



Energy AnalytiX Integration with Historian Servers



APPLICATION NOTE

October 2015

Description: Guide to integrating Energy AnalytiX with historical data.

General Requirement: ICONICS AnalytiX version 10.70 or later, Microsoft SQL Server 2008 R2 or later, understanding of OPC UA data access.

Introduction

One of the many new features of Energy AnalytiX for the 10.70 release is the support to retrieve and integrate historical data from ICONICS Hyper Historian as well as third party historians supporting the OPC UA historical data access interface.

Energy AnalytiX utilizes meter data as well as metadata bindings to perform its energy related calculations. The meter data, as shown in Figure 1, is utilized in standard consumption calculations, such as consumption, input, output and loss on a per meter type basis.

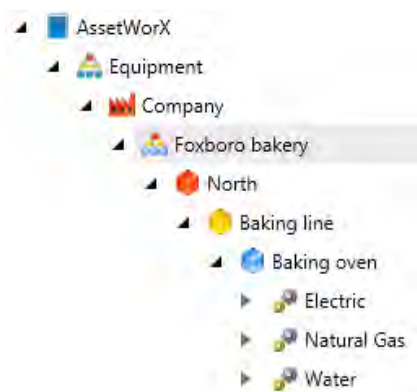


Figure 1 - Energy AnalytiX meters

In addition, energy metadata bindings are utilized in derived calculations, which are based on the standard calculations and metadata bindings. For example, a metadata binding can be a production count variable, used in a derived calculation to normalize consumption by production counts, as shown in Figure 2.

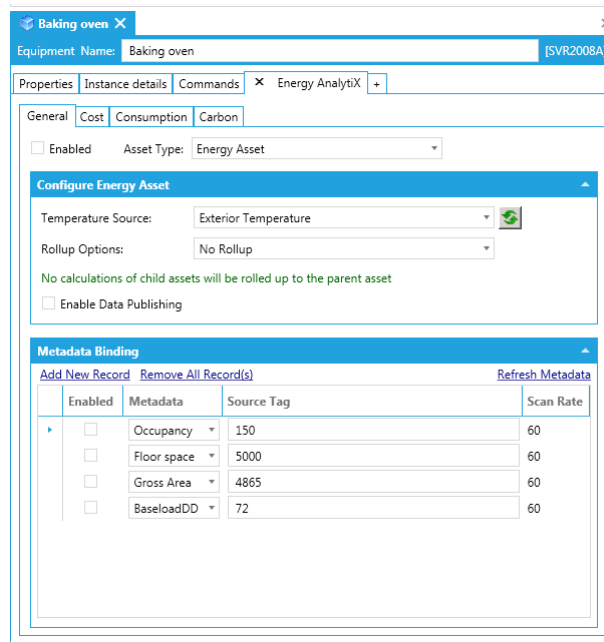


Figure 2 - Energy metadata bindings

Preparing to Configure Energy AnalytiX for Historical Data

Historical data coming from outside Energy AnalytiX could be collected or ordered differently than the data collected by Energy AnalytiX. As such, Energy AnalytiX utilizes a trigger mechanism to control the historical data requests and integration with the data flow of Energy AnalytiX.

A new tab has been added to the Energy AnalytiX provider, to configure triggers utilized in historical data retrieval.

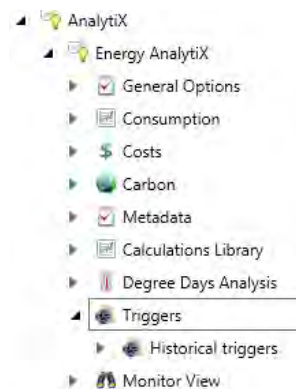


Figure 3 - Historical data triggers



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The user can define trigger folders and within each trigger folder, new triggers, as shown Figure 4.

Figure 4 - Historical data trigger configuration

The Advanced tab of the trigger configuration contains advanced parameters, such as the trigger delay. Key elements of the trigger configuration are:

- **Trigger Start Date:**
The date from which the periodic trigger will start creating events so that historical requests will be posted
- **Trigger Recurrence:**
The interval for which to post historical requests, for example hourly, daily etc. Typically this should be a multiple of the Energy AnalytiX base summary period and it is the related trigger's period.
- **Trigger Delay:**
An offset to accommodate for possible delays within the Historian in calculating the requested aggregates. If utilized, the trigger will create a periodic event at times equal its trigger period plus the offset
- **Synchronization Time:**
The (optional) time at which to synchronize data requests (typically 12:00 AM)

Here are some sample scenarios to understand the related configuration parameter significance

User Scenario 1:

Trigger Start Date: 2012/03/06 12:00:00 AM
Trigger Period: 1 hour
Trigger Delay: 5 minutes

Synchronization Time: 12:00 AM

Expected behavior:

Energy AnalytiX will post the following historical data retrieval requests:

Trigger Time	Data Request
00:05 AM	23:00 PM -> 24:00 AM
1:05 AM	24:00 AM -> 1:00 AM
2:05 AM	1:00 AM -> 2:00 AM

User Scenario 2:

Trigger Start Date: 2012/03/06 12:00:00 AM
Trigger Period: 1 day
Trigger Delay: 6 hours
Synchronization Time: 5:00 AM

Expected behavior:

Energy AnalytiX will post the following historical data retrieval requests:

Trigger Time	Data Request
6:00 AM (day2)	5:00 AM (day1)->5:00 AM (day 2)
6:00 AM (day3)	5:00 AM (day2)->5:00 AM (day 3)
6:00 AM (day4)	5:00 AM (day3)->5:00 AM (day 4)

Configuring triggers is the first step for enabling historical data access for Energy AnalytiX. Typically the trigger periods should be reasonably large as to not overload the system. In addition, a trigger delay should be utilized to make sure that the desired data is available within the Historian server. A typical example would be a 15 minute or 30 minute trigger period with a 5 minute delay. The exact timing of when the trigger will create periodic events depends highly on the trigger start date, trigger period and trigger delay.



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Configuring Meters to Utilize Historical Data

The energy meter configuration forms have been enhanced to allow for a new data source type, called Historian as seen in Figure 5.

[Add New Meter Tag](#) [Remove Selected Meter Tag](#) [Remove All Meter Tag\(s\)](#)

Enabled	Meter Tag Name	Data Source
☐	New Meter Tag Name	

General		Miscellaneous	
Data Source Type:	Tag	Meter Tag Type:	Consumption
Value Type:	Tag	Units:	C
Rollover Value:	External	Integration Type:	Seconds
	Historian		

Figure 5 - Historian data source

Once the user has selected the Historian data source, several options are enabled on the Meter Configuration form, as shown in Figure 6.

Data Source Type:	Historian	Meter Tag Type:	Consumption	Scan Rate:	60
Value Type:	Point	Units:	C		
Rollover Value:	0.00	Integration Type:	Seconds	Reset Threshold:	0.00
Trigger to retrieve history data:	<Not Selected>	Historical Aggregate:	<Not Selected>	Aggregation Interval (min):	0.00

[Add New Historical Tag](#)

Figure 6 - Historical data options

The user can select a historical data aggregate to access historical data from the built-in list of supported aggregates, as shown in Figure 7.

Historical Aggregate: <Not Selected> Ag Int

- <Not Selected>
- AnnotationCount
- Average
- Count
- Delta
- DurationBad
- DurationGood
- End

Figure 7 - Historian data aggregates

In addition, the user will need to select a trigger for the historical data requests as well as a processing interval. The processing interval, in minutes, determines how the historical data will be processed and aggregated. If this is set to zero, the entire aggregate value for the trigger period will be retrieved. If set to any non-zero value, an aggregate value will be retrieved for the given processing interval (for example, 5 minutes averages).

Configuring Metadata Bindings to Utilize Historical Data

The user can also enable metadata bindings to utilize historical data. Historical data support is reserved only for the metadata bindings that have been configured to have a Historian data source, as shown in Figure 8.

Electric * Internal X					
Metadata Folder					
Name	Description	Source Type	Data Type	Track Changes	Calculation Type
BaseloadDD	Baseload Degree Days	Static	Float	☐	Last Value
CDD	Cooling Degree Days	Static	Float	☒	Last Value
GradientDD	Gradient Degree Days	Tag	Float	☐	Last Value
HDD	Heating Degree Days	External Entry	Float	☒	Last Value
		Historian			

Figure 8 - Historian data source for bindings

Once a binding is enabled for historical data access, the user can select related historical data aggregate; trigger and processing interval within the asset binding's property page, as shown in Figure 9.

Metadata Binding					
Add New Binding Refresh All Bindings					
Location	Metadata	Source Type	Scan Rate	Aggregate	Aggr. Period
Occupancy	150	Static	60	N/A	N/A
Floor space	3000	Static	60	N/A	N/A
Gross Area	4800	Static	60	N/A	N/A
BaseloadDD	uktypemeterpoint1/Configuration/BaseloadDD	Historian	60	Average	5

Figure 9 - Historian data configuration for bindings



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Overall Application Configuration Parameters

Several new application configuration parameters have been added to the Energy AnalytiX service configuration file in:

C:\Program Files\ICONICS\GENESIS64\Components\
IcoBizVizEAService.exe.config

The above file can be edited using Notepad or another text editor. The settings take effect when the Energy AnalytiX service restarts. Typically the default values should be sufficient for most applications.

```
<add key="maxTriggerQueuedEvents" value="1000"/>  
<add key="waitPeriodSecsForHistUpdates" value="30"/>  
<add key="percentDataBad" value="100"/>  
<add key="percentDataGood" value="100"/>
```

maxTriggerQueuedEvents

This value controls the maximum number of queued trigger events, to avoid overloading the system.

waitPeriodSecsForHistUpdates

This specifies how long Energy AnalytiX will wait to process retrieved data from the Historian Server. Data updates from the Historian server are asynchronous and the above setting controls how long to wait between data callbacks to insert the supplied data into the Energy AnalytiX staging tables.

percentDataBad , percentDataGood

The above parameters control the quality of data returned by the historian server. The percentDataBad variable sets the minimum percentage of bad data in a given interval required for the StatusCode for the given interval for processed data request to be set to bad. The default value is 100.

PercentDataBad also sets the minimum percentage of uncertain data in a given interval before the interval's StatusCode is set to uncertain.

The percentDataGood variable indicates the minimum percentage of good data in a given interval required for the StatusCode for the given interval for the processed data requests to be set to good. The default value is 100.

PercentDataGood and percentDataBad must follow the following relationship $\text{percentDataGood} \geq (100 - \text{percentDataBad})$. If they are equal the result of the percentDataGood calculation is used.

Another useful IcoBizVizEAService.exe.config setting is:

```
<add key="totalSecondsSinceLastUpdateToWaitForExternalData"  
value="60"/>
```

This setting controls how long Energy AnalytiX will wait to process, summarize and move the historian server imported data (as external data) from its staging tables to the meter summary tables where they will be made available to calculations within Energy AnalytiX. Typically this should be smaller than the fastest trigger period.

Monitoring Historical Data Access

Energy AnalytiX has full TraceWorX support for historical data requests and data processing which can be utilized to troubleshoot Energy AnalytiX applications that utilize historical data.

In addition, inside the Energy AnalytiX database the table EA_Trigger_Info is used to monitor trigger related historical data requests. This includes the time that the trigger was activated and the start and end times for historical data requests, as shown in Figure 10.

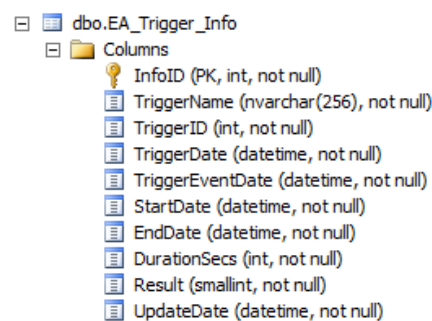


Figure 10 - Monitoring triggers for historical data

Native Hyper Historian Support

In addition to utilizing third party historical data, Energy AnalytiX can also support configuring meter and metadata for historical tags from ICONICS Hyper Historian.

To enable the dedicated support for Hyper Historian, edit the settings in the Energy AnalytiX provider General Options, Hyper Historian tab, as shown in Figure 11.

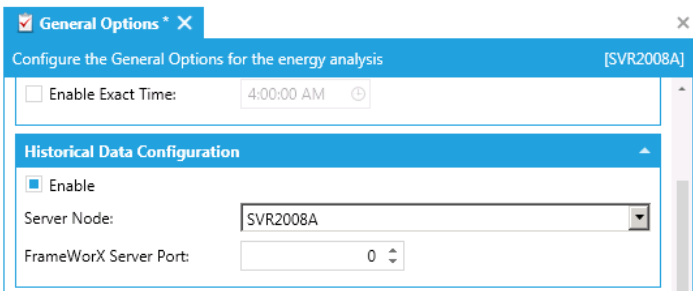


Figure 11 - Enabling Hyper Historian integration

Check the Enable Configuration button and optionally specify a server node where the Hyper Historian server resides, as well as a port number to access the Hyper Historian configuration. If the default values are left Energy AnalytiX will assume that Hyper Historian is installed locally and using the default port 8778.

Make sure that the logging groups, loggers, and aggregate groups are configured within Hyper Historian so that Energy AnalytiX will be able to utilize them.

Add historical tags using the Meter configuration form in Workbench, as shown in Figure 12. These options do not become available until the Enable Configuration box is checked as described above and the changes have been applied.

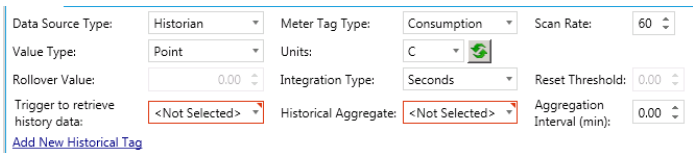


Figure 12 - Hyper Historian tag configuration in Workbench

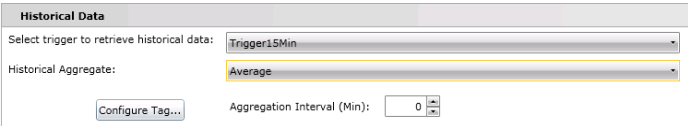


Figure 13 - Hyper Historian tag configuration in Workbench-SL

The Configure Tag button allows the user to configure a historical tag directly inside ICONICS Hyper Historian.

For more information on how to configure a Hyper Historian tag, see the help files and the *Hyper Historian – Quick Start* application note.

Hyper Historian Integration Scenarios and Considerations

This section will help identify when Hyper Historian integration support should be utilized.

If energy data is available both as real time OPC data as well as historical data, the user will have to decide on a best case deployment scenario to yield the best possible system performance and load balancing. Energy AnalytiX performs best when it automatically collects at rates of 1 minute or slower. The key factor will be the data collection rate of the required Energy AnalytiX data.

If energy meter data or metadata binding’s data are collected at 1 minute or slower, Energy AnalytiX is capable of handling the data volume.

In the case that energy meter data are collected every few seconds or certain metadata bindings are collected at an extremely fast rate, then the utilization of a historian, such as Hyper Historian, becomes a necessity.