates, an indication will popup. This notifies them that the display has been changed. Their options are then to either save their display as a new version or reload to update their display. This way users avoid change conflict and are guaranteed to be looking at the same version of the display.

If you want to view the changes to a display before accepting them, you can open the display in a new browser tab and then decide whether to keep the changes or not.

Manage PI Vision Displays

Manage Role-Based User Access Level

Your PI Vision Administrator can give users different level of access by assigning and managing user roles on the PI Vision Administration website. PI Vision provides four access roles based on PI AF identities:

- **Administrators**
    - Have access to administer AVEVA PI Vision via the AVEVA PI Vision Administration website.
    - Have access to restricted functions in the AVEVA PI Vision application such as reassigning displays to another user.
    - View and edit all displays.
    - Additionally, have all the access rights of Publishers and Utility Users.
- **Publishers**

Have full user access to the application and can view, save, and share displays.

- **Explorers**

Have access to the application but cannot save or share displays. An Explorer can still export data from a display.

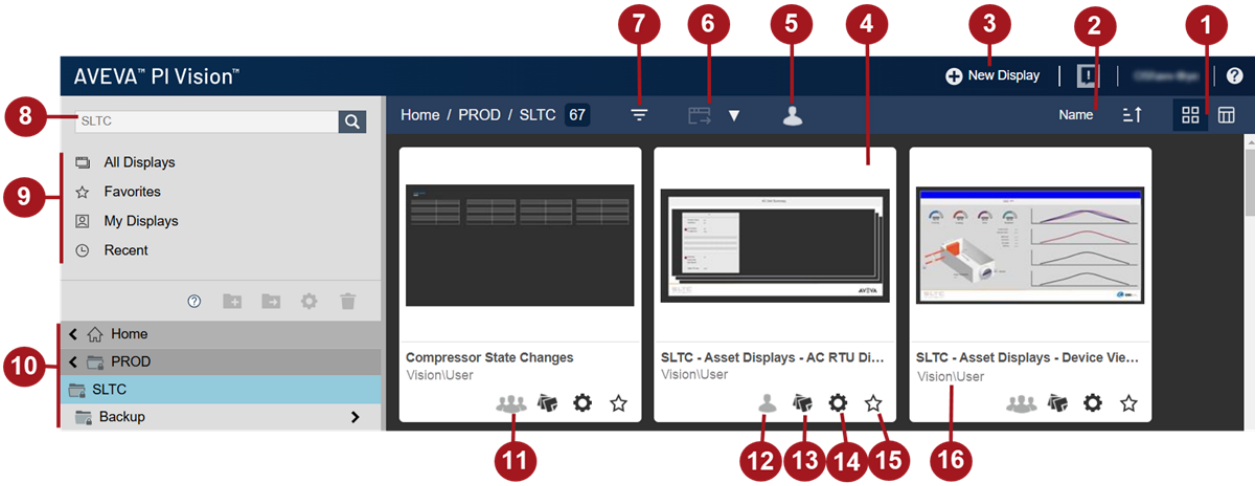
- **Utility Users**

Have permission to connect to the AVEVA PI Vision server for the purpose of using the PI Vision Display Utility, PI ProcessBook to PI Vision Migration Utility, or the public REST API.

PI Vision Homepage

The AVEVA PI Vision home page shows the displays you can access. You can search for displays, create new displays, and use several options to filter and sort displays.

Administrators and those with write access can create folders and organize displays.



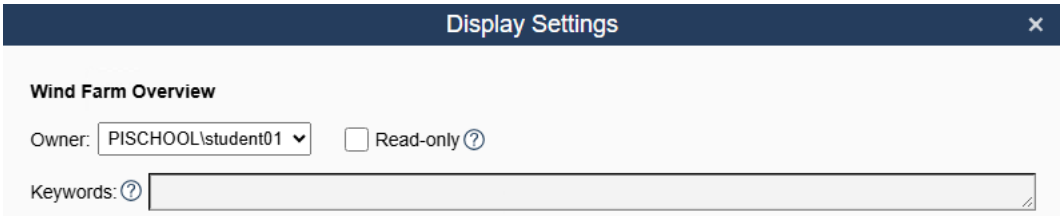
1. **Thumbnail/Table views** - Allows you to switch between viewing the list of available displays with their thumbnail images or in a simple table with only text.
2. **Sort options** - Allows you to choose the order that the displays are listed on the page.
3. **New display button** - Allows you to create a new display.
4. **Display thumbnail** - A preview of available displays. Select the thumbnail to view the display.
5. **Show/hide private displays** - Allows administrators to show displays that are set up as private. A private display is a display where no permissions were granted to any identities, so that it is generally intended to be viewed only by the user who created it.
6. **Select displays to move** - Allows administrators to select displays then move them to a different folder.

7. **Filter by Keywords** - Allows you to filter the displays that appear based on keyword tags that are assigned to displays.
8. **Search box** - Allows you to search for displays based on any words in the display name.
9. **Predefined groups** - System-provided options for filtering the displays that appear.
10. **Folders** - The folders where displays are stored, which are created by your organization .
11. **Public display icon** - Indicates that at least one identity is granted permission to view the display.
12. **Private display icon** - Indicates that no identities are granted permission to view display, so that it is generally intended to be viewed only the user who created it. Administrators can view private displays that were created by other users.
13. **Related displays** - Allows you to show only the displays that share at least one keyword tag with that display.
14. **Edit display settings** - Allows you to change the display's settings, such as the display owner, keyword tags, and the identities that have permission to view and edit the display.
15. **Add display to favorites** - Allows you to designate the display as a favorite, so that it appears when you choose to show only Favorites from the predefined groups.
16. **Owner** - The user who owns the display. The owner can view and edit the display even if their identity is not granted any read or write permissions for the display.

Organizing PI Vision Displays

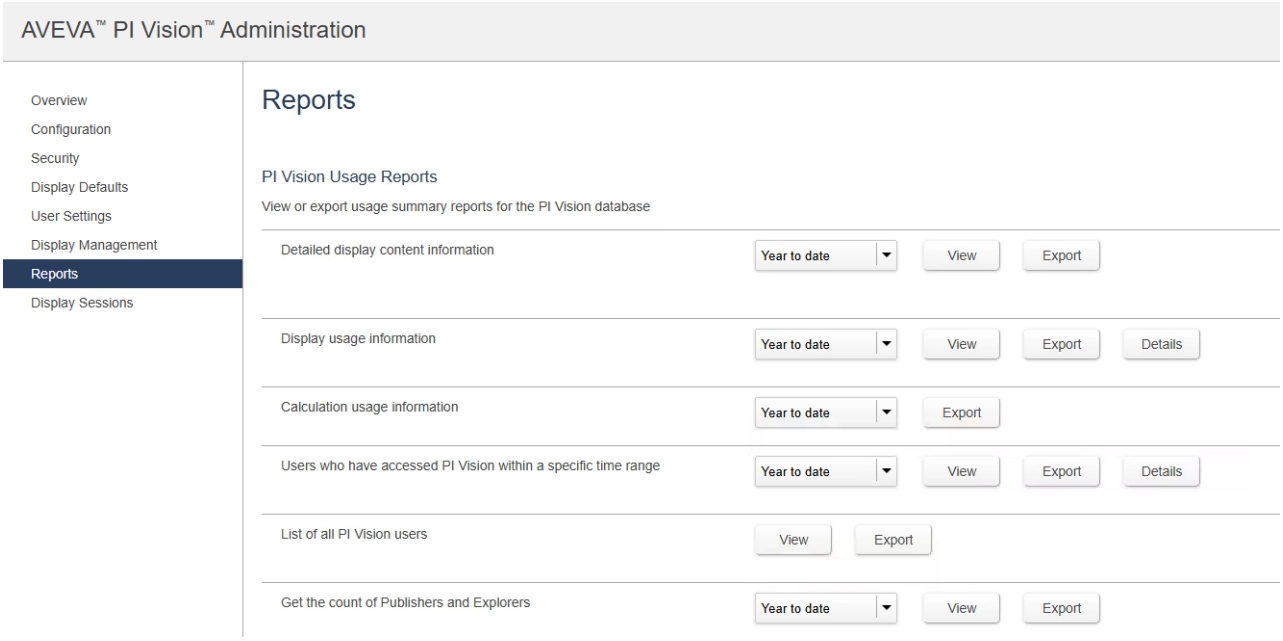
PI Vision offers new options for organization of displays to provide a quicker way of finding displays of interest.

- Search All Displays: Displays are searchable by name or owner.
- Favorites: You can mark displays as "favorites" by clicking the star icon. Favorites are a user-specific property.
- Keywords: You can apply keywords to displays to categorize them. The keywords can be viewed in a keyword cloud by selecting "Filter by Keywords." Within the keyword cloud, the keywords are sorted alphabetically, and their size is determined by their relative frequency. Keywords applied by one user are visible to the rest of the users.
- You can add a keyword by clicking the Display Settings icon and typing in the keyword in the Keywords box. Once you start typing the keyword, the matching available keywords become available in a list.


Display Settings
Wind Farm Overview
Owner:
PISCHOOL\student01
Read-only
Keywords:

Reports

PI Vision administrators can view or export six different reports about the usage of PI Vision. The reports are available under the Reports tab on the PI Vision Administration site. In the virtual environment you can access the PI Vision Administration site under the URL https://pisrv01.pischool.int/pivision/admin.



Each of the report types is defined as follows.

- **Detailed display content information**

Provides a summary of the contents of displays created during a specified time range. This can include information about data items, symbols, display visibility, and display ownership.

- **Display usage information**

Provides a count of total views and unique users that have accessed a display in the specified time range.

- **Calculation usage information**

Provides detailed information about all PI and AF calculations used in AVEVA PI Vision displays.

- **Users who have accessed PI Vision within a specific time range**

Provides a count of users who have opened AVEVA PI Vision displays each month during the specified time range.

- **List of all PI Vision users**

Provides a count of displays owned by each AVEVA PI Vision user.

- **Get the count of Publishers and Explorers**

Provides a count Publisher and Explorer licensed users that have accessed AVEVA PI Vision in the specified time range.

Final Exam

The final exam in this course is taken online. Please check the course listing online for more detail.