

July 25, 2019

WEBS-N4 ANALYTICS

Honeywell



AGENDA

1. Selling

- I. Niagara Framework
- II. How it works
- III. Algorithms
- IV. Tagging
- V. Reports
- VI. Selling Strategy
- VII. Intermission: 10 minutes

2. Technical

- I. 7 New Energy Reports
- II. Analytics Web Chart
- III. Analytics Web Table
- IV. Missing Data Handling
- V. Time Filter Block Enhancement
- VI. Workbench Demo
- VII. Closing

WHERE DO ANALYTICS RUN?

Data science / AI – Very large data sets

Cloud

Gateway

Building

Edge

Sensor

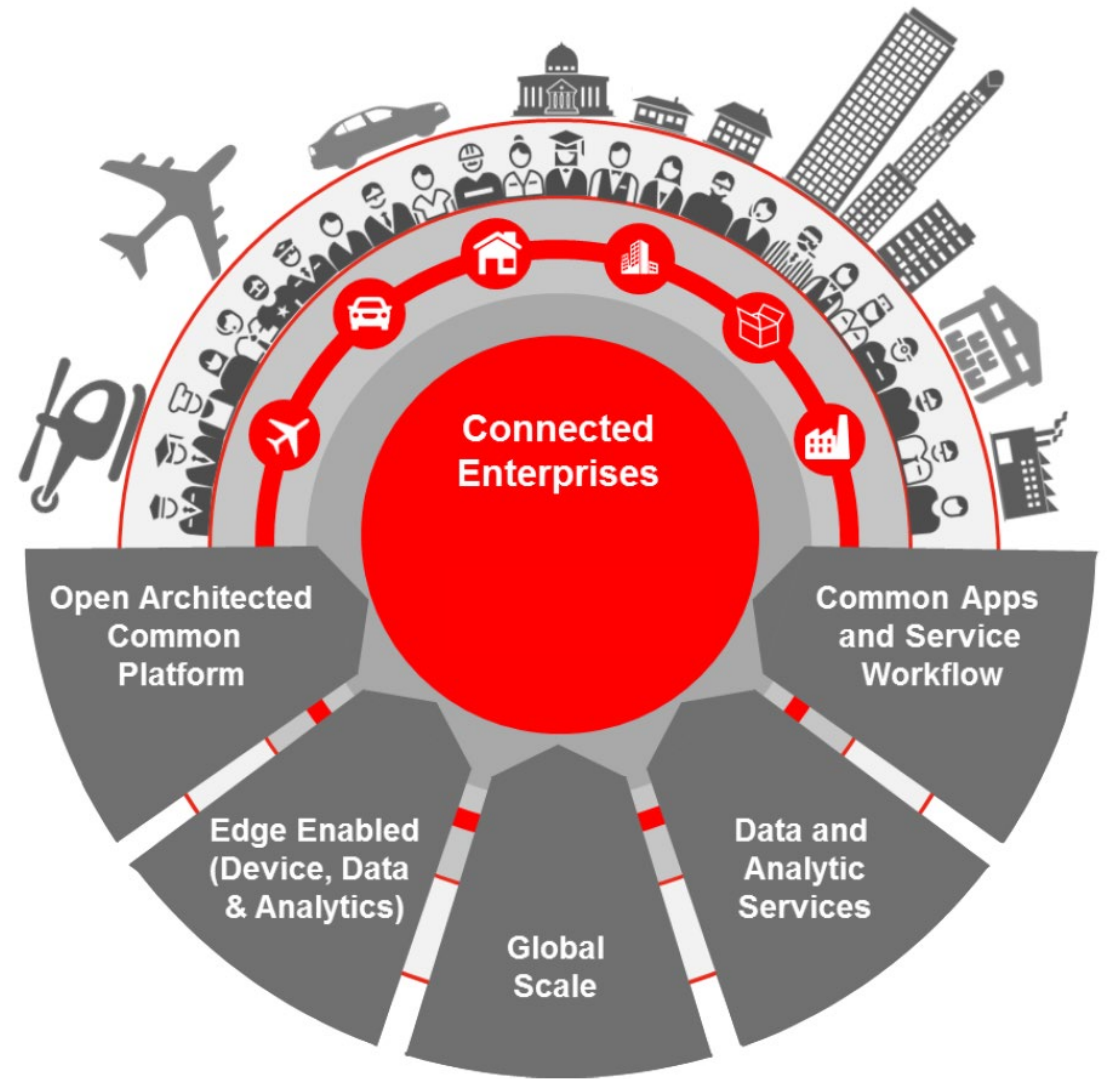


ANALYTICS needs to SCALE

POWERFUL CLOUD VENDORS

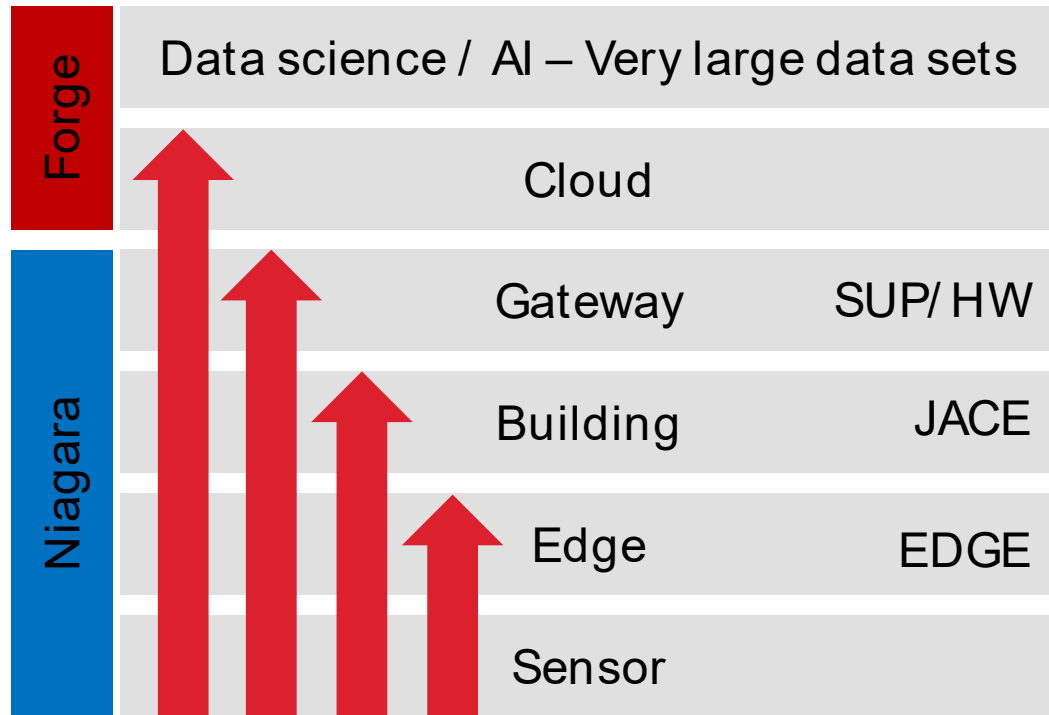


CONNECTED ENTERPRISE



Honeywell Connected Enterprise – Honeywell Forge brings SCALE

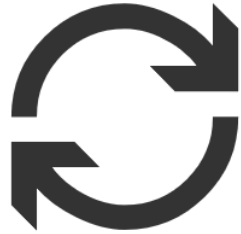
SCALABLE ANALYTICS



A Complete stack for Analytics



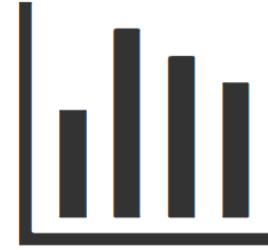
Smart Alerts



Continuous
Commissioning



Cost Analysis



Energy Reports



Optimize

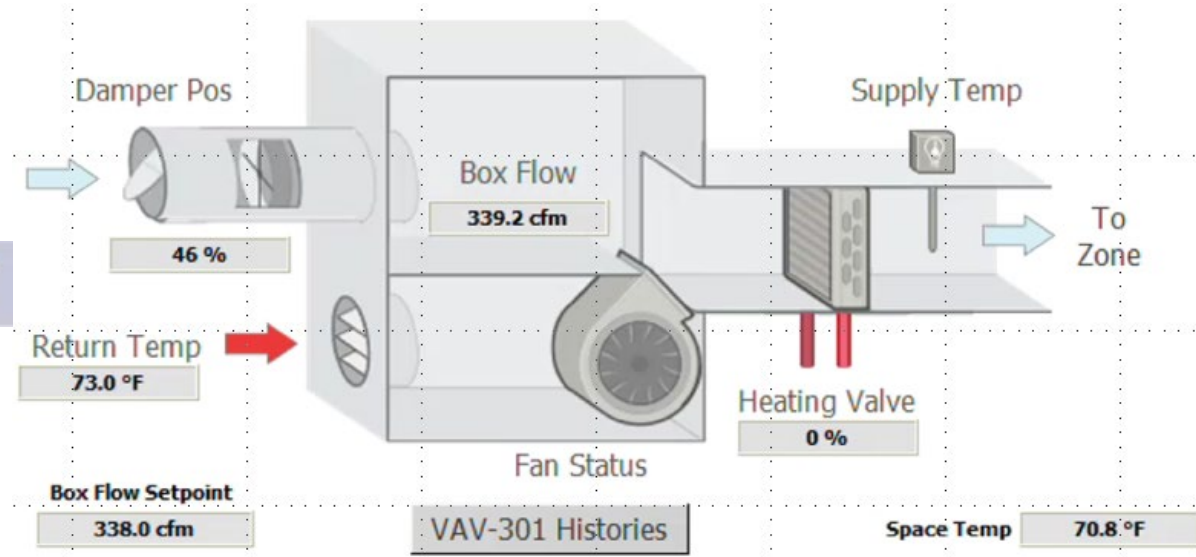
NIAGARA FRAMEWORK

SMART ALERTS



- Create meaningful alerts using algorithms.
- With standard alarming, your alarm console may be flooded with space temperature alarms when a chilled water system goes out of spec. With analytic alerts, you are able to isolate the source of the problem quickly and take action.
- We can do this at the edge – unique application!

Message Text VAV-301: Space Temp High with **Flow Control Damper at Maximum Open Position** and Low Current Flow



Facility Managers, Service Providers, Maintenance Staff


CONTINUOUS COMMISSIONING



- Verify that your systems are operating within compliance.
- An analytic algorithm can determine if **fresh air dampers are positioned as specified for the approved sequence of operation for weather and occupancy conditions**. If the dampers are not positioned correctly, the algorithm can raise an alert. The algorithm can be deployed throughout the system without duplicating the development effort by referencing tags and hierarchies.



 **true**
Open > 75 for 2 Minute

 **stuck**
Value has not changed for 2 hours

Commissioning Agents, System Integrators, Specifying Engineers

COST ANALYSIS



- Analyze costs associated with your equipment.
- By **assigning costs to equipment operation**, the facility manager can determine how much it **costs to operate individual pieces** of equipment and roll-up those costs by department, facility or across the enterprise.
- The facility manager can also determine how much it costs to **operate equipment outside of standard business hours**.
- Alerts can be raised when costs are expected to exceed the facility budget so corrective action can be taken.

Facility Managers, Energy Retrofit Guarantor

COST ANALYSIS



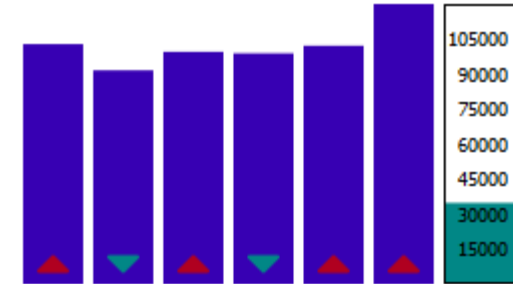
TRACKING
Monthly Target

\$ 0.15
5,214.60
Dollars
Cost this Month

▼ 34,764
KW-hr
This Month

▲ 102,124
KW-hr
Last Month

July Compared to last 6 Months

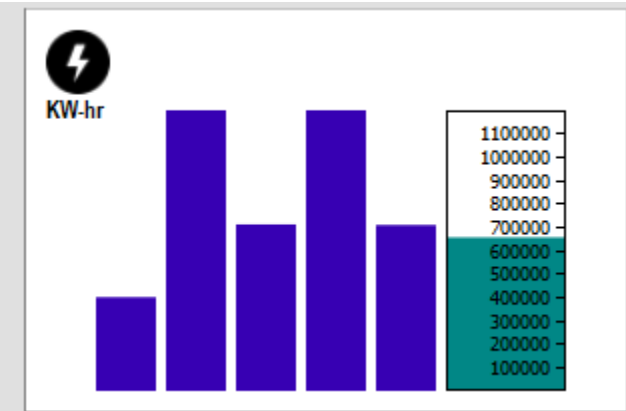
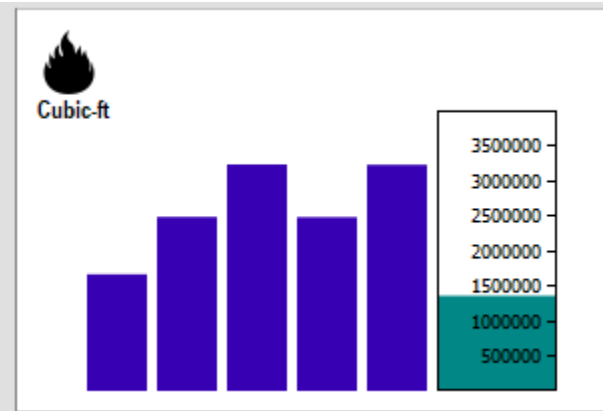
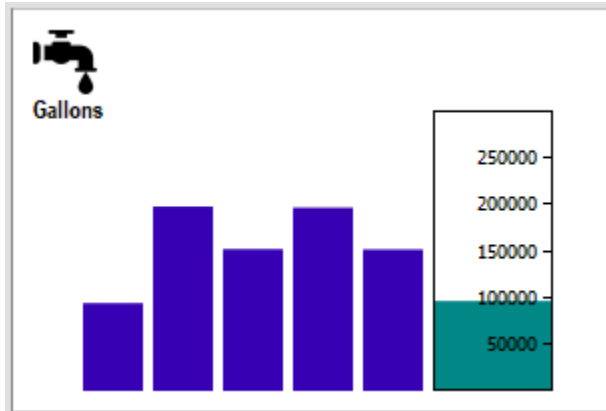


EXCEEDS
Monthly Target

CUR	72,750
TGT	70,700
-2,050.00 kW-hr	
2.9 %	
Monthly Difference	

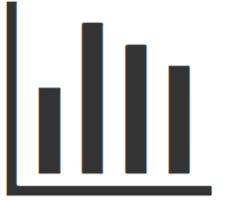
\$ 10,912.50
Cost Difference

\$ 0.15



Facility Managers, Energy Retrofit Guarantor

ENERGY REPORTS



- Niagara Analytics includes 7 energy reports that can be easily configured from the Web UI and saved for later use.
- These reports allow the facility manager to quickly visualize which facility is running most efficiently, what percentage different types of load are contributing to overall usage, anomalies in usage, and equipment runtime.
- You can also create custom reports to meet your specific needs.
- Reports can be exported with data to pdf format to be used in budget meetings and negotiations with energy providers.

Facility Manager, Energy Guarantor

ENERGY REPORTS



All Reports








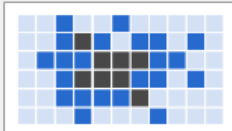
































New Report

Search :

Sort by :

Last Updated

Showing 1 to 10 of 10 reports

<p>Average profile   </p>  <p><i>Average profile</i> Location : defaultFolder Last Updated : July 1st 2019, 10:04</p>	<p>Spec   </p>  <p><i>Spec</i> Location : defaultFolder Last Updated : June 25th 2019, 14:59</p>	<p>Report   </p>  <p><i>Report</i> Location : defaultFolder Last Updated : March 21st 2019, 10:36</p>	<p>Load Duration   </p>  <p><i>Load Duration</i> Location : defaultFolder Last Updated : March 11th 2019, 10:08</p>	<p>ShiftTest   </p>  <p><i>ShiftTest</i> Location : defaultFolder Last Updated : February 28th 2019, 10:24</p>
<p>Ranking   </p>  <p><i>Ranking</i> Location : defaultFolder Last Updated : November 19th 2019, 11:13</p>	<p>Energy   </p>  <p><i>Energy</i> Location : defaultFolder Last Updated : November 19th 2019, 10:13</p>	<p>Equipment Operation   </p>  <p><i>Equipment Operation</i> Location : defaultFolder</p>	<p>Aggregation   </p>  <p><i>Aggregation</i> Location : defaultFolder Last Updated : November 19th</p>	<p>Relative Contribution   </p>  <p><i>Relative Contribution</i> Location : defaultFolder Last Updated : November 19th</p>

Facility Manager, Energy Guarantor

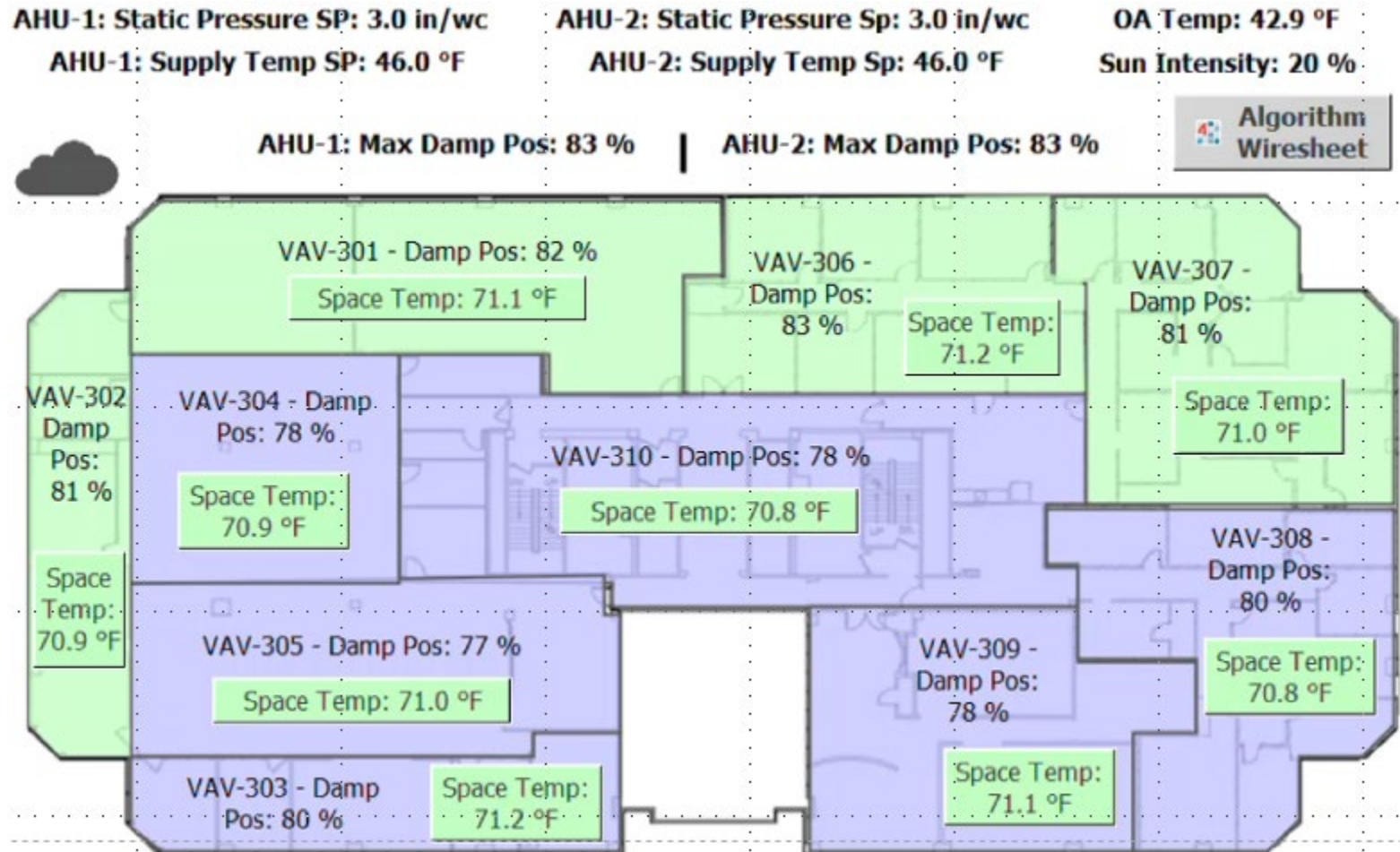
OPTIMIZE



- Niagara Analytic algorithms running in the controller can evaluate real-time data and make control changes to save money.
- An analytics control point can **periodically look** at all of the VAV Box damper positions and **continuously adjust** the Air Handler or Roof-Top Unit static pressure. Supplying the minimum required static pressure can reduce equipment operating costs.
- Analytics at the edge!

Facility Manager, Energy Guarantor

OPTIMIZE



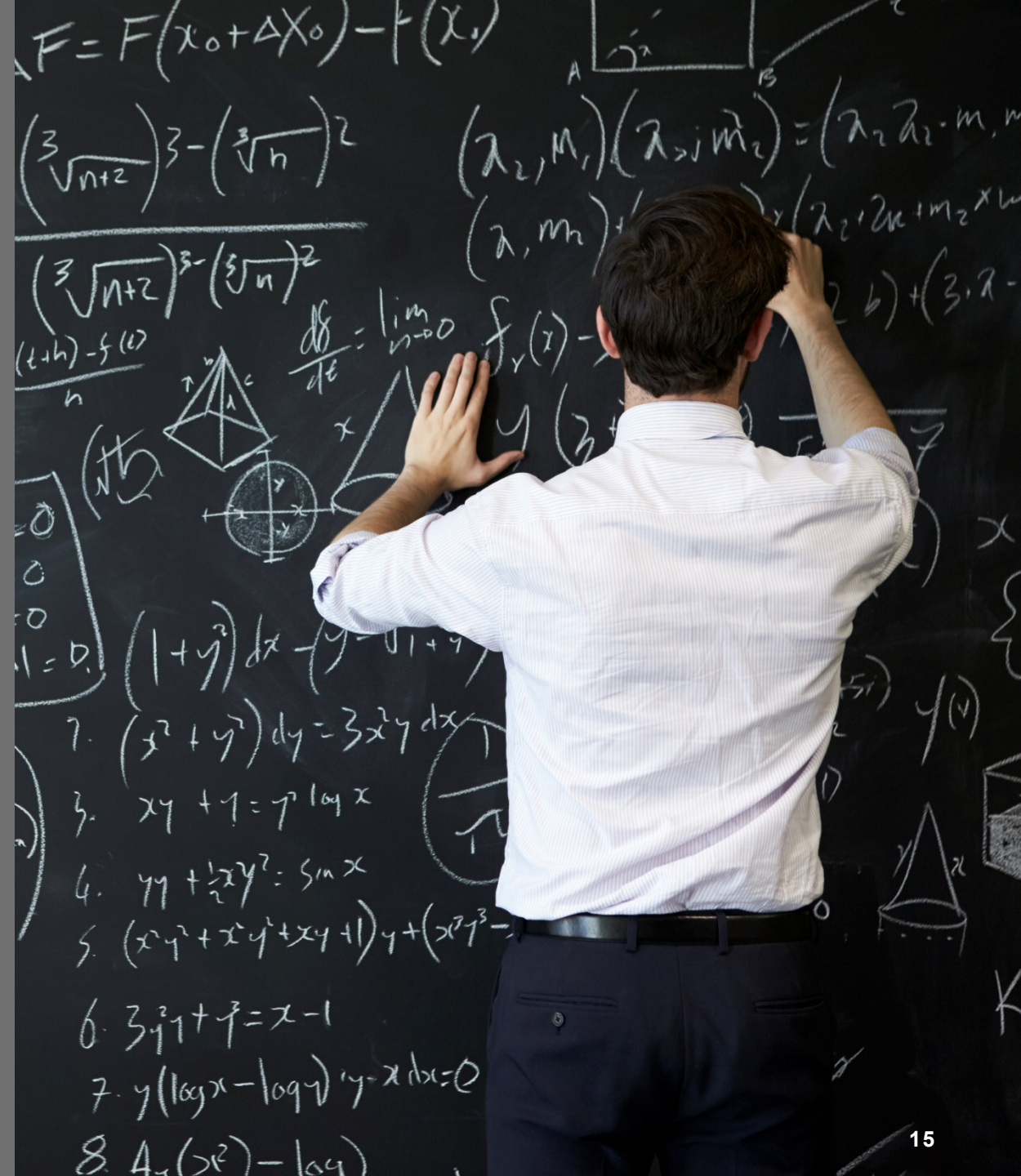
Facility Manager, Energy Guarantor

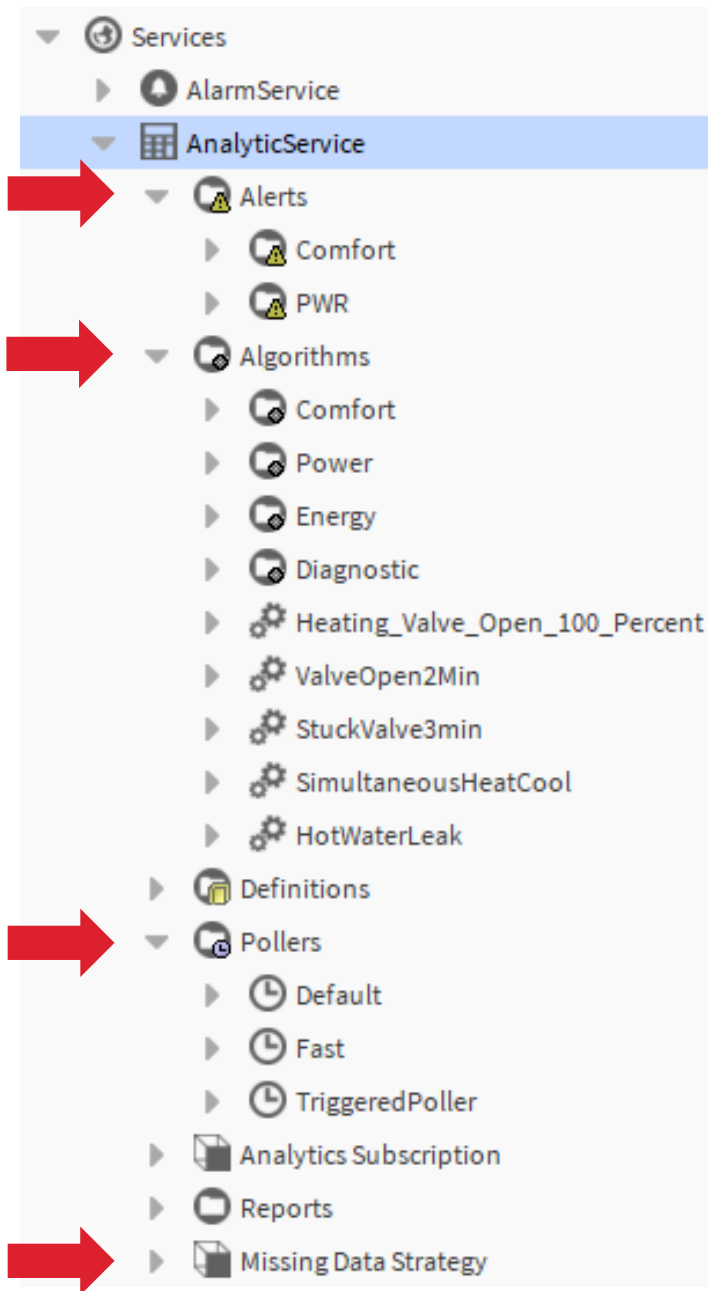
HOW DOES IT WORK?

NIAGARA ANALYTICS SERVICE

Niagara Analytics Framework:
runs as a service on the Niagara platform

Niagara Analytics:
utilizes Niagara real-time data, histories, tags, and hierarchies

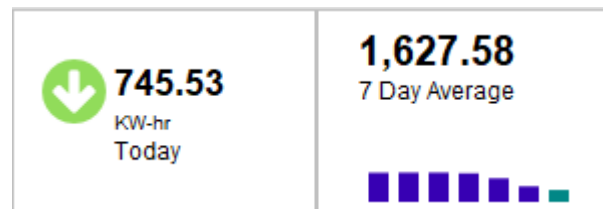




What's special?

Niagara Analytics runs as a service within Niagara. You don't need a separate application.

Niagara Analytics leverages both real-time and historical data without requiring a separate server to store data.



NIAGARA ANALYTICS ENGINE

Algorithms, rollup and aggregation calculations are powered by the Niagara Analytics engine.



Algorithms are configured using function blocks dropped on a wire sheet – just the same as other Niagara logic is set up.

A screenshot of a 'Yesterday' function block configuration. The block is titled 'Yesterday' and is a 'Numeric Writable' with a status icon 'N'. It has several input and output fields:

Out	968.07 {ok} @ 16
In10	- {null}
In16	968.07 {ok}
node	slot:/Examples/Analytics/Energy/EnergyM
data	hs:energy
Poll	

Algorithms are applied to systems based on tags and hierarchies. An algorithm can be deployed to an entire enterprise, saving labor.

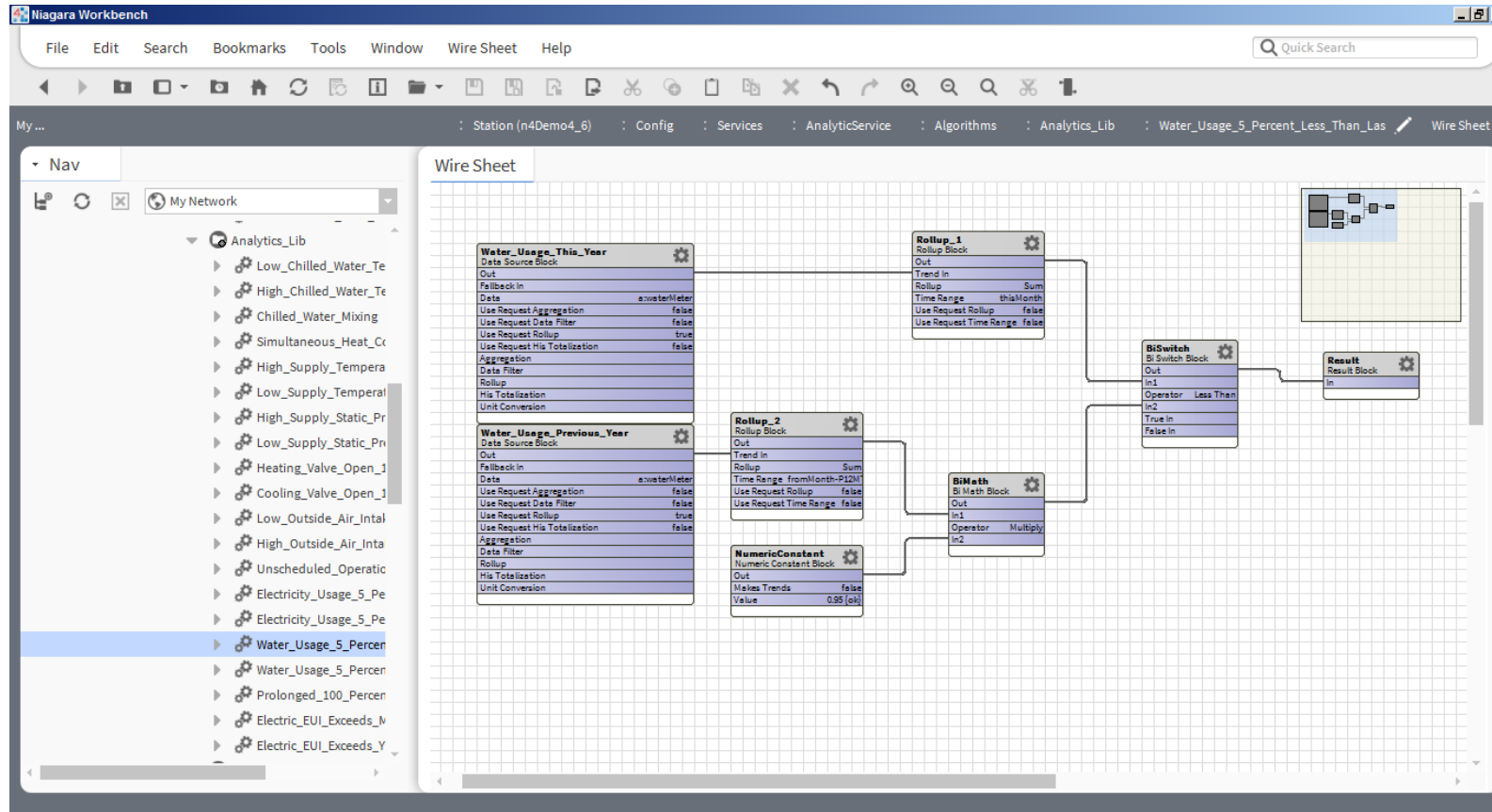
A screenshot of an 'ExceedsMTHTarget' algorithm configuration. The block is titled 'ANALYTICS' and 'ExceedsMTHTarget' and is a 'Boolean Writable' with a status icon 'B'. It has several input and output fields:

Out	true {ok} @ 16
In10	- {null}
In16	true {ok}
Poll	

Below the configuration is a section titled 'ALGORITHM USED' with the following text:

```
alg:Electric_EUI_Exceeds_Month_Target
```

NIAGARA ANALYTICS ALGORITHMS



What's special?

Niagara Analytic algorithms are programmed using analytics function blocks on a wire sheet – just like other Niagara logic.

You don't need to learn another programming language to use Niagara Analytics.

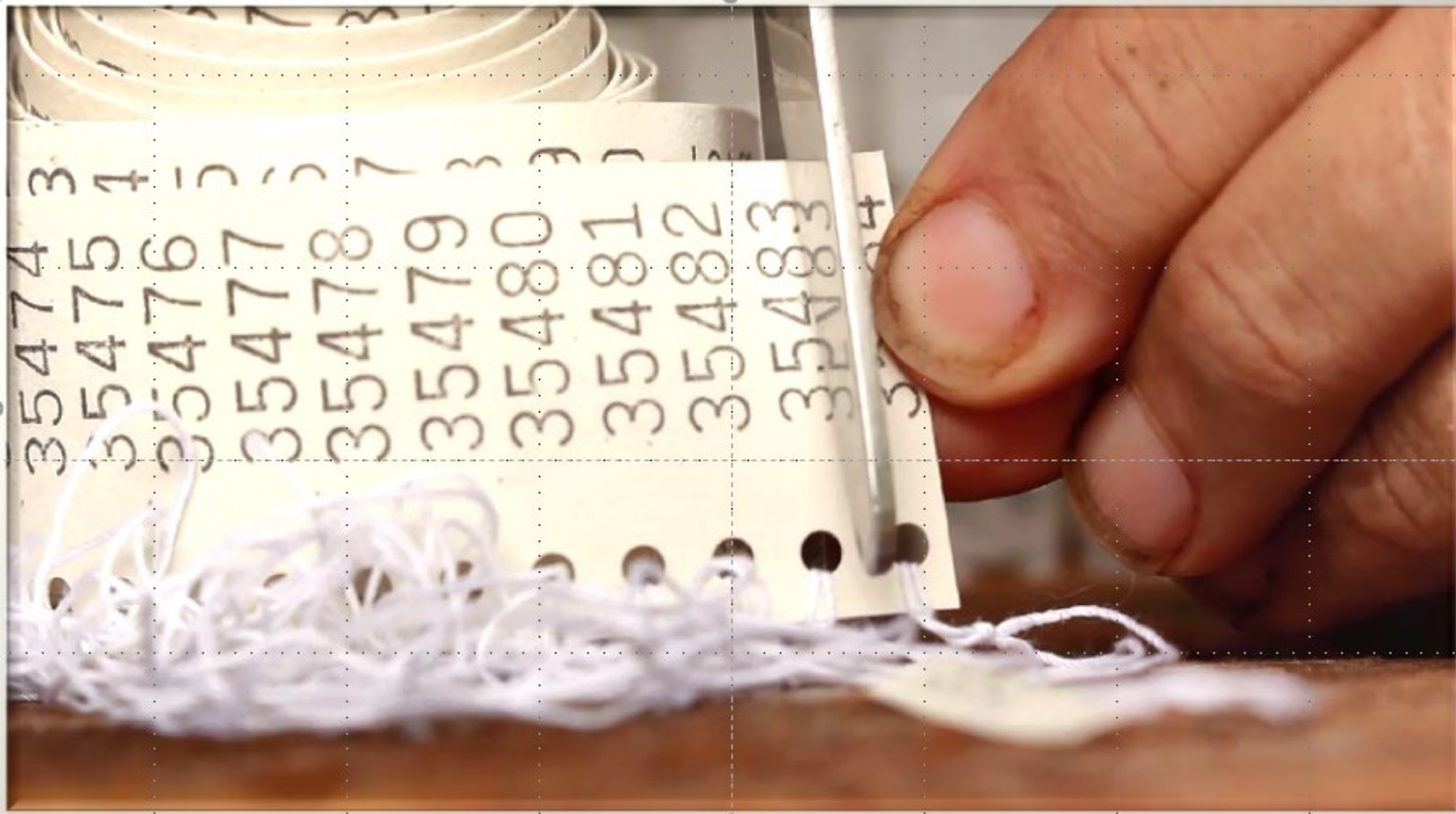
TAGGING

DIRECT TAGS

The screenshot shows the Haystack Tag Dictionary interface. At the top, there is a search bar with 'Haystack' and a 'Show All' filter. Below this is a 'Tag Dictionary' section with '441 objects'. A table lists tags with columns for 'Name' and 'Type'. One tag, 'absorption', is listed with the type 'Marker'. Below the table are two tabs: 'Direct Tags' (selected) and 'Implied Tags'. Under 'Direct Tags', a component 'direct (Component)' is shown with two associated tags: 'hs:sensor' and 'a:a', both with the type 'marker'. A red arrow points to the 'Direct Tags' section. At the bottom of the interface are buttons for 'Save', 'AddTag', 'RemoveTag', and 'Cancel'.

Direct Tags are applied directly to the point

TAGGING



Tedious

IMPLIED TAGS

The screenshot shows the Haystack Tag Dictionary interface. At the top, there's a search bar with 'Haystack' and a 'Show All' filter. Below that, the 'Tag Dictionary' section shows a table with columns 'Name' and 'Type'. A tag named 'absorption' is listed with the type 'Marker'. Below this, there are two tabs: 'Direct Tags' and 'Implied Tags'. The 'Implied Tags' tab is active, showing a list of implied tags for a component named 'implied (Component)'. A red arrow points to the 'hs:unit' field, which is set to 'misc ()' and 'percent relative humidity (%RH)'. The 'hs:humidity' field is set to 'marker'. At the bottom, there are buttons for 'Save', 'AddTag', 'RemoveTag', and 'Cancel'.

Name	Type
absorption	Marker

Property	Value
n:name	Room\$20Humidity
n:displayName	Room Humidity
n:type	control:NumericPoint
n:ordInSession	station: h: f4ab
n:station	BLUE
n:point	marker
n:input	marker
hs:cur	marker
hs:curErr	
hs:curStatus	ok
hs:curVal	66.00
hs:id	h: f4ab
hs:kind	Number
hs:maxVal	+inf
hs:minVal	-inf
hs:point	marker
hs:tz	New_York
hs:unit	misc () percent relative humidity (%RH)
hs:humidity	marker

Implied tags are applied during runtime **AUTOMATICALLY**

TAG DICTIONARY MY SPACETEMP RULE

AND Rule with a IsType + OR condition

AndRule

isType
or

Boolean
Filter

Tags

Property Sheet

- SpaceTemp (Tag Rule)
 - Condition And
 - IsType Is control:NumericPoint
 - Object Type control NumericPoint
 - Or Or
 - RoomTemp Boolean Filter
 - Filter n:name like '*.RoomTemp.*'
 - RoomTemperature Boolean Filter
 - RoomTmp Boolean Filter
 - SpaceTemp Boolean Filter
 - Filter n:name = 'SpaceTemp'
 - SpaceTemperature Boolean Filter
 - SpaceTmp Boolean Filter
 - Filter n:name = 'SpaceTmp'
 - Tag List Tag Info List
 - Tag Group List Tag Group Info List
 - hs:tempSensor Tag Group Info
 - Validity And
 - Tag List Tag Info List
 - hs:temp Marker
 - hs:sensor Marker
 - Relation List Relation Info List

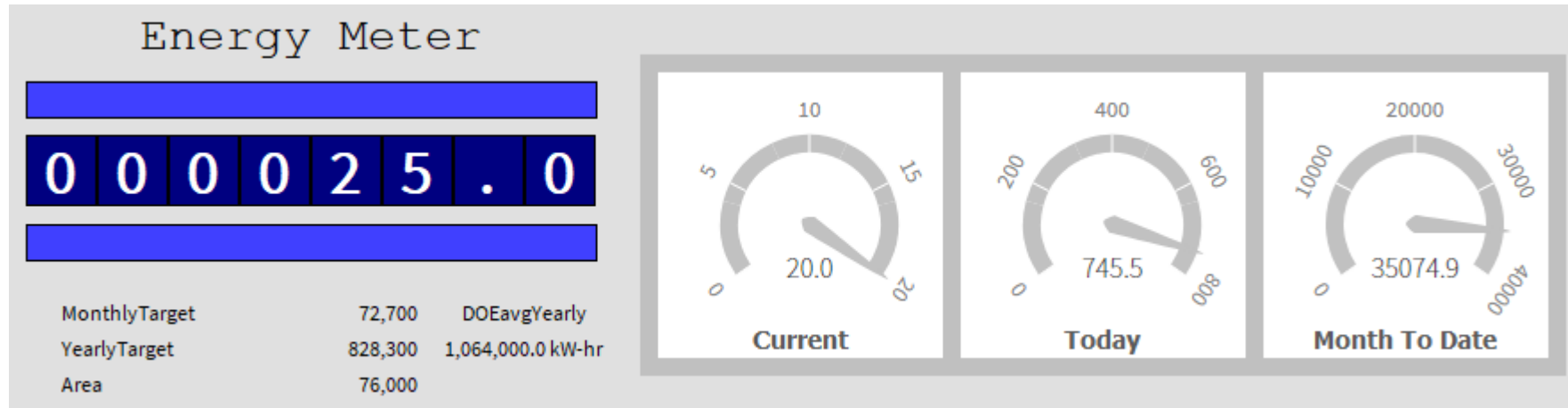
Must be a Control Point

AND one of these

Gets these tags

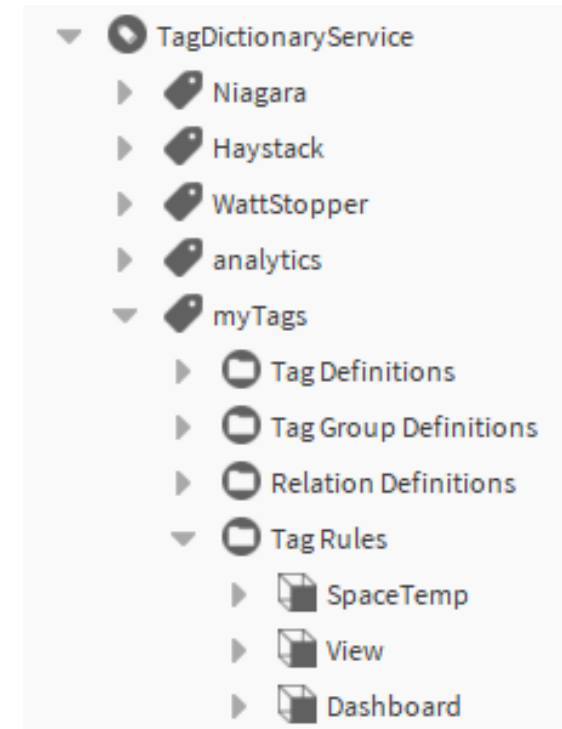
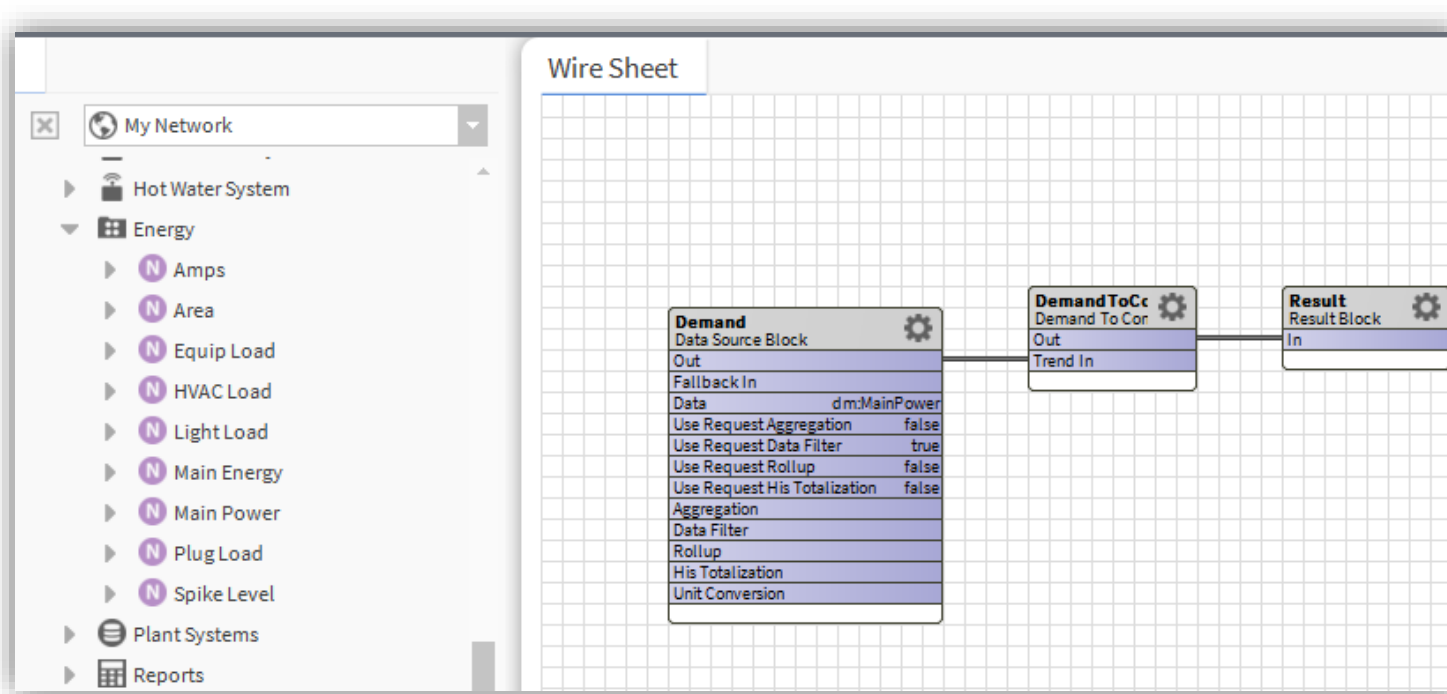
Rules are AUTOMATIC

STEP 1 – TAG!



- First, points in the database are tagged.

STEP 1 – TAG!

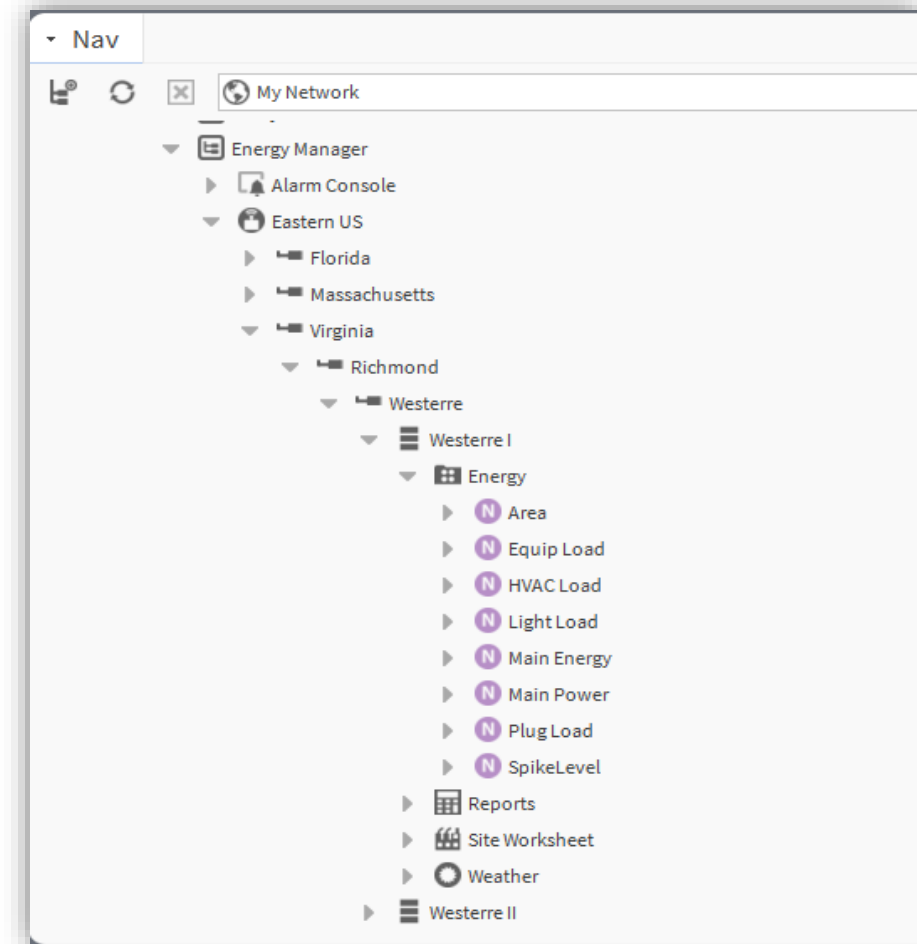


- You can use the Haystack standard tags provided with Niagara, or create tag libraries of your own.
- Algorithms specify which tagged points and nodes supply data.
- Algorithms use real-time data or historical data associated with the tagged points.

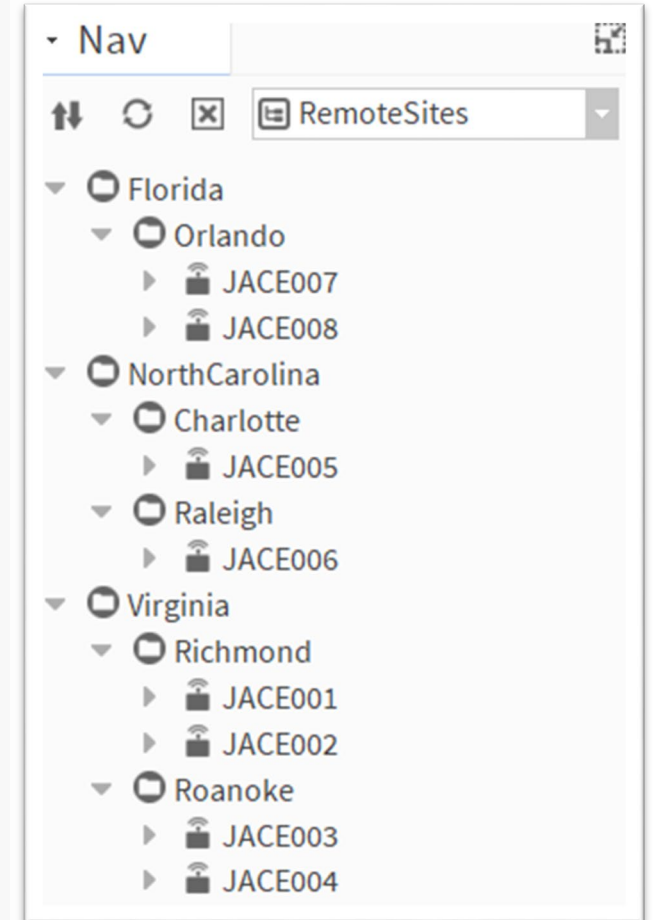
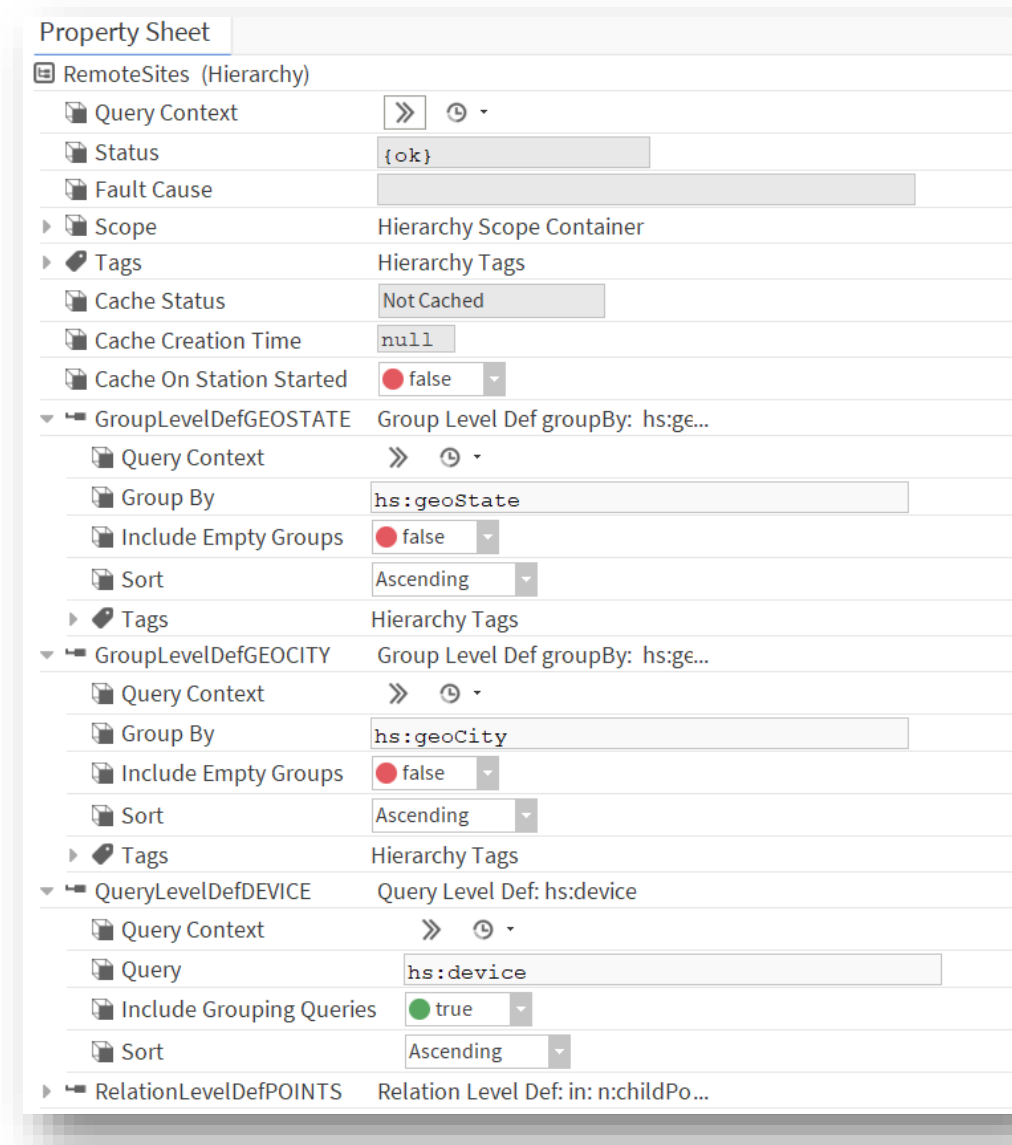
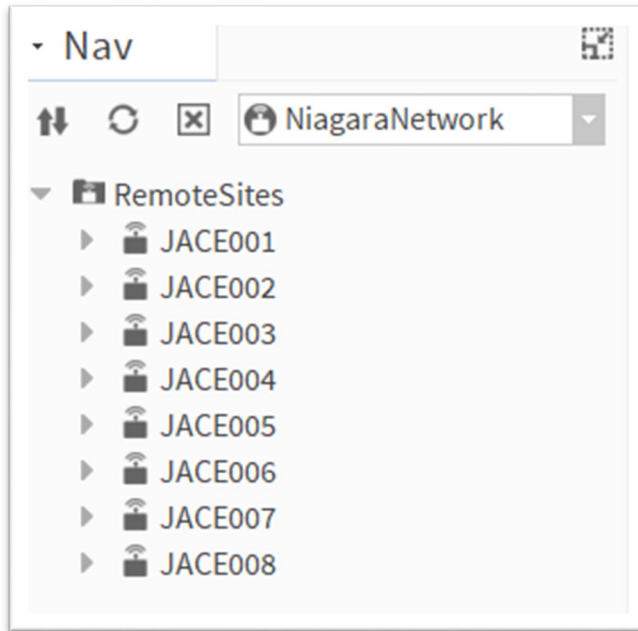
STEP 2 - ORGANIZING YOUR DATA

After your system is tagged, you can build hierarchies to organize your data.

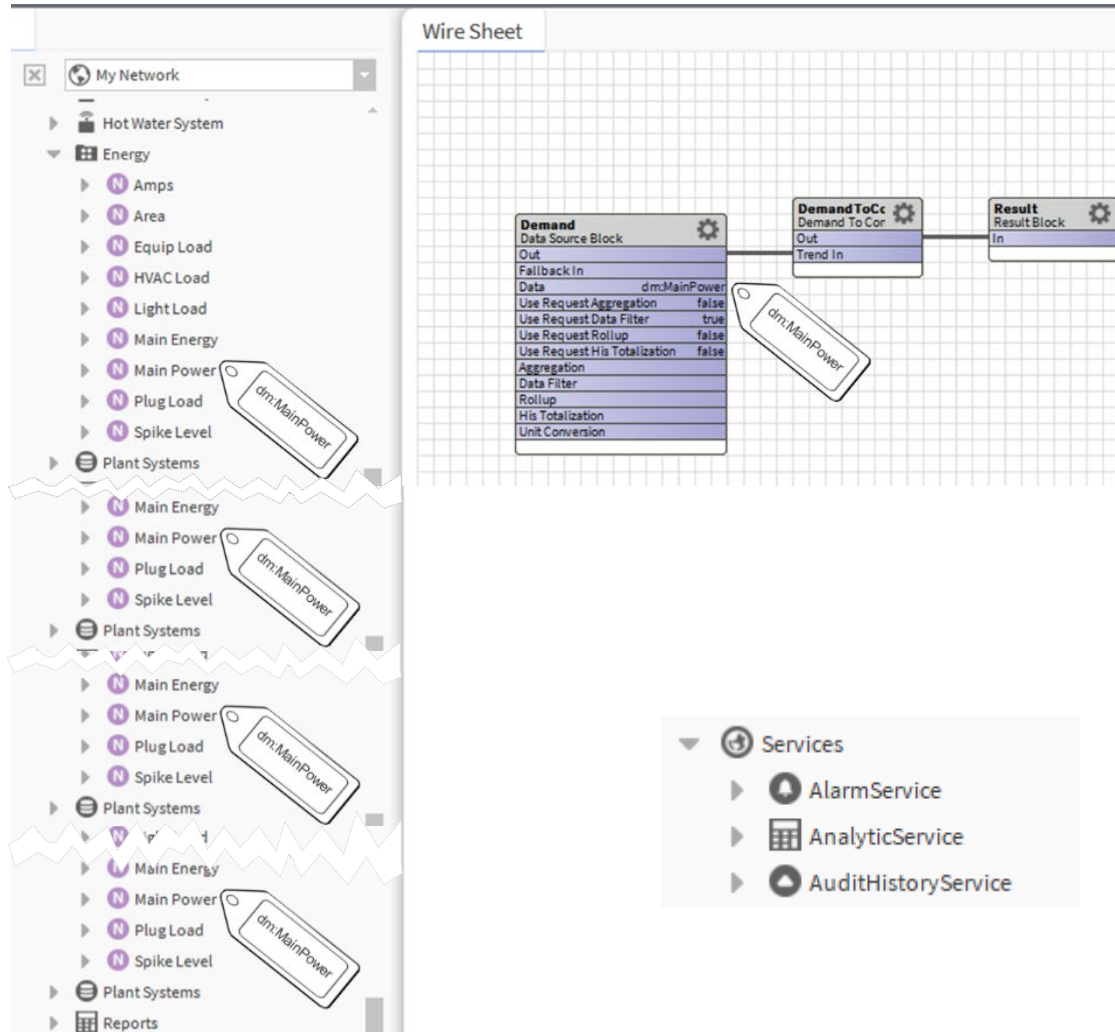
This will help you apply analytics to logical groupings of points.



TAGS HELP IN ORGANIZING YOUR DATA



SAVING LABOR



Algorithms are applied to all points that are subordinate to a specified node that have a matching tag.

You don't need to do 100's of calculations – just do one and apply it.

If you need to change it, change it once.

Your algorithms will run on a device, building, campus, or region. You control how much by telling it where to look

ALERTS


GENERATING ALARMS


Analytic alerts or smart alarms are generated by algorithms.

Analytic alerts isolate the source of an issue and aggregate the message.

Eliminates the noise of multiple related alarms.

Recovery Alarm


NORMAL
 RTU-1
 Temp Recovery



FAULT

RTU-1
Temp Recovery

5

78 73 80

TMP SPT OUT

Fahrenheit

alg:TempRecoveryCheckAlert

Alert

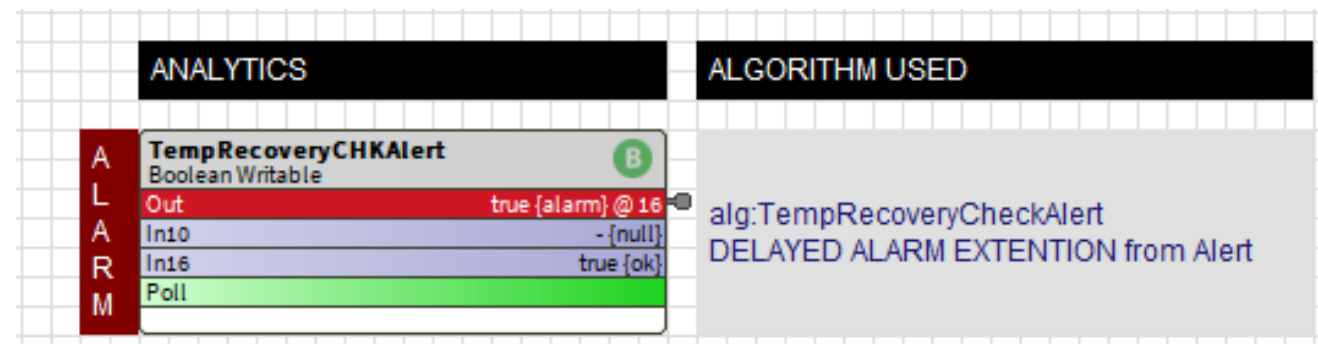
1.0

Alarm 30s Delay

1.0

140

6:0:31



What's special?

Rather than looking at many alarms on an alarm console when a system failure occurs, you can receive a single alert that isolates the problem.

In this example, we see one alert in the alarm console that indicates that multiple VAV boxes at a location have insufficient airflow or cooling.

This information would lead the system specialist to look at the source of air and cooling for that group of VAV boxes.

Meaningful & actionable.

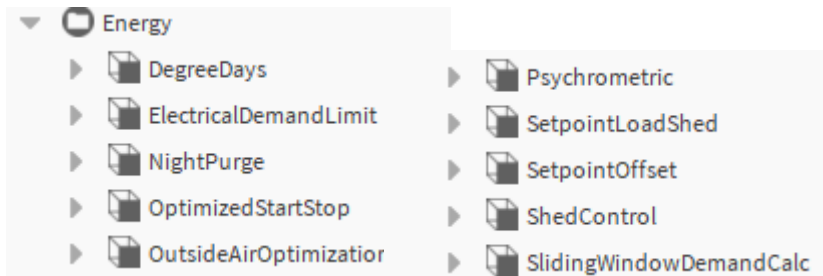
The screenshot shows the Niagara Workbench Alarm Portal interface. The main window displays the 'Alarm Console Monitor' with a table showing one connected console. Below it, the 'Portal Alarm Console' shows a single alert for 'VAV-309: Space Temp High with Flow Control Damper at Maximum Open Position'. A pop-up window titled 'slot:/Services/AnalyticService/alerts/VAV_VaFlowIssueTest' provides a detailed view of 10 related alarms, all from the same source and class.

Timestamp	Source	Alarm Class	Message Text
8/22/18 10:37:09 CDT	Eastern USA/Virginia/Richmond/Westerre/Westerre II	HvacSystemAlarmClass	VAV-309: Space Temp High with Flow Control Damper at Maximum Open Position and Lc
8/22/18 10:37:09 CDT	Eastern USA/Virginia/Richmond/Westerre/Westerre II	HvacSystemAlarmClass	VAV-306: Space Temp High with Flow Control Damper at Maximum Open Position and Lc
8/22/18 10:37:09 CDT	Eastern USA/Virginia/Richmond/Westerre/Westerre II	HvacSystemAlarmClass	VAV-307: Space Temp High with Flow Control Damper at Maximum Open Position and Lc
8/22/18 10:37:09 CDT	Eastern USA/Virginia/Richmond/Westerre/Westerre II	HvacSystemAlarmClass	VAV-308: Space Temp High with Flow Control Damper at Maximum Open Position and Lc
8/22/18 10:37:09 CDT	Eastern USA/Virginia/Richmond/Westerre/Westerre II	HvacSystemAlarmClass	VAV-301: Space Temp High with Flow Control Damper at Maximum Open Position and Lc
8/22/18 10:37:09 CDT	Eastern USA/Virginia/Richmond/Westerre/Westerre II	HvacSystemAlarmClass	VAV-310: Space Temp High with Flow Control Damper at Maximum Open Position and Lc
8/22/18 10:37:09 CDT	Eastern USA/Virginia/Richmond/Westerre/Westerre II	HvacSystemAlarmClass	VAV-304: Space Temp High with Flow Control Damper at Maximum Open Position and Lc
8/22/18 10:37:09 CDT	Eastern USA/Virginia/Richmond/Westerre/Westerre II	HvacSystemAlarmClass	VAV-303: Space Temp High with Flow Control Damper at Maximum Open Position and Lc
8/22/18 10:37:08 CDT	Eastern USA/Virginia/Richmond/Westerre/Westerre II	HvacSystemAlarmClass	VAV-302: Space Temp High with Flow Control Damper at Maximum Open Position and Lc
8/22/18 10:37:08 CDT	Eastern USA/Virginia/Richmond/Westerre/Westerre II	HvacSystemAlarmClass	VAV-305: Space Temp High with Flow Control Damper at Maximum Open Position and Lc

OPTIMIZATION

Control System Overrides in response to System Conditions

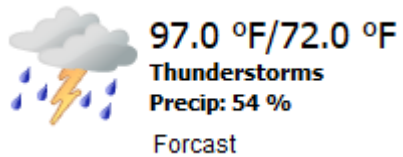
Curtail Energy Usage



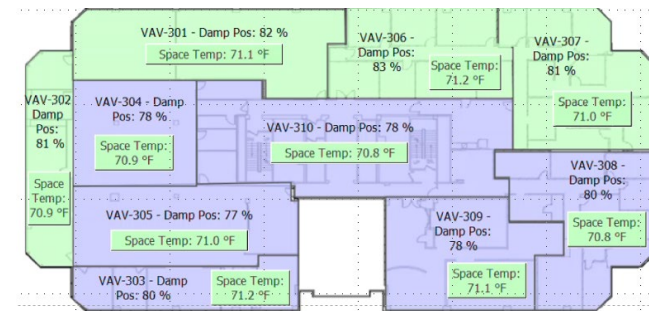
Respond to changing weather



Anticipate weather change

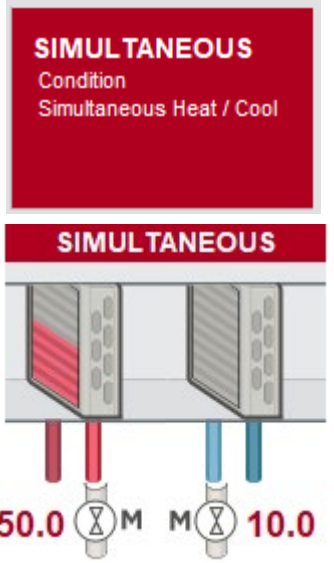


Adjust systems for optimum performance

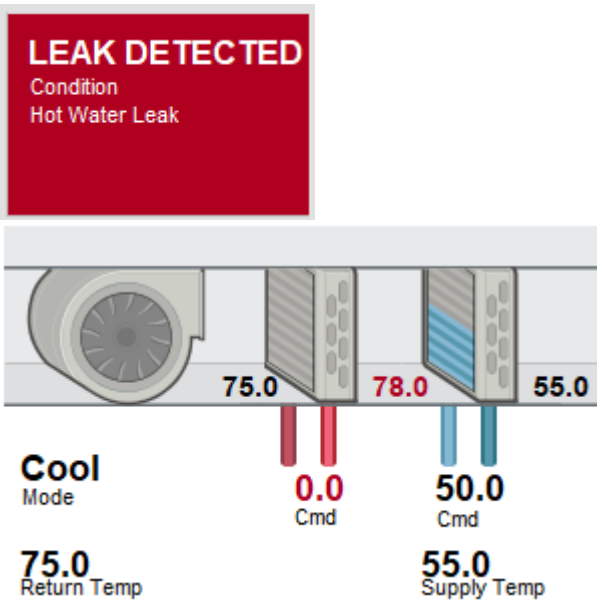


Eliminates the noise of Multiple Related Alarms

Normal
Condition
Simultaneous Heat / Cool



Normal
Condition
Hot Water Leak



What's special?

Energy saving strategies can be deployed throughout the enterprise.

If the strategy needs to be adjusted, then the algorithm may be changed and the changes will take affect immediately throughout the system.

FAULT DETECTION

FAULT DETECTION

OCC	FAN ON	COMP
TMP	F PWR	PWR
Cool	BELT	REFG

RTU Diagnostic Faults

Algorithms can be written to check for several conditions.

When the algorithms detect an issue, you can then visualize what parts of a system are affected.

Smarter buildings!

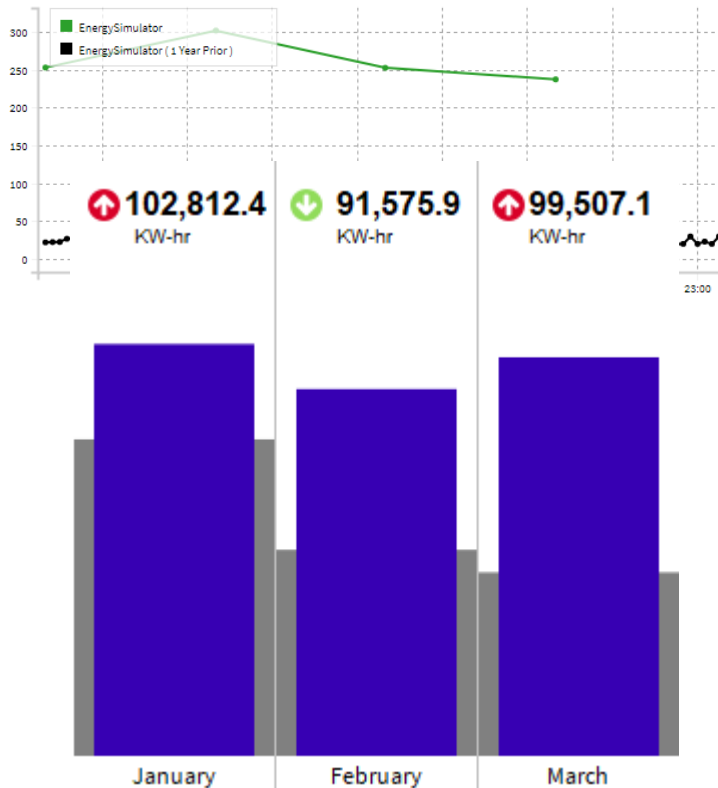
No more Space Temp High

RTU-1 Belt Failure, Temp rising do to inadequate air flow. Oh, and by the way Change that Outside Air filter while your replacing the belt!

REPORTS

NEW ENERGY REPORTS

Baselining



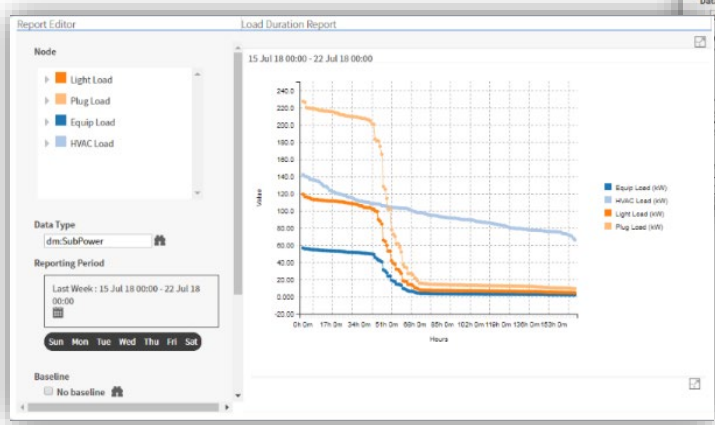
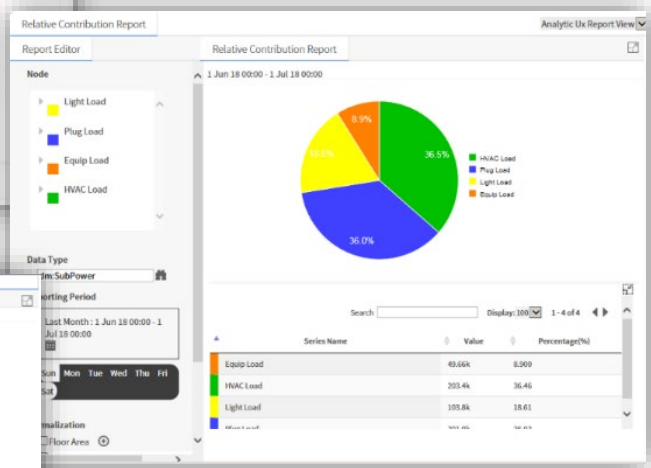
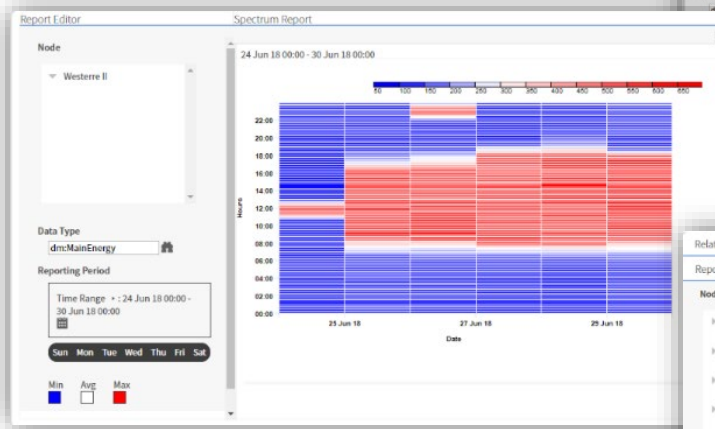
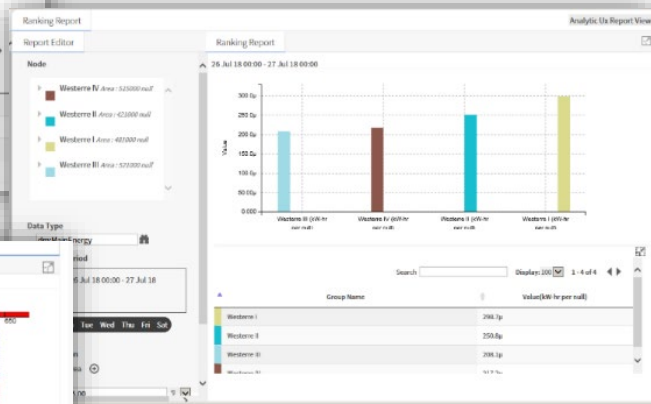
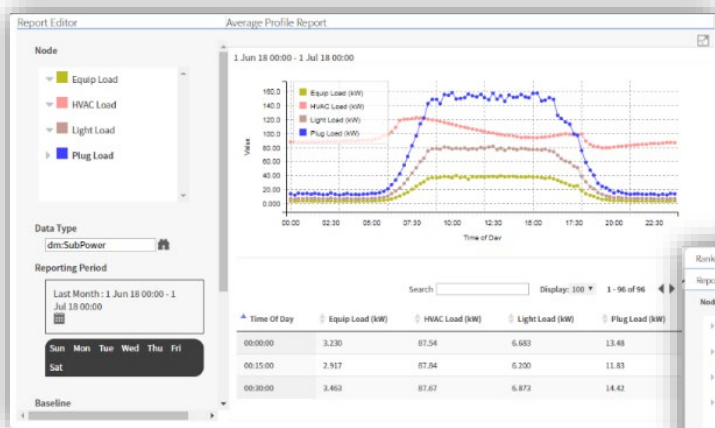
Normalization

- Area
- Temperature

Roll-up & Aggregates

- Average
- Min
- Max
- Sum
- Load Factor
- First
- Last
- Median
- Analytic Result

On-the-fly, configurable energy reports, saved for future

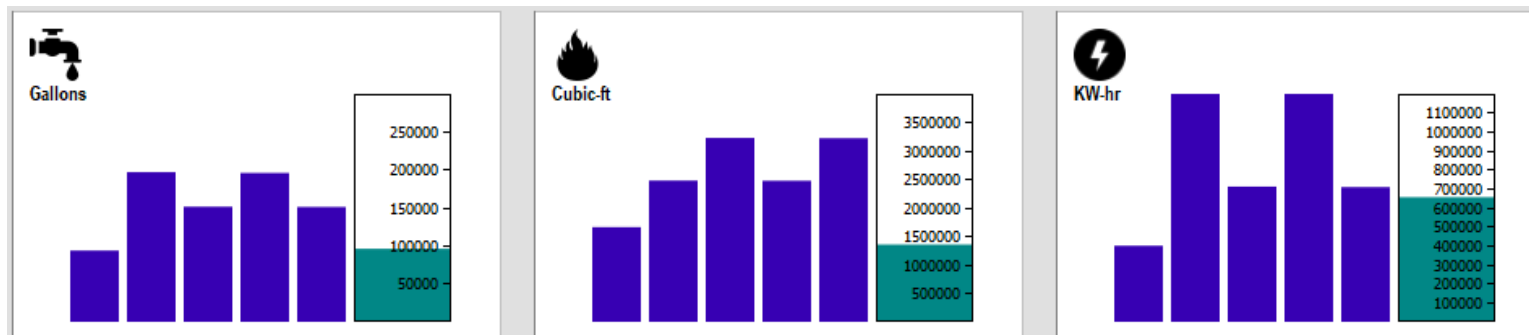
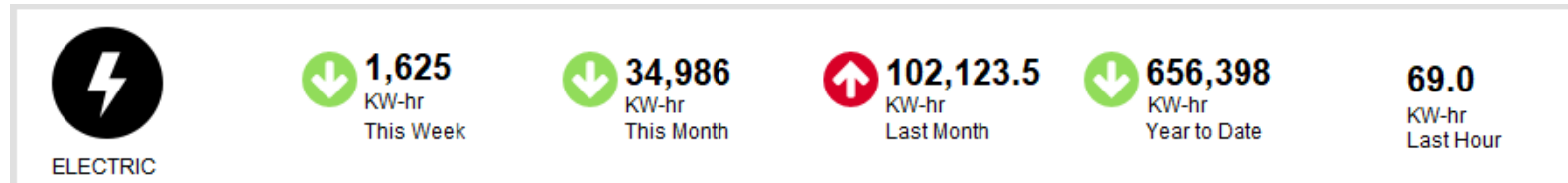
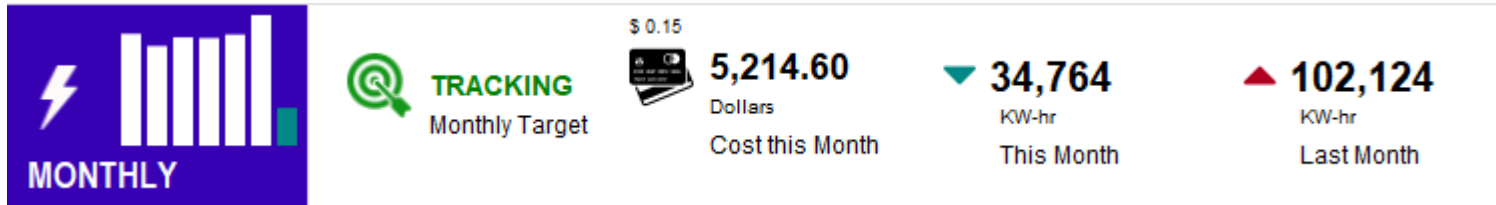


What's special?

The end user can quickly create reports that utilize analytics functions and save them for future use.

These reports can be exported and used to determine energy strategies and negotiate with energy providers for a better rate structure.

VISUALIZE



What's special?

Create dashboards that incorporate analytic data.

Users can change settings and save change for the next time they log in.

Analytic bindings are available on charts and tables that can be displayed on dashboards or standard Niagara graphics.

HTML5 Widgets with analytic bindings are available for display on monitors or mobile devices

SELLING STRATEGY

Jay Helgren

THE ISSUE

With Analytics, how do we make the invisible visible?

VALUE PROPOSITION

Honeywell WEBs Analytics enables end-users to be **proactive** with their HVAC system. This is accomplished with the 3 P's of WEBs Analytics:

Preventing Shutdowns

Predictive Maintenance & Alerts

Prescriptive Optimization



Smart Alerts



Continuous Commissioning



Cost Analysis



Energy Reports



Optimize

DON'T LEAD WITH THE
VALUE PROPOSITION

BUILDING A CALL PLAN

- 1. Research your customer and prepare *insights* they might not be aware of yet would help them compete, grow, win, etc.**
- 2. Lead with an Up Front Contract. This always includes:**
 - Appreciation for the opportunity to meet
 - What you need to know from the customer
 - What they should know from you
 - How you will close the meeting and what your expectation is for the outcome so you can determine success
- 3. Use questioning/ listening to determine what they value. Tell a story.**
- 4. Relate their needs to the appropriate value proposition.**
- 5. Now you can communicate specific product feature/ benefits.**
- 6. Summarize and close**
 - Next steps, and...
 - Get a yes, yes with a future date, no, or no with a specific future action

QUESTIONING PATHS – CREATE A BUYING VISION

Smart Alerts

What is your process for determining and/or isolating the source problem?

Continuous Commissioning

How do you know your building system is following the approved sequence of operation?

Cost Analysis

What is your process for determining how much equipment costs to operate?

Energy Reports

How do different loads affect your ability to maximize your building system efficiency?

Optimization

What steps are you taking to reduce equipment operating costs?

QUESTIONING PATHS – CREATE A BUYING VISION

Level of proactiveness

Are you a read/react or command/control customer?

What happens when..? What are you/ your team able or allowed to do?

Facility HVAC goals

Energy, comfort, productivity, management reporting, sustainability?

Minimizing downtime

Based on the type of facility, what happens when equipment fails?

Maximize uptime

What is the benefit of a system that runs flawlessly? Any performance-based incentives for facility management?

IN DETAIL - CREATE A BUYING VISION FOR ENERGY

There are 7 new energy reports available in 2.1.

- **These reports help the energy manager identify when peak usage occurs**
- **Determine how various loads contribute to overall usage**
- **Compare efficiency between buildings**
- **Display and compare equipment runtime**
- **Understand load profiles**

The new reports include a baseline feature for comparing a previous period to a current period, and normalization for building area and degree days.

IN DETAIL - CREATE A BUYING VISION FOR ENERGY

There are 7 new energy reports available in 2.1.

- **These reports help the energy manager identify when peak usage occurs**
 - What actions could you take to limit peak usage charges?
- **Determine how various loads contribute to overall usage**
 - Do certain equipment and/or practices need to be replaced/reevaluated?
- **Compare efficiency between buildings**
 - Which one is more efficient, why, and what can/should you do to change?
- **Display and compare equipment runtime**
 - What are your short and long-term goals for fixing/replacing?
- **Understand load profiles**
 - What could you do with better insight into your facility operation?

TELL A STORY

Here's an example of a real-life customer:

- **A VAV box was holding set point and the customer did not realize there was a problem as the tenant did not complain.**
- **After applying analytics to the building, it was determined that the VAV box had a leaking hot water valve which raised the temperature in the space.**
- **The VAV compensated by opening the air valve to cool the space and keep it at temp.**
- **The VAV box was using twice the energy to maintain the set point than it would have if the components were working normal.**

TELL A STORY

- **An air handling unit was holding set point with no complaints from the tenants.**
- **After applying analytics, it was found that during morning warm up the economizer damper minimum was set too high. If the outside temp was below 25 deg the gas heat could not overcome and heat up the building.**
- **The burner ran hours until the outside temperature raised enough to be able to raise the temperature in the building to set point. This was a massive waste of energy and the tenant was paying the utility bill.**
- **After fixing the problem the utility bill decreased by 33% .**

CONTRACTORS: USING ANALYTICS TO GROW

- **A contractor can use analytics as a tool to grow their business without having to hire new employees.**
- **Using Analytics, you can monitor a building and the HVAC equipment without having a tech onsite. Instead of sending a technician out every three months, a company can run a report monthly and the report can show what units need to be checked out.**
- **This increases the efficiency of the technician. The company can send the right technician to the very unit needing repair, knowing what needs to be repaired, while bringing the repair part with them.**
- **This increases the amount of time the technician can spend on other projects and service calls. This also shows the building owners that their equipment is running efficiently so they can budget more effectively.**

SUMMARY

- 1. Goal is to make the invisible visible for the customer.**
- 2. Prepare for your sales call.**
- 3. Understand what they value, then tie to the value Analytics delivers.**
- 4. Finish with specifics and ask for the order!**

INTERMISSION

10 MINUTES

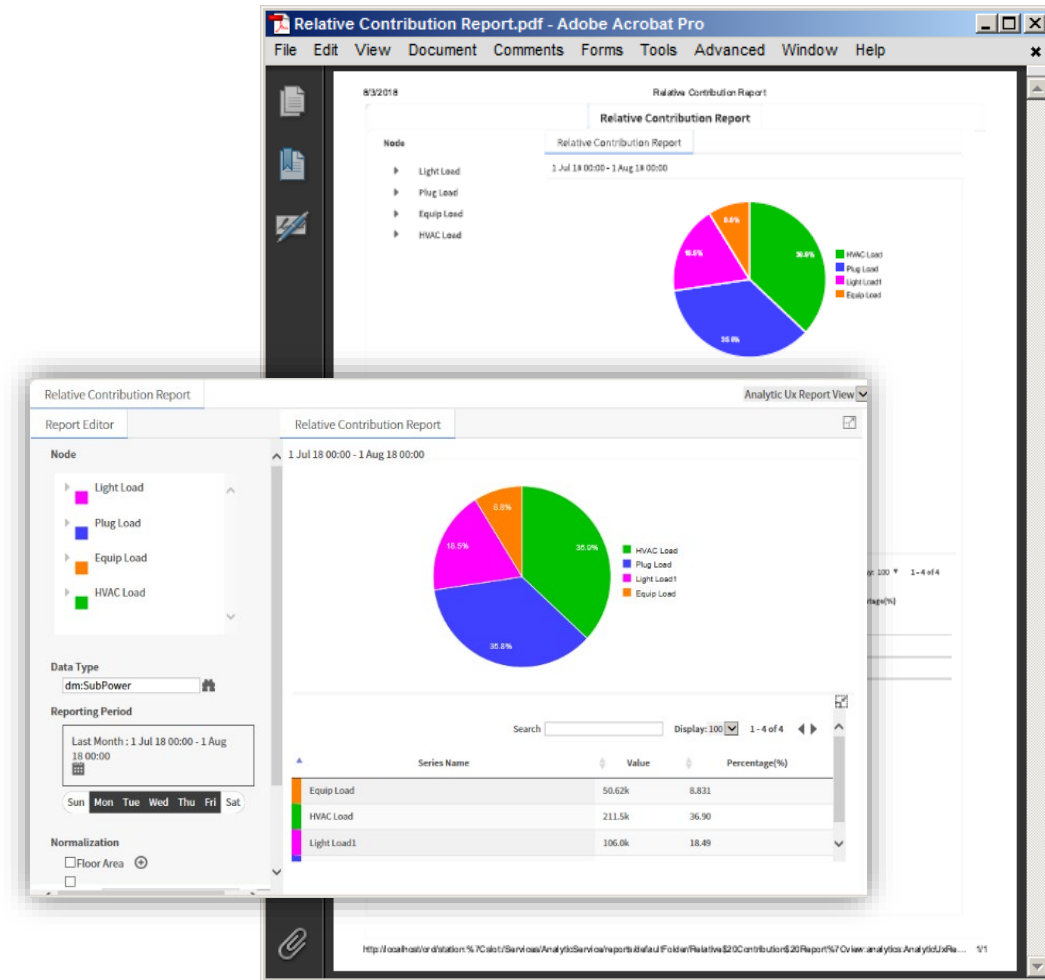
WEBS-N4 ANALYTICS 2.1 RELEASE

Honeywell



7 NEW ENERGY REPORTS

- System users can now configure reports easily by dragging and dropping nodes onto the report editor
- Reports and charts can be stored in folders for future recall
- Report data can be printed and exported to pdf using the Chrome or Firefox browser print function
- Normalization for Area and Temperature
- Compare values with baseline

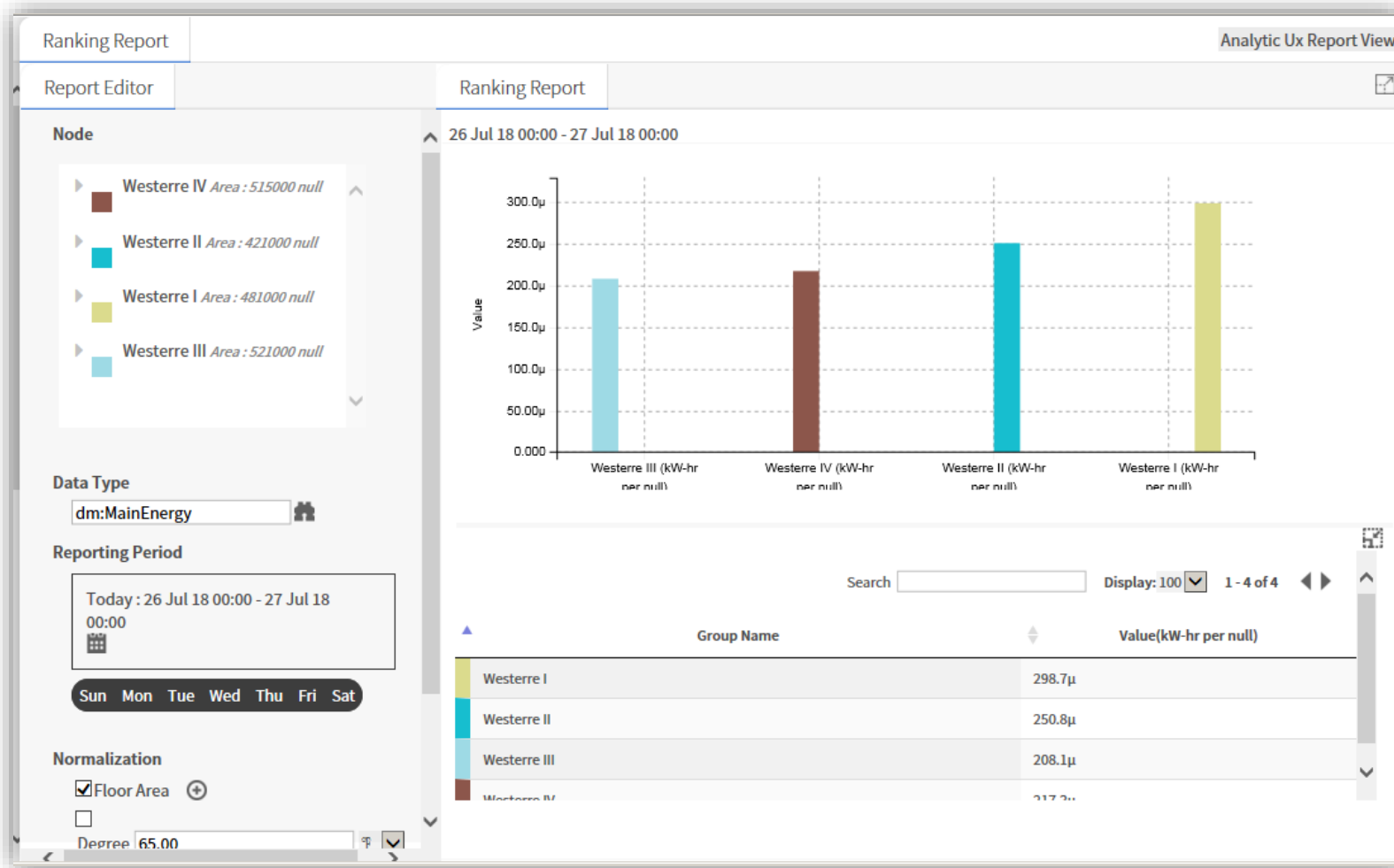


AVERAGE PROFILE REPORT

- The report plots average value vs. Time of Day
- See the loads that increase roughly at the same time
- Could peak demand be reduced by staggering the startup of HVAC equipment?
- Could overall usage be affected by shutting down or setting back HVAC equipment when the facility is unoccupied?



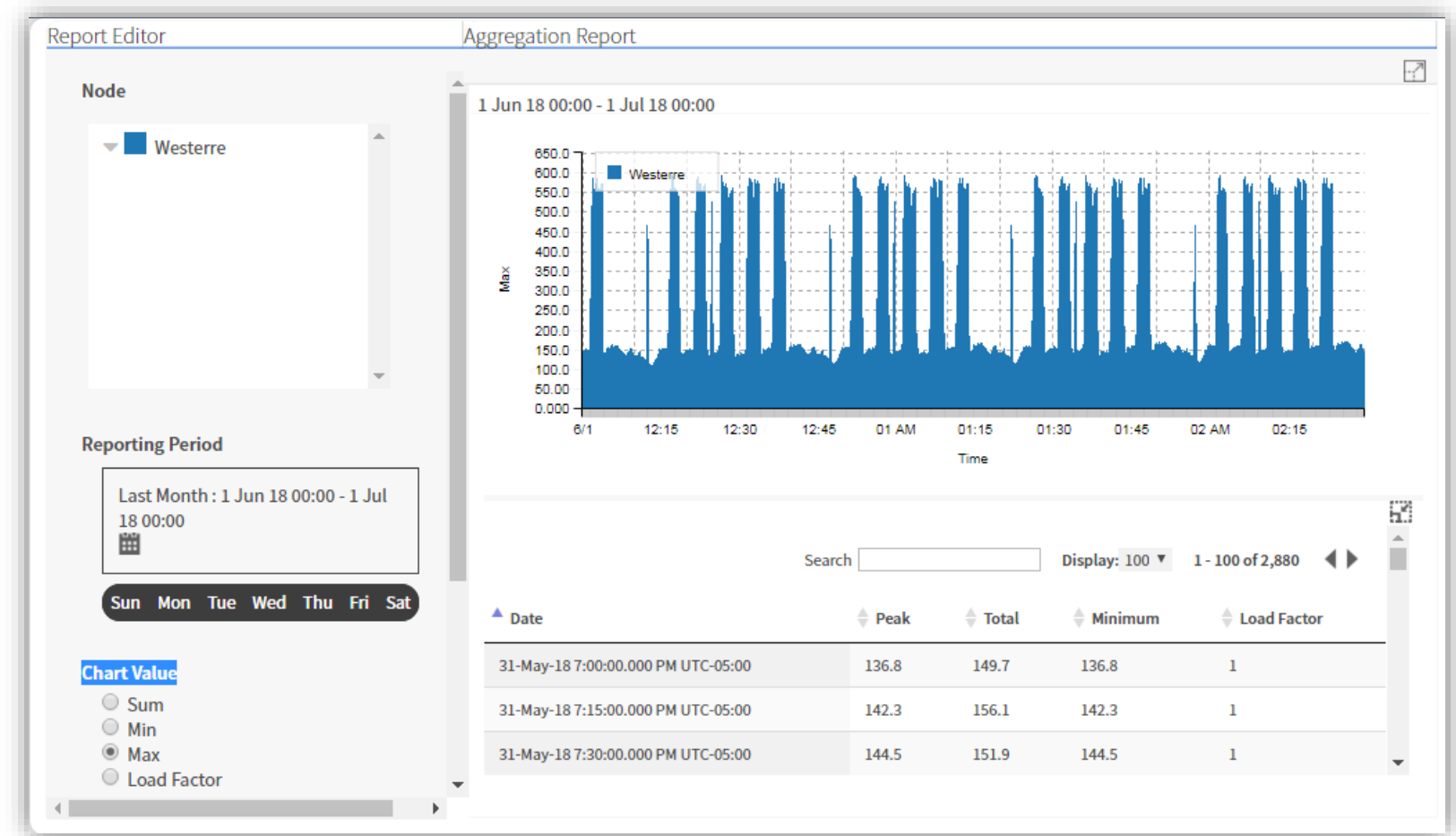
RANKING REPORT



- This report ranks buildings or areas against each other
- In this example, Westerre I is shown to be using the greatest amount of energy per square foot

AGGREGATION REPORT

- Aggregates data for defined data types under a node
- For example, if you want to run a report for an entire campus, this report can combine all values found under the node with the same tag definition
- This report could also be used to combine Submeters for a tenant, building, or area



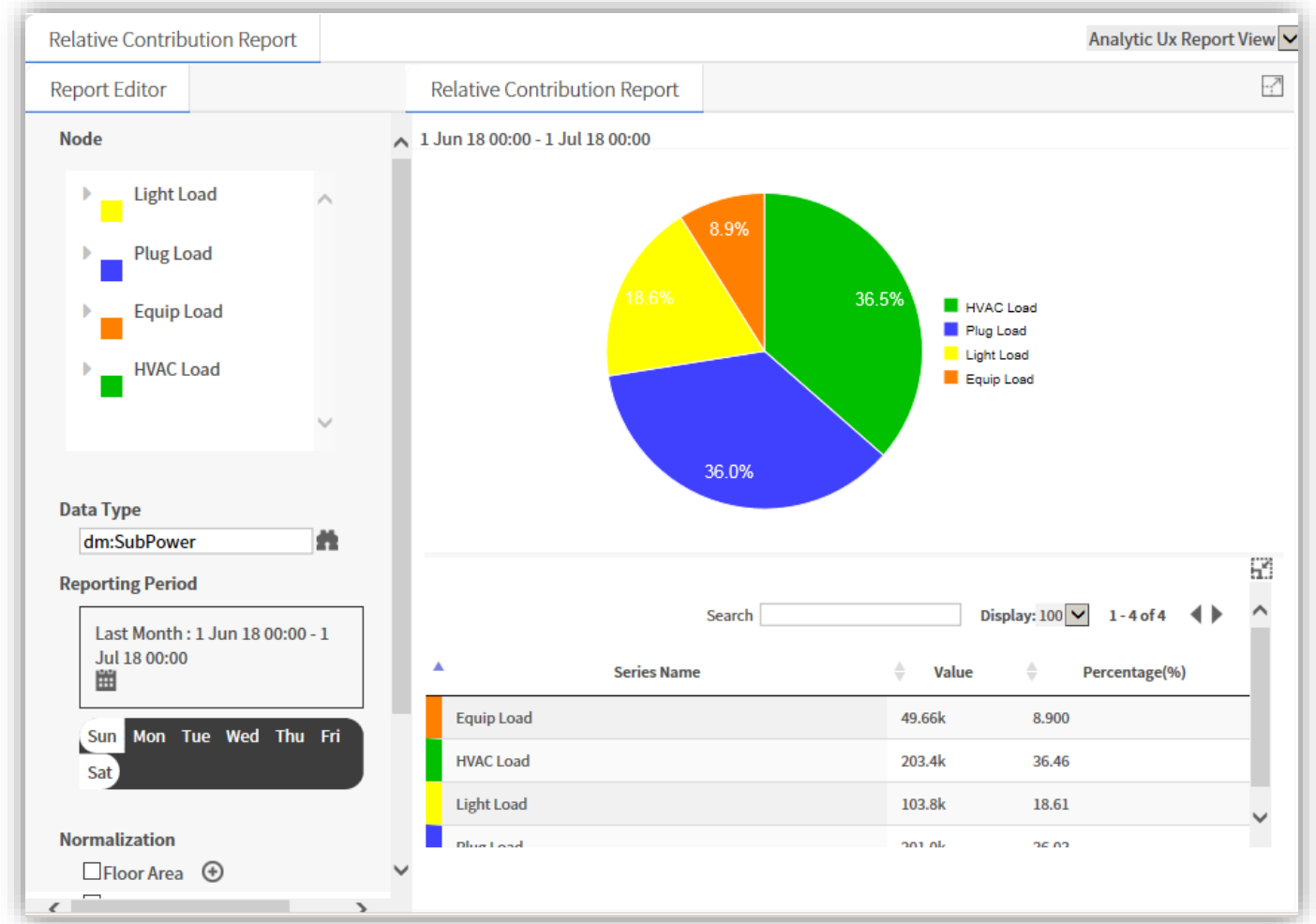
SPECTRUM REPORT



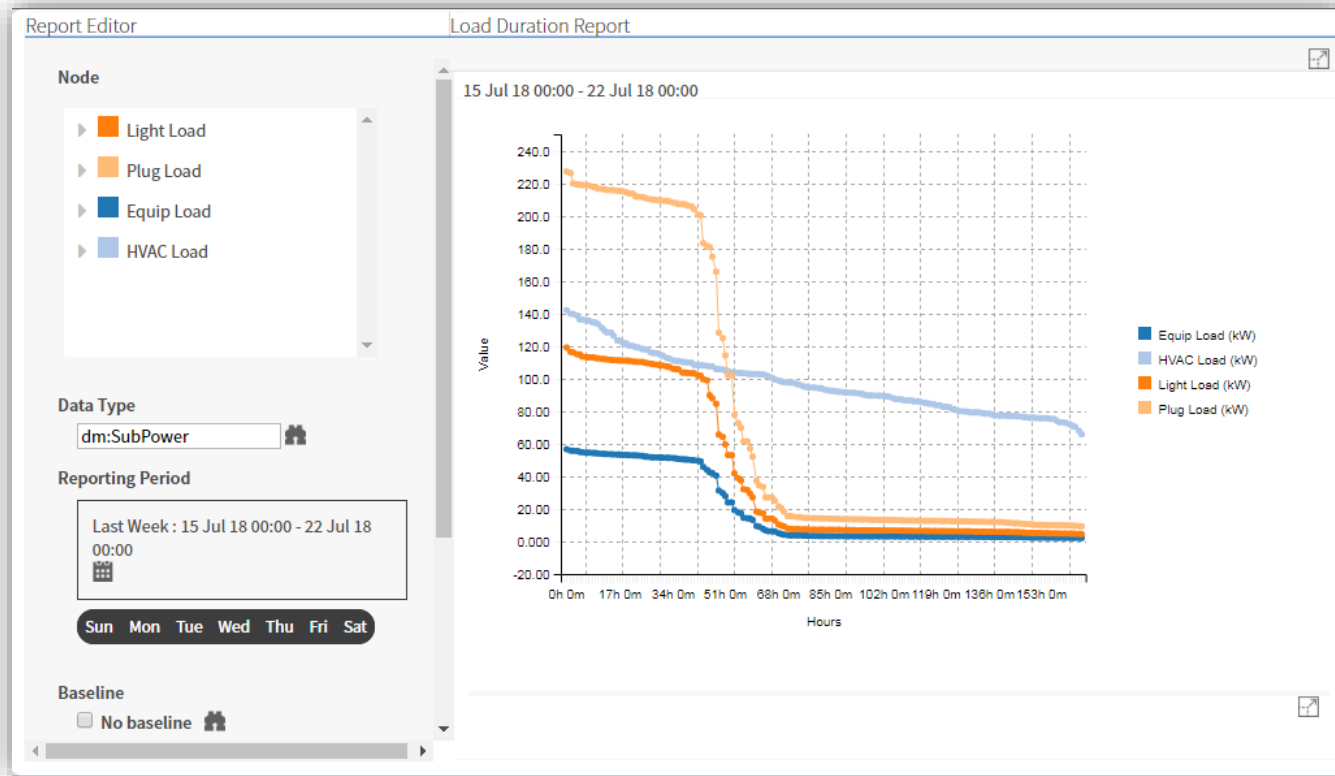
- Gives a quick view as to when energy use in a facility is at it's highest
- Allows facility manager to quickly see anomalies in usage
- For example, note the red areas on Sunday and Tuesday evening

RELATIVE CONTRIBUTION REPORT

- Shows how various loads contribute to the entire usage
- For energy reduction, one would want to focus on the largest contributors



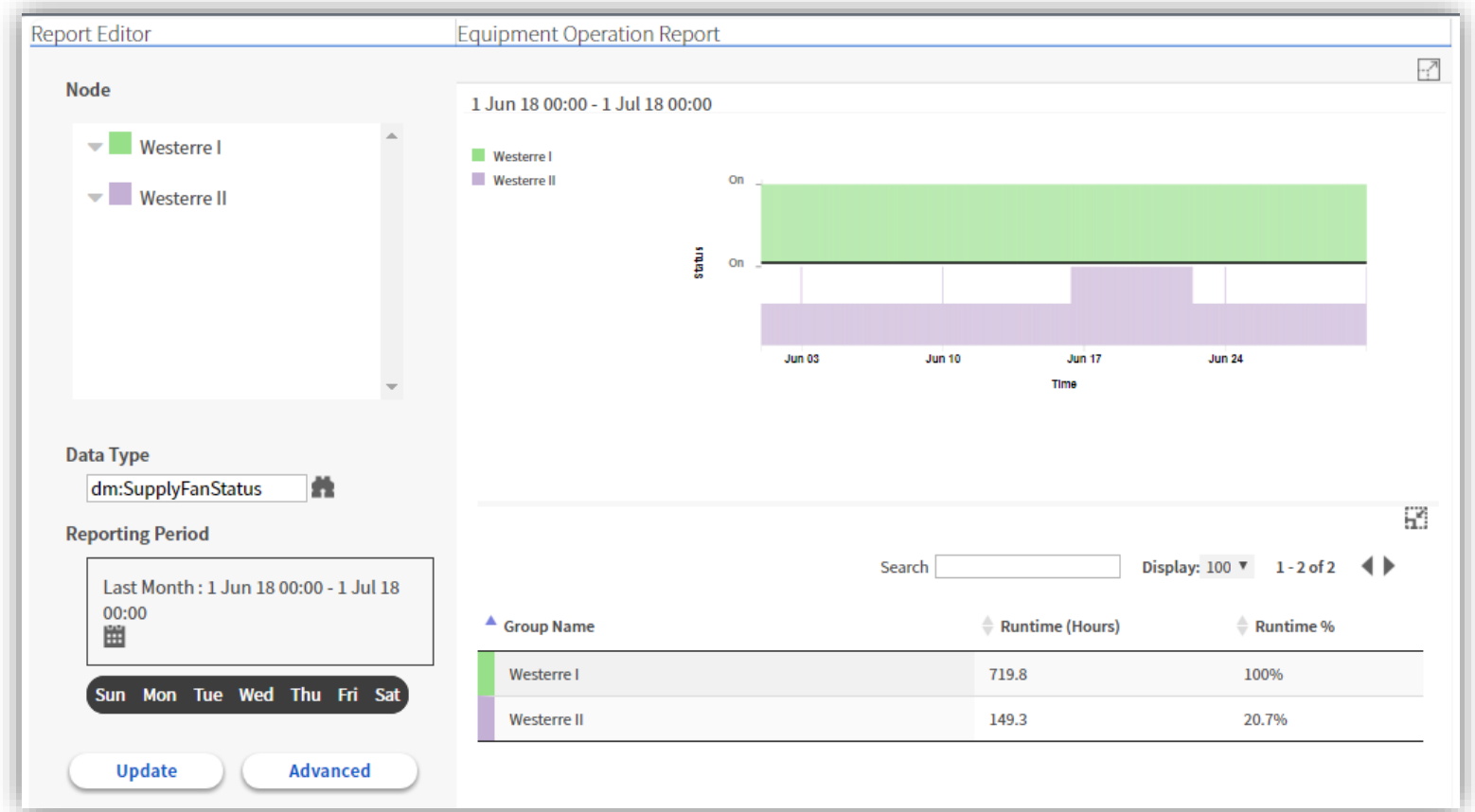
LOAD DURATION REPORT



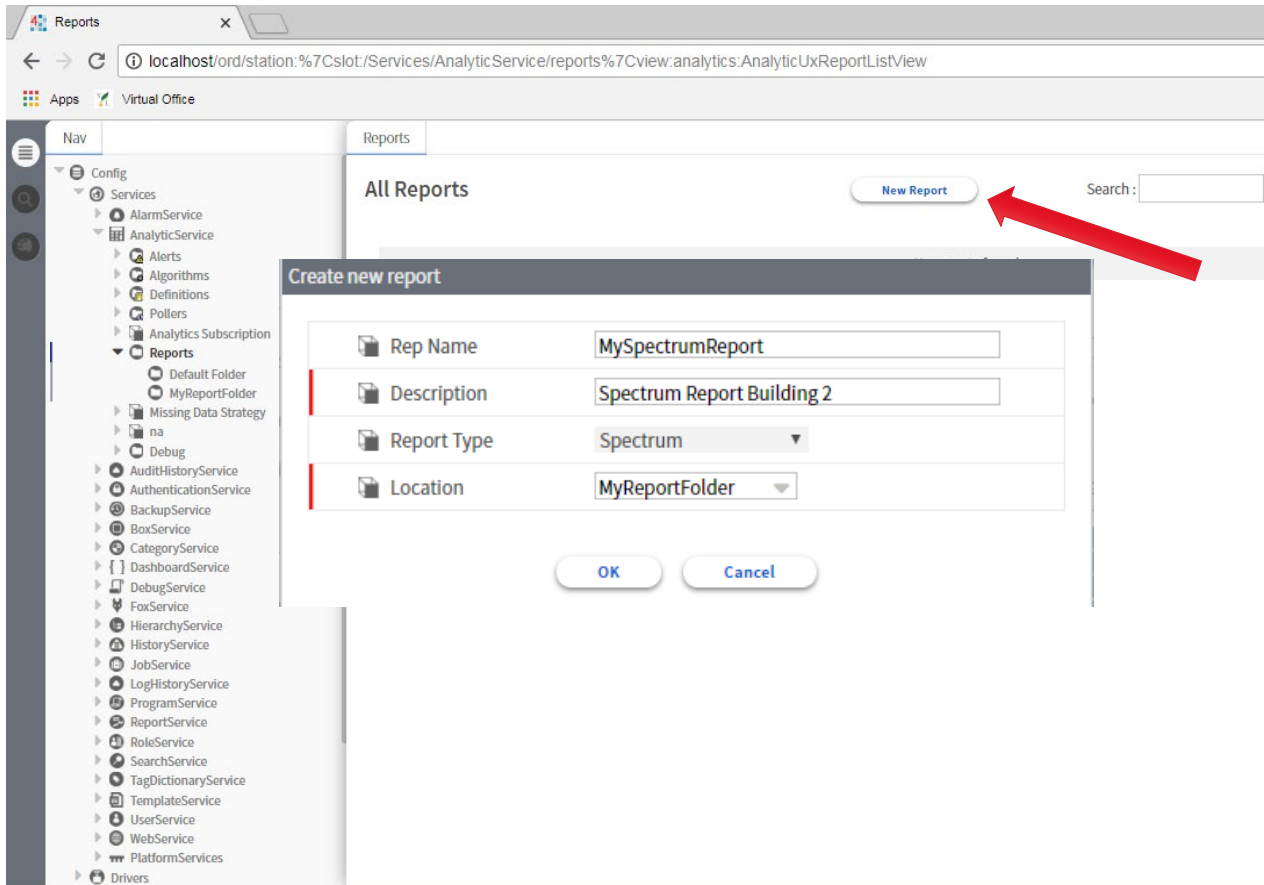
- Shows how long a certain amount of energy is used
- Show that plug, light, and equipment loads all decrease significantly after about 42 hours of runtime
- Even out these loads and peak usage could be reduced
- Perhaps shifts could be staggered to reduce peak usage

EQUIPMENT OPERATION REPORT

- Shows the percentage of time equipment is running
- We can see Westerre I is running equipment 100% of the time, while Westerre II is running equipment only 21% of the time



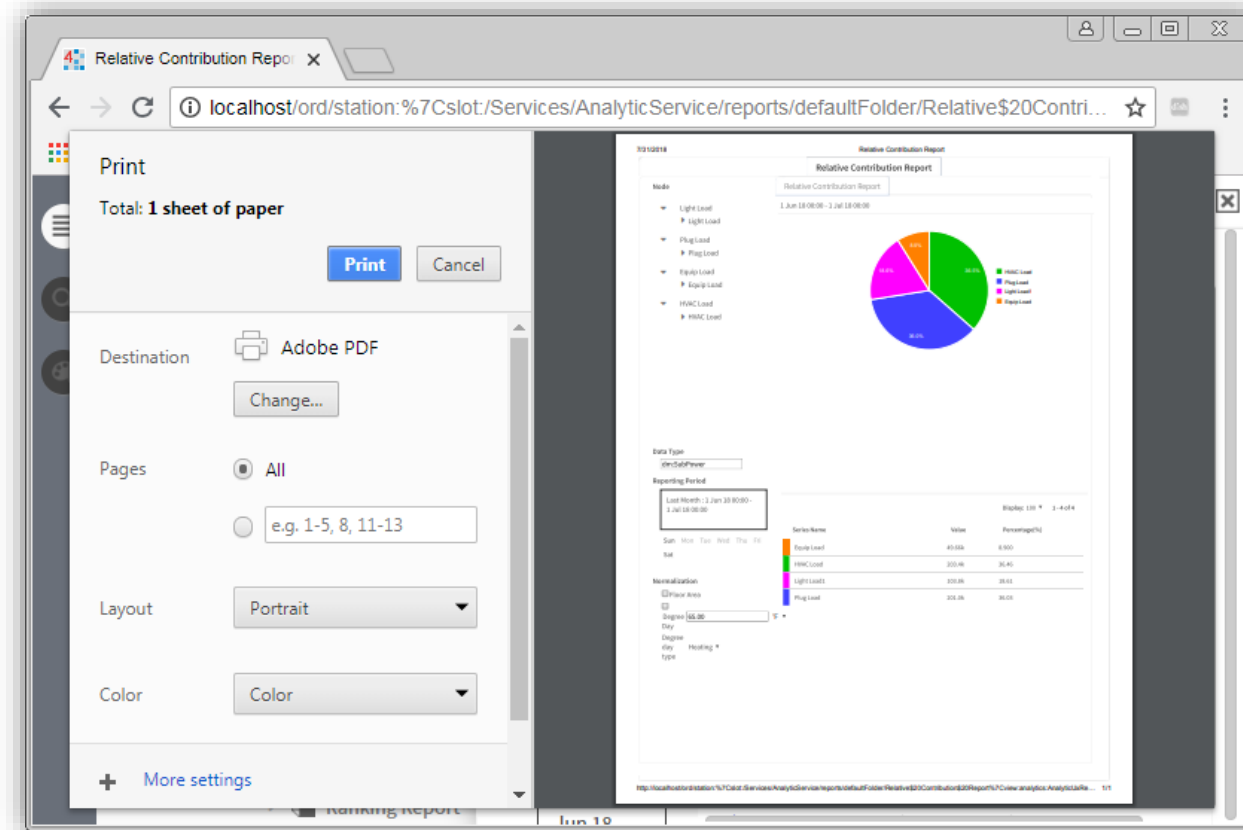
ADD REPORTS FROM WEB UI



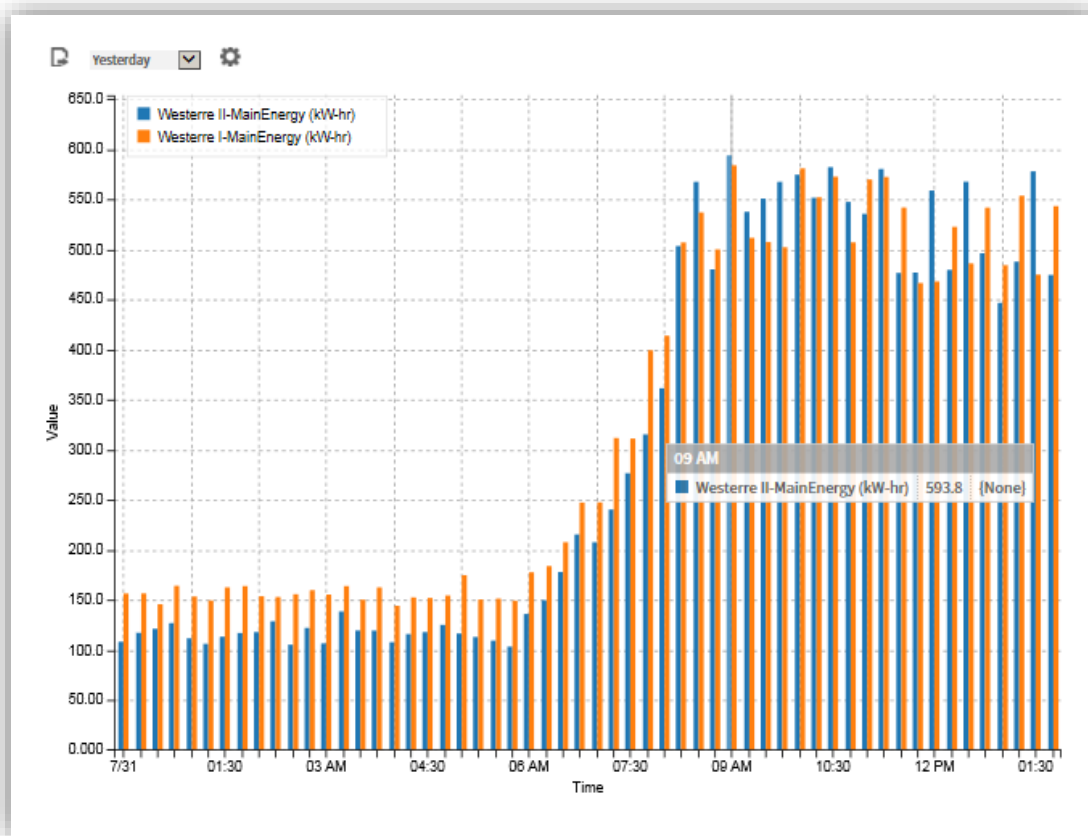
- From the Analytic Report Service, new reports can be added and saved to a folder for future use from the Web UI – no workbench configuration is required!
- The end user can now simply drag and drop nodes onto the pre-configured reports, providing immediate access to requested information

EXPORT REPORT TO PDF

- Analytic reports can now be exported to a PDF file by using the browser tools
- Use Mozilla or Chrome browser print tools and select the adobe PDF printer



ANALYTICS WEB CHART



- HTML5 chart with analytic bindings
- Use this chart on px pages and dashboards
- View from browser or mobile devices
- Chart type (Bar, line, area, step, area_step, spline, area_spline, scatter) is configurable from the web UI
- Optionally, bindings can be shown on the Y axis

ANALYTIC WEB TABLE

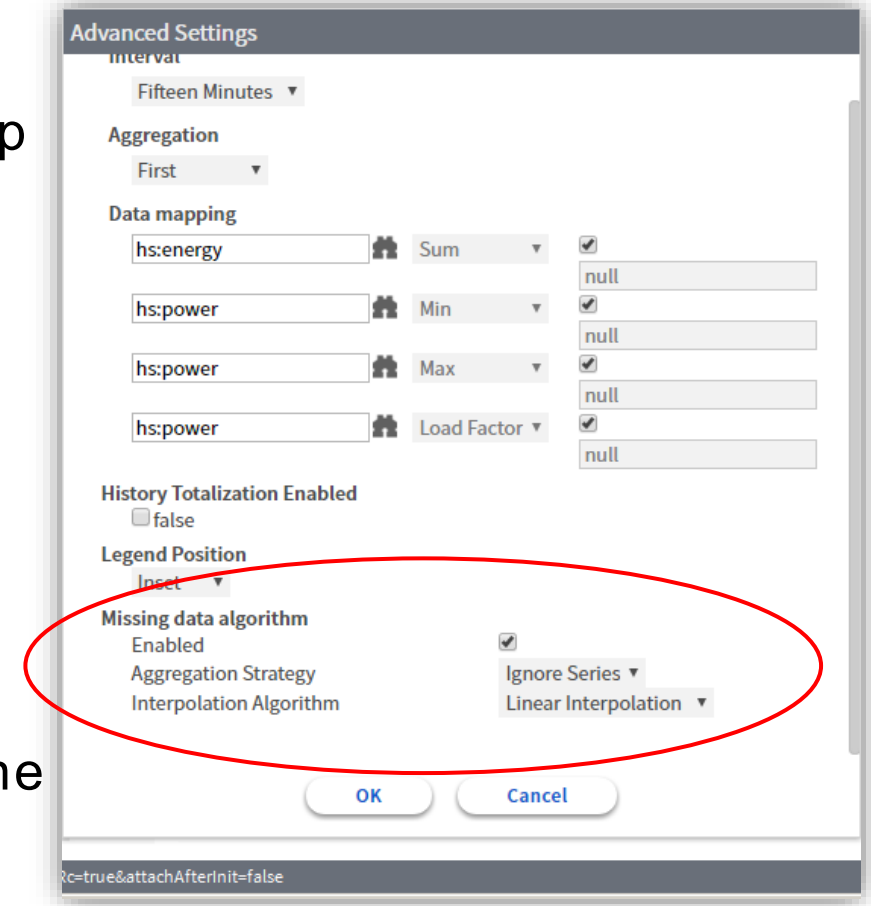
The screenshot shows a web browser window with the title 'Energy Breakdown Table'. The address bar shows a localhost URL. The browser interface includes a navigation pane on the left with a tree view of folders like 'Config', 'Home', 'Files', 'ReportFiles', 'Histories', 'AnalyticsDataModel', 'Energy Manager', 'Alarm Console', 'Eastern US', 'Florida', 'Massachusetts', 'Virginia', 'Richmond', 'Westerre', 'Westerre I', 'Westerre II', 'Energy', 'Reports', 'Site Workshee', 'Weather', 'Westerre III', 'Westerre IV', 'Facility Manager', and 'National Site Plans'. The main content area displays the 'Westerre II Meter Data' table. The table has a search bar and a 'Last Week' filter. The table columns are: Timestamp, Equip Load-history Value, Equip Load-history InterpolationStatus, HVAC Load-history Value, HVAC Load-history InterpolationStatus, Light Load-history Value, and Light Load-history InterpolationStatus. The table contains four rows of data for Sun Aug 12, 2018.

Timestamp	Equip Load-history Value	Equip Load-history InterpolationStatus	HVAC Load-history Value	HVAC Load-history InterpolationStatus	Light Load-history Value	Light Load-history InterpolationStatus
Sun Aug 12 2018 00:00:00 GMT-0400 (Eastern Daylight Time)	3.500000596046448	{None}	76.55000114440918	{None}	6.79999952316284	{None}
Sun Aug 12 2018 01:00:00 GMT-0400 (Eastern Daylight Time)	3.474999964237213	{None}	75.5	{None}	7.39999976158142	{None}
Sun Aug 12 2018 02:00:00 GMT-0400 (Eastern Daylight Time)	3.1250000596046448	{None}	75.92499923706055	{None}	7.199999928474426	{None}
Sun Aug 12 2018 03:00:00 GMT-0400 (Eastern Daylight Time)	3.774999976158142	{None}	76.14999961853027	{None}	7.549999952316284	{None}

- HTML5 table with analytics bindings
- Time, rollup, aggregation, series name, data name, and data filters configurable in browser
- Multiple data points and nodes can be configured and added as columns in a single table
- Export data to csv or chart files

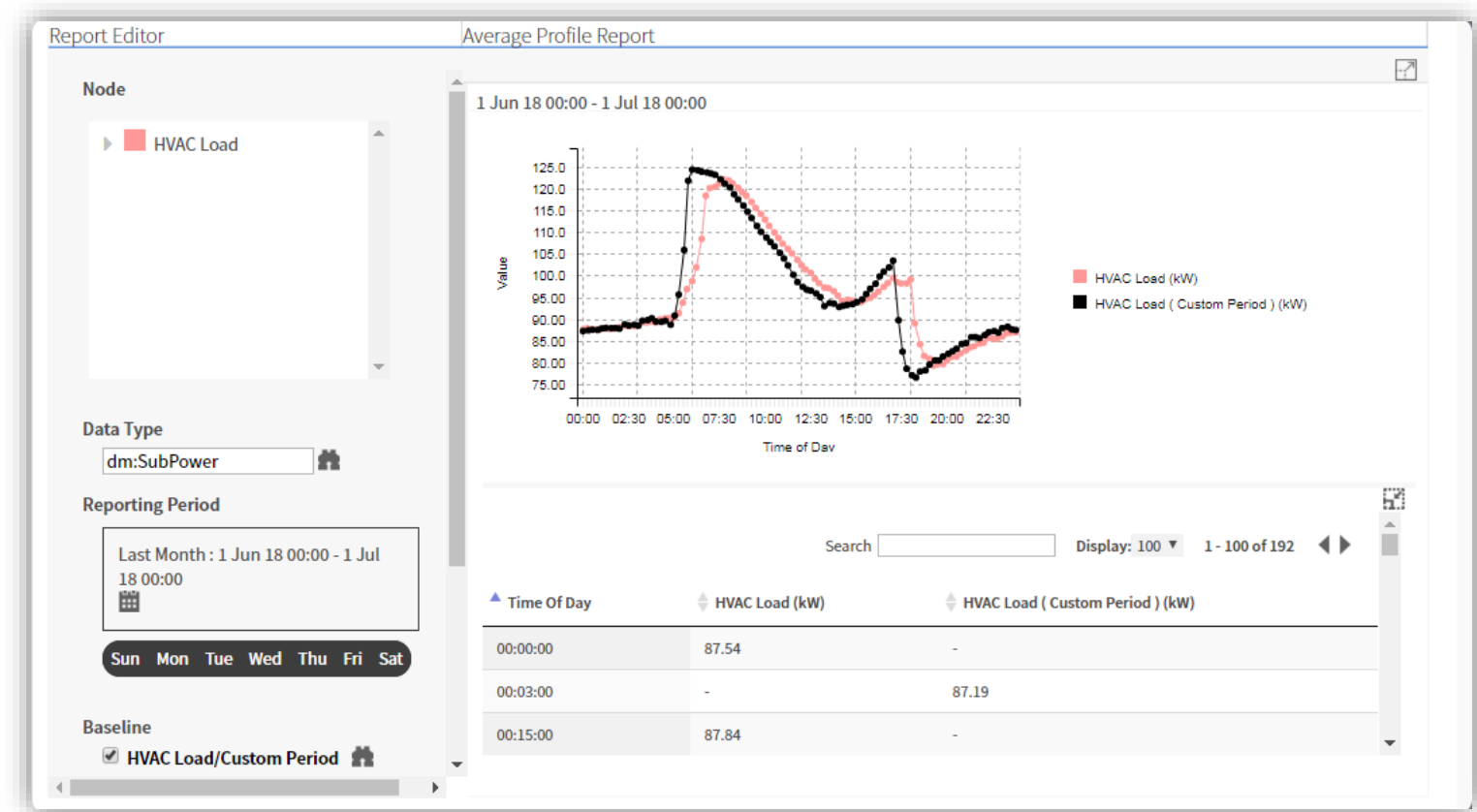
MISSING DATA HANDLING

- Apply algorithms, charts, proxy points, alerts, and reports
- Linear interpolation (analog values)
- Interpolates values for missing data by calculating the slope between first and last known good values adjacent to the missing data and filling in missing data
- K-Nearest Neighbor
- For Boolean and enum values, missing data is calculated by filling in the data with a value equal to the majority of adjacent data. “k” specifies the number of fields that are considered in the calculation
- For Aggregation Charts and Reports:
 - Ignore series – if there is missing data in a series, ignore the entire series. This is the method that was implemented in previous versions.
 - Ignore points – ignore missing data in the series (set to 0)



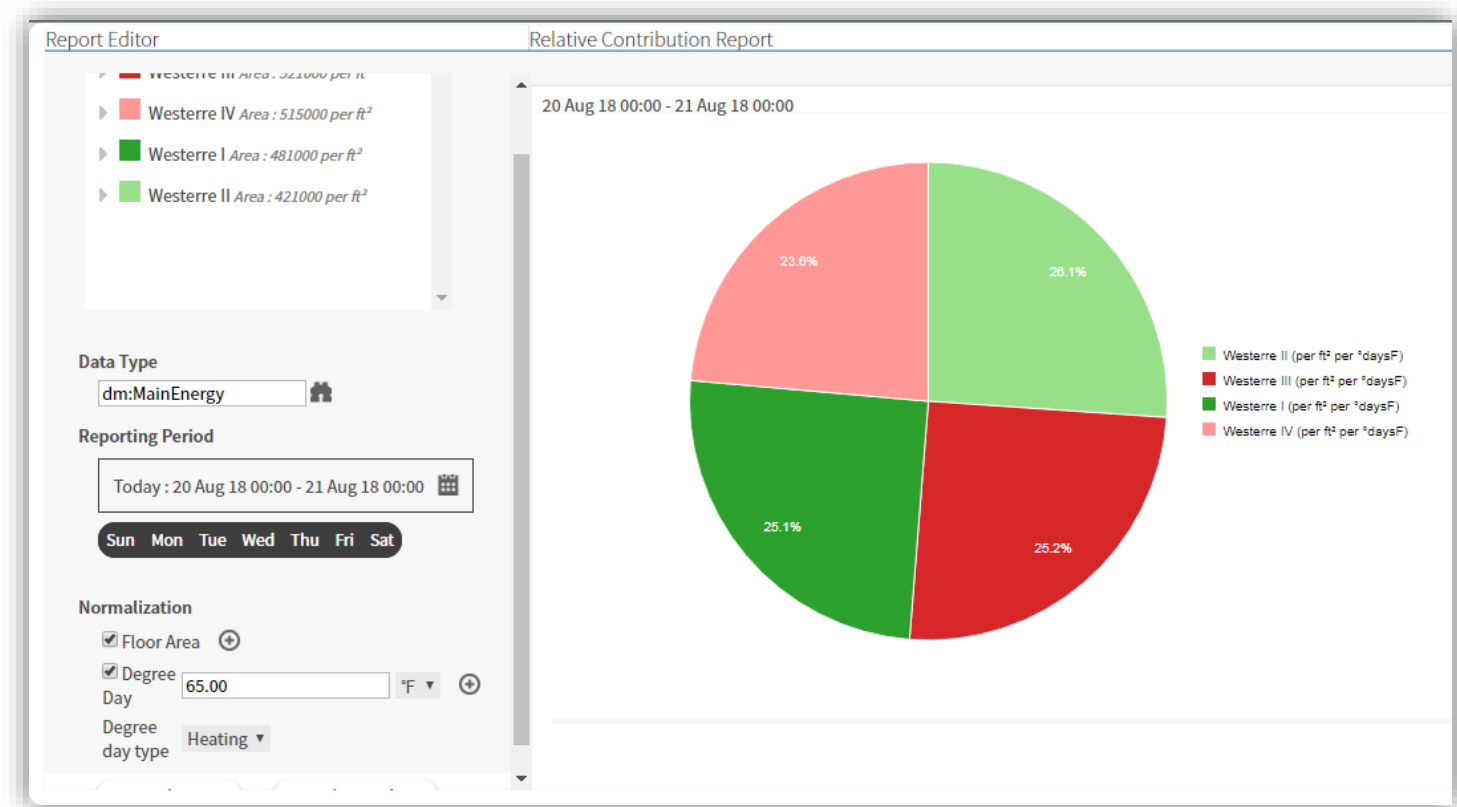
BASELINE

- Compare current data with data from a previous period
- Determine if performance has improved or deteriorated



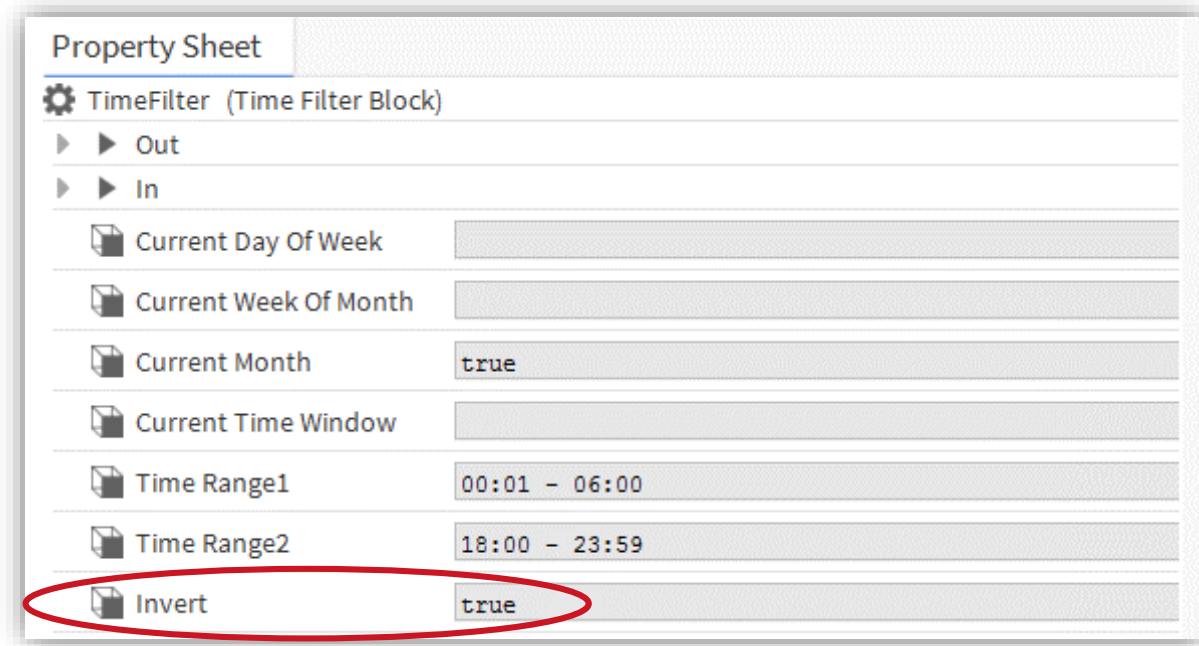
NORMALIZATION

- When comparing facilities of different size or different geographical regions, normalize the data by area and/or weather to get good “apples to apples” comparisons



TIME FILTER BLOCK ENHANCEMENTS

- New – Invert Time Ranges
- If true, the values defined in Time Range 1 and Time Range 2 are excluded from the output
- Reduces number of blocks needed for algorithms when certain time ranges need to be excluded



THANK YOU

- BuildingControls.Honeywell.com
- Global Engineering Services
- WEBsSquad
- Part #'s and Pricing
- Contact your Sales Representative for further information

