

Energy Site Manager

The Harris Stratex Networks solution provides the most cost efficient operation for an off-grid cell site. Cost efficiency is from analyzing the running costs and the capital costs of operation, and configuring the systems for optimum performance. These capabilities, supported by configuration tools and monitoring system performance, are provided with the ProVision Energy Site Manager.

Regarding diesel generators and fuel—with the Energy Site Manager, part of the total savings can be a 20% - 60% reduction of fuel consumption, depending on the energy load and the capacity of the generator.

Energy Site Manager—ProVision

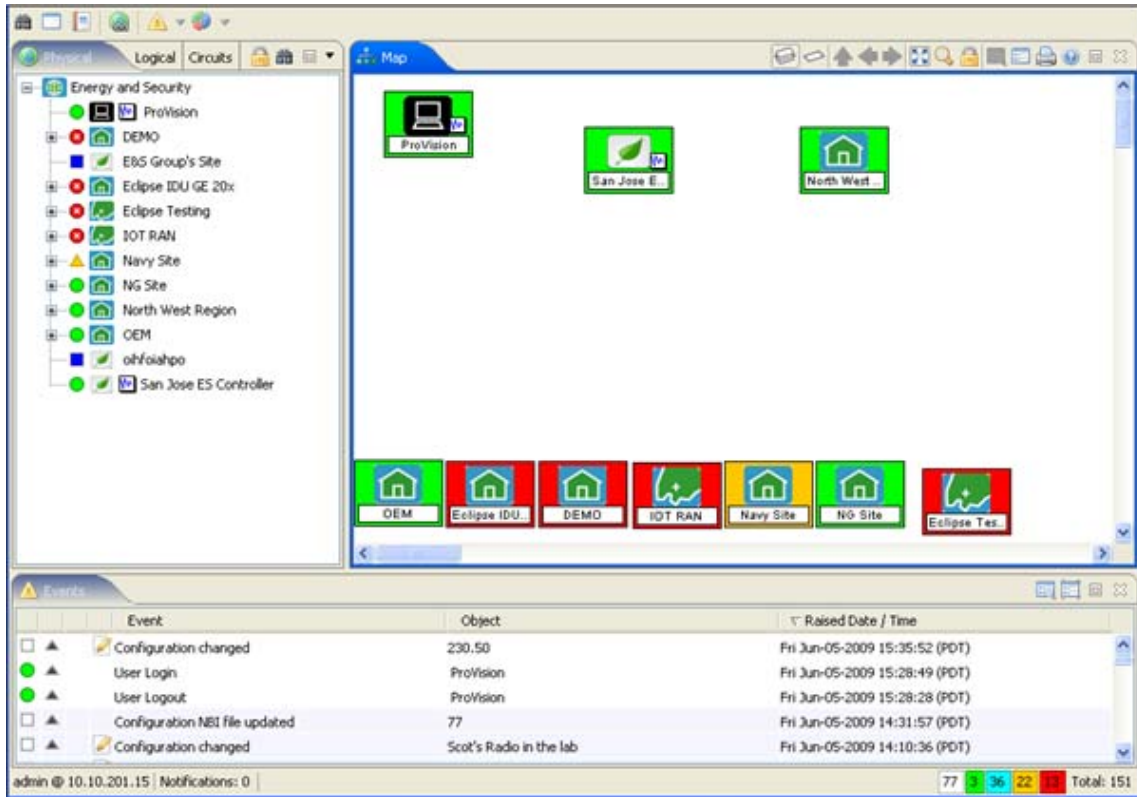
Energy Site Manager, which is accessed through ProVision[®], provides access to multiple sites through an easy-to-read graphical user interface (GUI).

Top Level Overview

The top level provides an overview of all sites, the status of each site, and access to the event log.

- The sites are displayed as named icons. The background color of an icon shows the current status of the site.
 - White—information about an object
 - Green—the object is operating correctly
 - Blue—minor event, a small problem
 - Yellow—warning, a significant problem that needs attention before failure occurs
 - Red—critical, a failure has occurred and immediate attention is needed

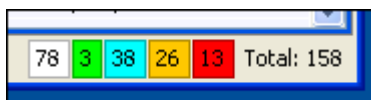
The details of each status condition can be viewed in the *Events* log, the bottom pane of the screen.



To view all events, scroll down the screen. To view specific events, use one of two filtering tools: *Level of Event* and *Event Filter*.

Level of Event

Each tab shows the number of events per condition.



- The white tab shows 78 informational events.
- The green tab shows three (3) items in full operation.
- The red tab shows thirteen (13) items are in critical condition.
- The total number of events is shown: 158.

To view specific conditions, click the appropriate color tab. Below is a list of all the critical events, which is displayed after clicking the red (critical event) tab.

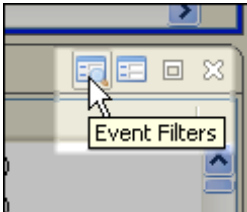
Event Browser - Untitled

File Options Tools

	Event	Object	Raised Date / Time
✖ ▲	Traffic path down	[Edge 1 Node10/Ethernet - LI...	Tue Jun-02-2009 08:38:18 (PDT)
✖ ▲	Demodulator not locked	[Edge 1 Node10/Ethernet - LI...	Tue Jun-02-2009 08:38:18 (PDT)
✖ ▲	Traffic path down	[Repeater Node/LINK3] RAC3	Tue Jun-02-2009 08:37:12 (PDT)
✖ ▲	Demodulator not locked	[Repeater Node/LINK3] RAC3	Tue Jun-02-2009 08:37:11 (PDT)
✖ ▲	RX IF synthesiser not locked	[230.50/LINK2] ODU2	Wed May-27-2009 14:06:47 (...)
✖ ▲	Transceiver TX failure	[230.50/LINK2] ODU2	Wed May-27-2009 14:06:47 (...)
✖ ▲	Trib 3 output failure	[250.50 A] Data	Tue May-19-2009 18:00:21 (P...
✖ ▲	Trib 3 LOS	[250.50 A] Data	Tue May-19-2009 18:00:21 (P...
✖ ▲	Demodulator failure	[77/LINK3] RAC3	Tue May-19-2009 18:00:09 (P...
✖ ▲	Modulator failure	[77/LINK3] RAC3	Tue May-19-2009 18:00:09 (P...
✖ ▲	Clock generator failure	[77/LINK3] RAC3	Tue May-19-2009 18:00:09 (P...
✖ ▲	Traffic path down	[Gateway Node/To_ NTU Cx1 ...	Sat Sep-29-2007 13:39:22 (PDT)
✖ ▲	Demodulator not locked	[Gateway Node/To_ NTU Cx1 ...	Sat Sep-29-2007 13:39:21 (PDT)

13 Total: 13

Event Filter



For more detailed sorting, the *Event Filter* can be used.

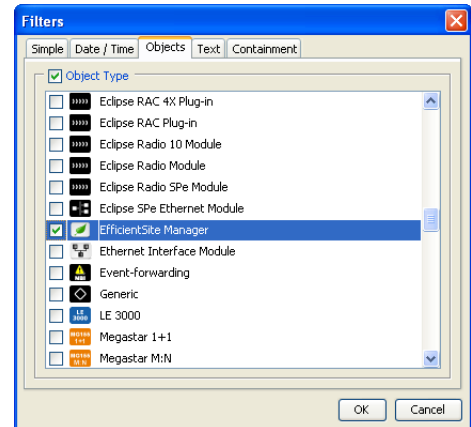
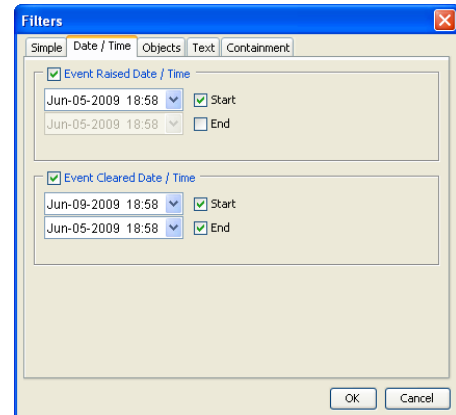
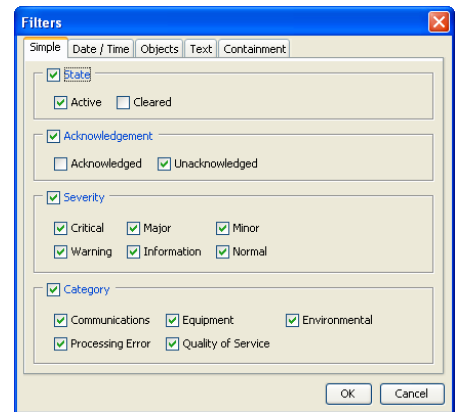
Five sorting methods are available: Simple, Date/Time, Objects, Text, and Containment. The sorting methods can be used simultaneously. This is an important feature. Multiple sites can be monitored, and each site can have a large quantity of devices (objects) that are monitored individually—this saves the time of scrolling through hundreds, possibly thousands of events, from a large aggregated system.

The filters are described below.

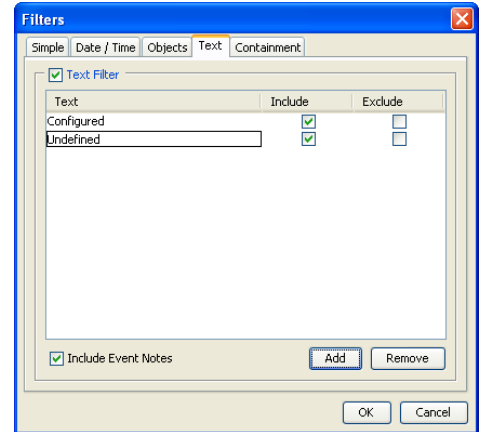
- Simple—the state conditions
 - The reported state (event) has been cleared (resolved) or is still open to attention
 - The reported state has been acknowledged or is still waiting for attention
 - The level(s) of severity
 - The category (type) of event—communications, equipment, environmental, processing error, quality of service

- Date/Time—chronological selection of the event, and the selection of when the event occurred (was raised) and/or when the event was cleared (resolved)

- Objects—selection of which object (device) reported an event

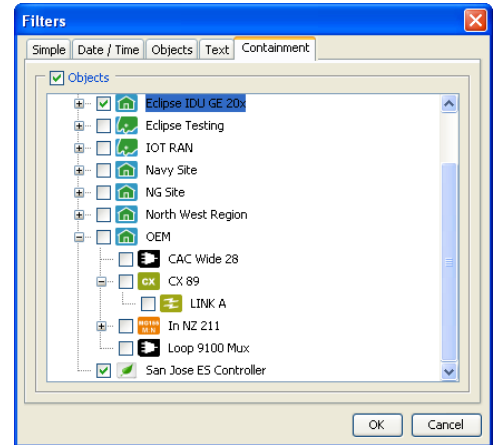


- Text—filter the event logs with specific terms (words)



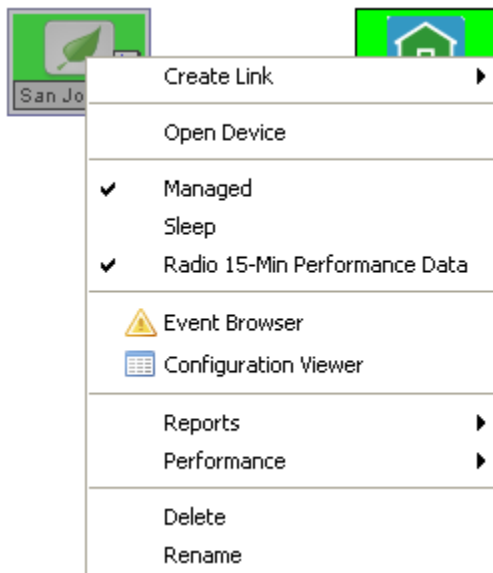
- Containment—filter per object(s) per containment: select the objects per site

Note that the selection is similar to the right pane of the home page as shown in *Top Level Overview* on page 1.



Viewing Reports of a Site

The reports of a selected site can be pulled up for review. To do so, right-click the icon of the selected site and select the desired item from the drop menu.



Following are examples of three significant reports: Open Device, *Fuel Reports*, and *Performance*.

Open Device



Open Device provides immediate details of the operations of the selected site.

Following is an example of an *Open Device* report of an energy site.

EfficientSite Manager
/San Jose ES Controller : 10.10.39.142

Installed Systems

- Energy
- Access
- Surveillance

Energy Source

Grid
Supply: -

Battery
Supply: -
Voltage: 49.3 V
Cycles: -
Temperature: 32.0 °C

Generator
Supply: -

Fuel Tank
Volume: 19.0 %
Remaining: 8.6 liters
Consumption: 0.00 liters/hour

Environment Control

- Enclosure HVAC
- Shelter HVAC

Environment Conditions

Ambient
Temperature: 27.3 °C
Humidity: 33.0 %

Enclosure
Temperature: 27.1 °C
Humidity: 34.0 %

Energy Source Summary

- Grid Runtime: -
- Generator Runtime: -
- Hybrid Runtime: -

? Data not available

Environment Control Summary

- Off Runtime: -
- HVAC Runtime: -

? Data not available

- Installed Systems—a checkmark indicates the system is installed. In this example:
 - Energy—management of the energy site, including power distribution, turning the generator on and off, cycling the batteries, and so on.
 - Access—controlled access (entry) to specific areas. This feature is optional.
 - Surveillance—security system that surveys the sites 24/7. This feature is optional.
- Energy Source—current usage and status of energy sources:

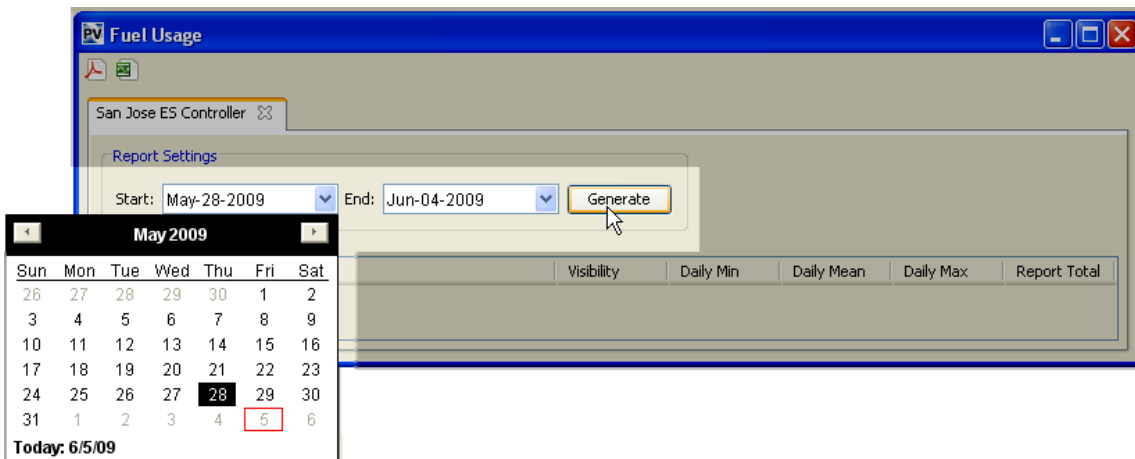
- Grid—the green box indicates the power grid is active.
- Battery—the green box indicates the battery bank is in use.
- Generator—the red box indicates the generator is not in use.
- Fuel Tank—the check box indicates the fuel tank is operational; however, the red color of the volume shows that the fuel tank reserve is very low and needs to be refilled. The displayed consumption of 0.00 liters/hour is appropriate, as the generator is currently not in use; fuel should not be “consumed” when the generator is not running.
- Environmental Control—the one checkmark indicates that an air conditioner was installed only in the enclosure; no air conditioner was installed in the shelter.
- Environmental Conditions—shows the current ambient (external) and enclosure (internal) temperatures and humidity levels.
- Energy Source Summary—shows a percentage summary of the activity of the energy devices.
- Environmental Control Summary—shows a percentage summary of how often the air conditioner is on (cooling the enclosure) and how often the air conditioner is off.

Fuel Reports

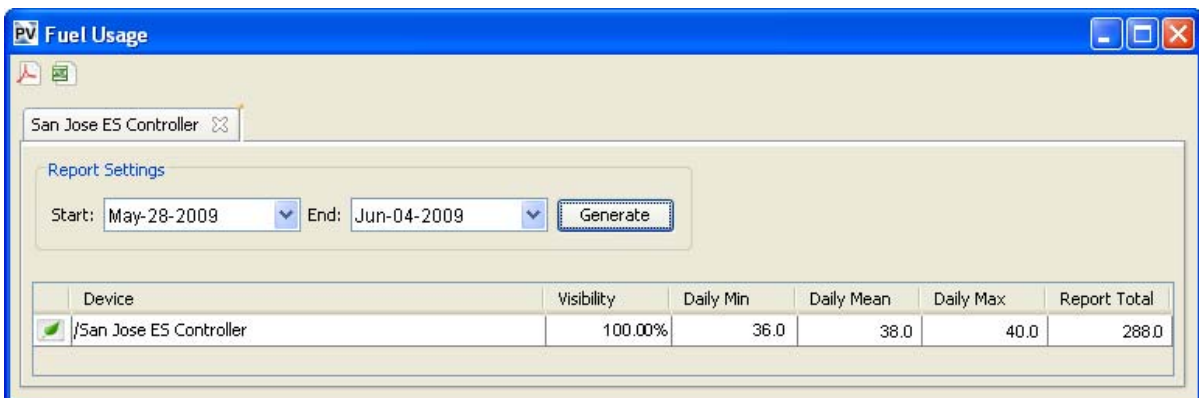


Reports provide detailed reports of fuel usage. This is significant information for analyzing the performance and cost of the energy sites.

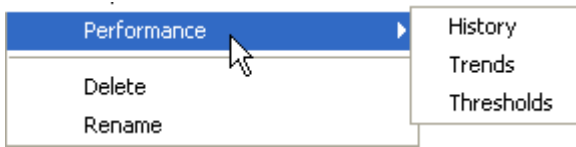
A fuel report can be isolated to a specific time period.



Following is an example of a fuel usage report during a specified time period.



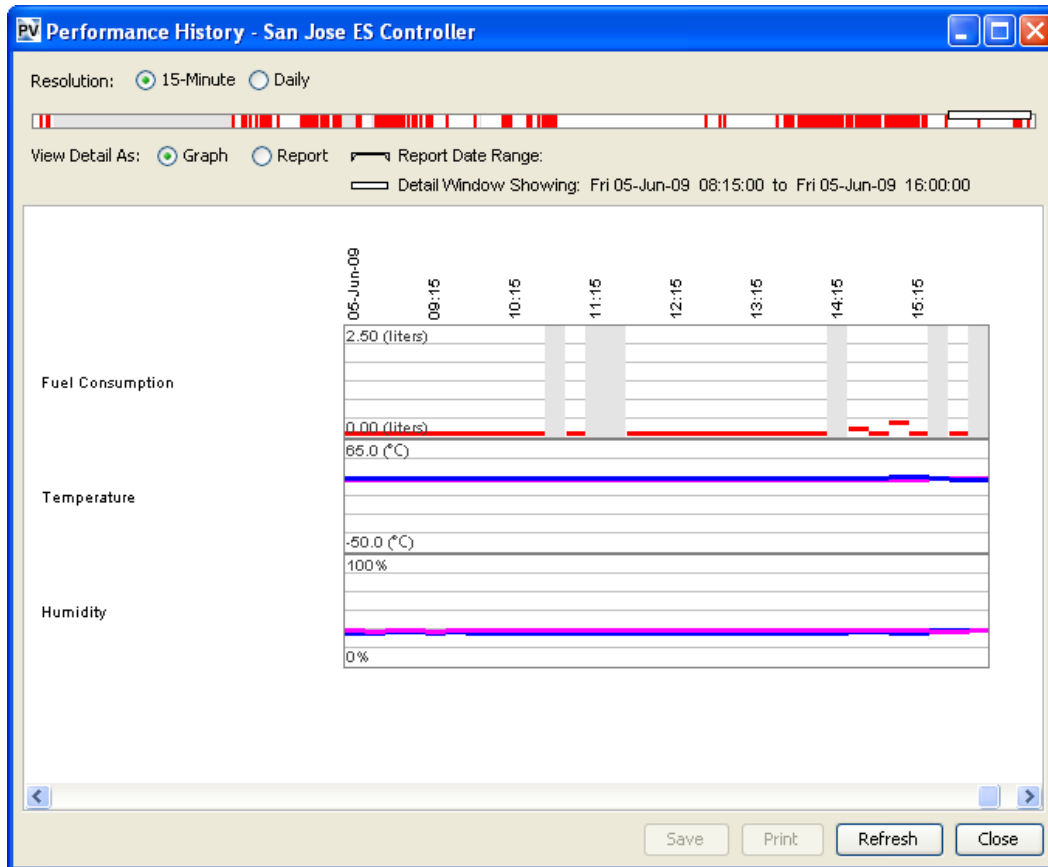
Performance



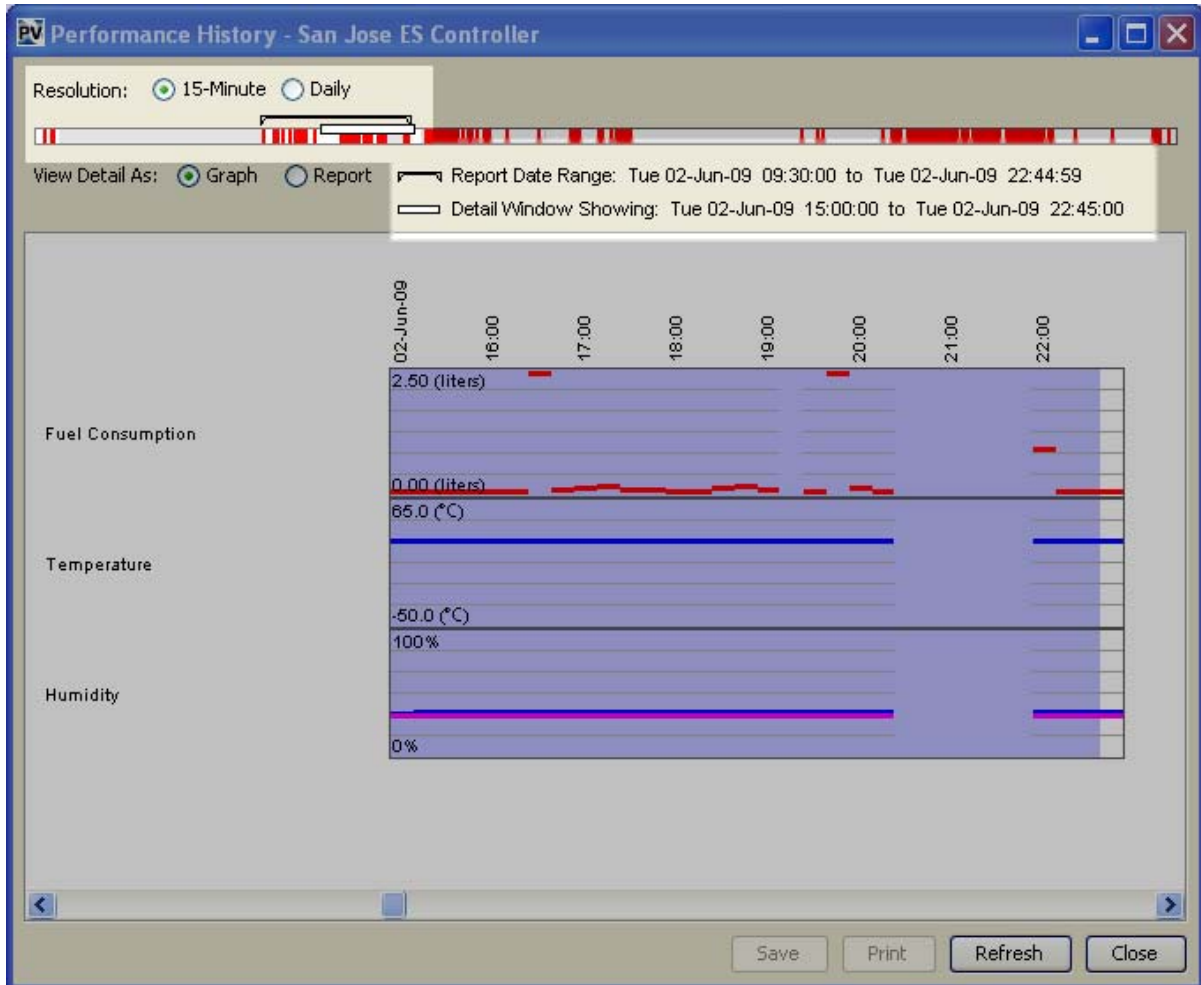
Site performance can be viewed from three perspectives: *History*, *Trends*, and *Thresholds*.

History

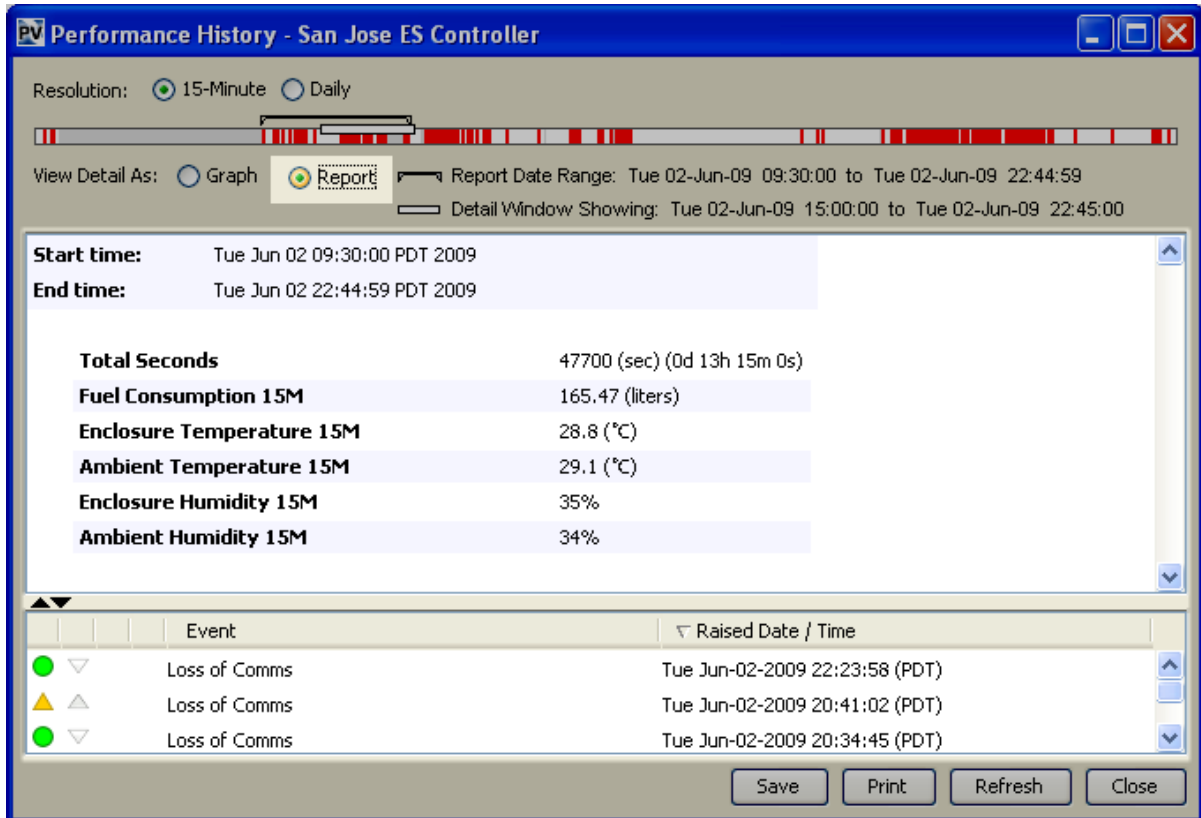
Below is an example of a history report. Specific data can be selected over the *reported time range*.



The example below shows selecting the resolution of time (15 minutes vs. daily) and the date range. To select the date range, move the cursor over the time line. To ensure the accuracy of your data, the selected dates and times will be displayed.

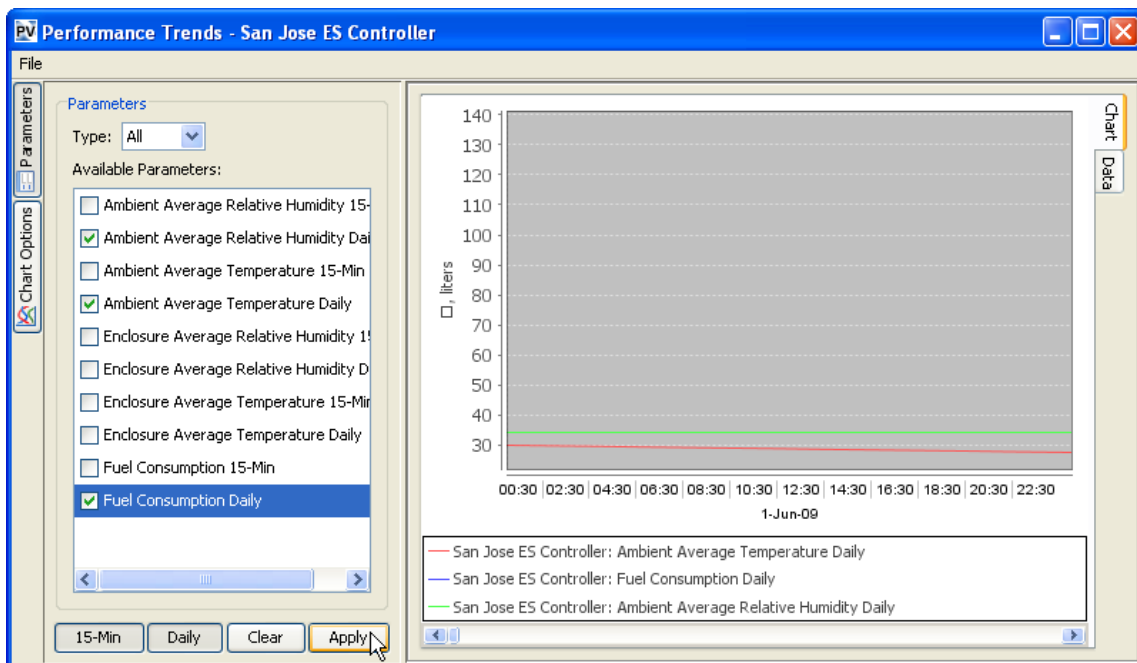


By default, the information is displayed as a graph. Alternatively, the information can also be displayed as a text *report*. The recorded events of the selected period will also be displayed as part of the report. To view data as text, click the *Report* button.

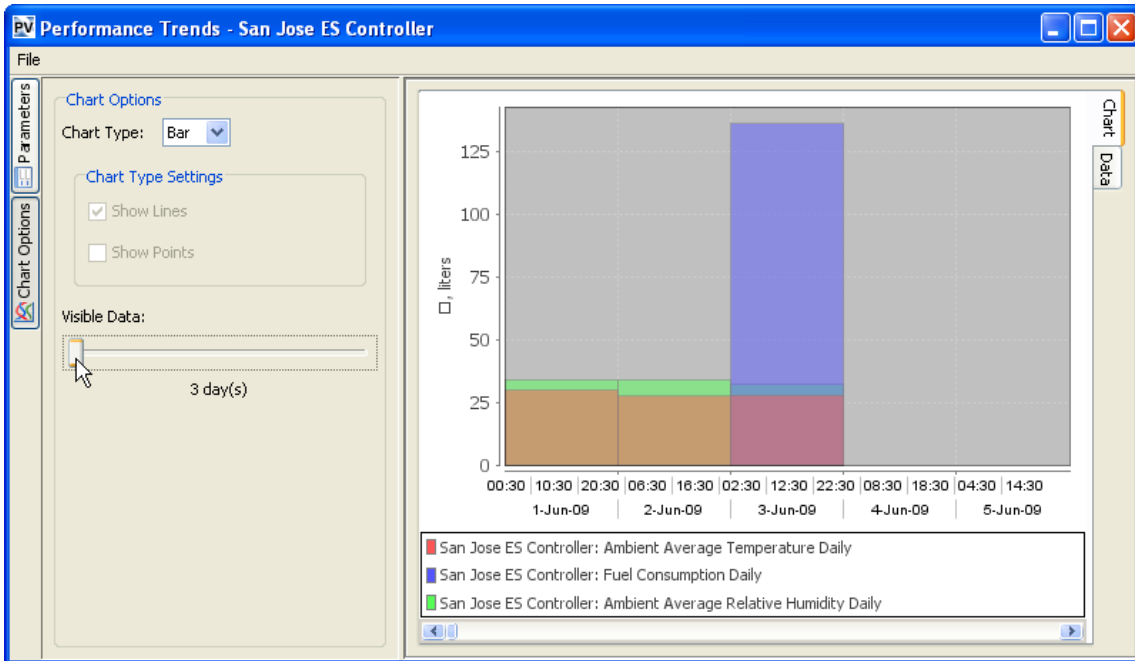


Trends

Trend data is important for analyzing the cause and effect of site performance. Below is an example of graphical data of fuel consumption and environmental conditions.



The type of chart displayed, and the calendar range of the data can be selected. Below is an example of a bar chart over three days.



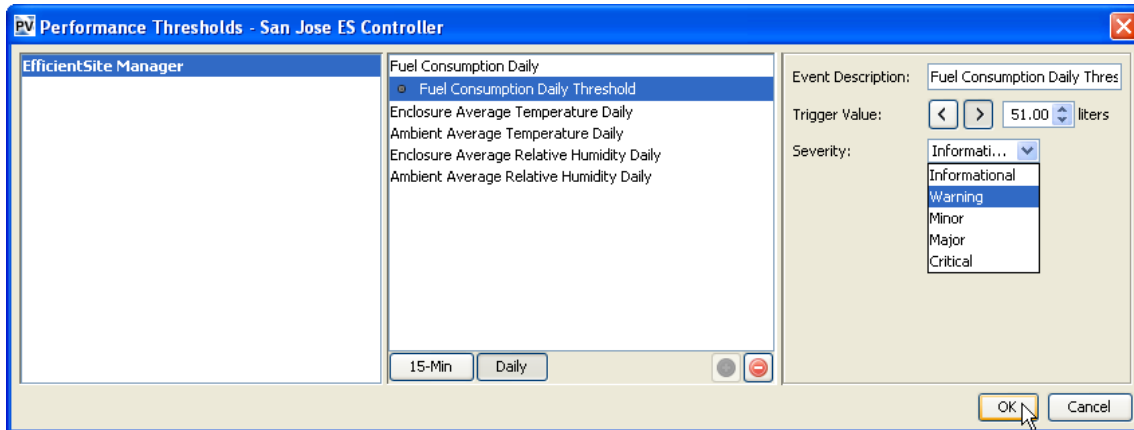
The information can also be displayed as text, and then downloaded as data. The example below shows the data being saved in a format suitable viewing in a spreadsheet.

Time	Object	Ambient Average Tempera...	Fuel Consumption 15-Min	Ambient Average
Jun 1, 2009 2:15:00 PM	San Jose ES Controller	26.8		33%
Jun 1, 2009 2:30:00 PM	San Jose ES Controller	26.8	0.00	34%
Jun 1, 2009 2:45:00 PM	San Jose ES Controller	26.8	0.00	33%
Jun 1, 2009 3:00:00 PM	San Jose ES Controller	26.9	0.02	34%
Jun 1, 2009 3:15:00 PM	San Jose ES Controller	26.9		34%
Jun 1, 2009 3:30:00 PM	San Jose ES Controller	26.9	0.20	34%
Jun 1, 2009 3:45:00 PM	San Jose ES Controller	26.8	0.11	35%
Jun 1, 2009 4:00:00 PM	San Jose ES Controller	26.9	0.00	34%
Jun 2, 2009 9:45:00 AM	San Jose ES Controller	27.4	28.21	32%
Jun 2, 2009 10:00:00 AM	San Jose ES Controller	27.4		32%
Jun 2, 2009 10:15:00 AM	San Jose ES Controller	28.1		33%
Jun 2, 2009 10:30:00 AM	San Jose ES Controller	28.2		33%
Jun 2, 2009 10:45:00 AM	San Jose ES Controller	28.2	0.07	33%
Jun 2, 2009 11:00:00 AM	San Jose ES Controller	28.2	0.02	33%
Jun 2, 2009 11:15:00 AM	San Jose ES Controller	28.2		33%
Jun 2, 2009 11:30:00 AM	San Jose ES Controller	28.2	0.16	33%
Jun 2, 2009 11:45:00 AM	San Jose ES Controller	28.2		33%
Jun 2, 2009 12:00:00 PM	San Jose ES Controller	28.2	0.04	33%
Jun 2, 2009 12:15:00 PM	San Jose ES Controller	28.2		33%
Jun 2, 2009 12:30:00 PM	San Jose ES Controller	28.2	0.22	33%
Jun 2, 2009 12:45:00 PM	San Jose ES Controller	28.2	0.03	33%
Jun 2, 2009 1:00:00 PM	San Jose ES Controller	28.2	0.21	33%
Jun 2, 2009 1:15:00 PM	San Jose ES Controller			
Jun 2, 2009 1:30:00 PM	San Jose ES Controller			
Jun 2, 2009 1:45:00 PM	San Jose ES Controller			
Jun 2, 2009 2:00:00 PM	San Jose ES Controller			
Jun 2, 2009 2:15:00 PM	San Jose ES Controller			
Jun 2, 2009 2:30:00 PM	San Jose ES Controller			
Jun 2, 2009 2:45:00 PM	San Jose ES Controller			
Jun 2, 2009 3:00:00 PM	San Jose ES Controller			

Thresholds

Thresholds can be set by the user to determine when data should be stored as an event. After selecting the object, in this example, EfficientSite Manager and Fuel Consumption Daily Threshold, the following can be set:

- Event Description—the name of the event
- Trigger value—the value when the event is triggered. Note that the event is triggered when the measured value is less than < or greater than > the value.
- Severity—the severity of the event: Information, Warning, Minor, Major, or Critical.



EfficientSite Craft Tool

The EfficientSite Craft Tool comes up from the Energy Site Manager as a drill down item to provide detail information of a specific site. This tool can be used to diagnose and verify the cause of alarms.

The *Summary* page shows which applications are installed and in use. The figure below shows that *Energy System*, *Shelter Environmental System* and *Enclosure Cooler* have been installed.



For ease and efficiency of use, all applications are integrated in the Craft Tool.

Energy System

The Energy System monitors and controls the energy components of an energy system, including power generator usage, power grid output, and battery charge cycles.

Shelter Environmental System

The *Shelter Environmental System* monitors and controls the temperature of the customer shelter. Temperature control ensures maximum performance and long life of the equipment in the shelter; controlling the cooling system ensures maximum return of investment (ROI).

Because of the effect on the equipment performance as well as cost of operations, air conditioners are a part of the energy system, not a separate expense. Depending on the environment and system requirements, the most cost effecting cooling may be through convection cooling, with minimal use of an air conditioner.

As part of the environmental system, door sensors are used to monitor when the shelter is exposed (doors are opened) to the external environment.

Enclosure Cooler

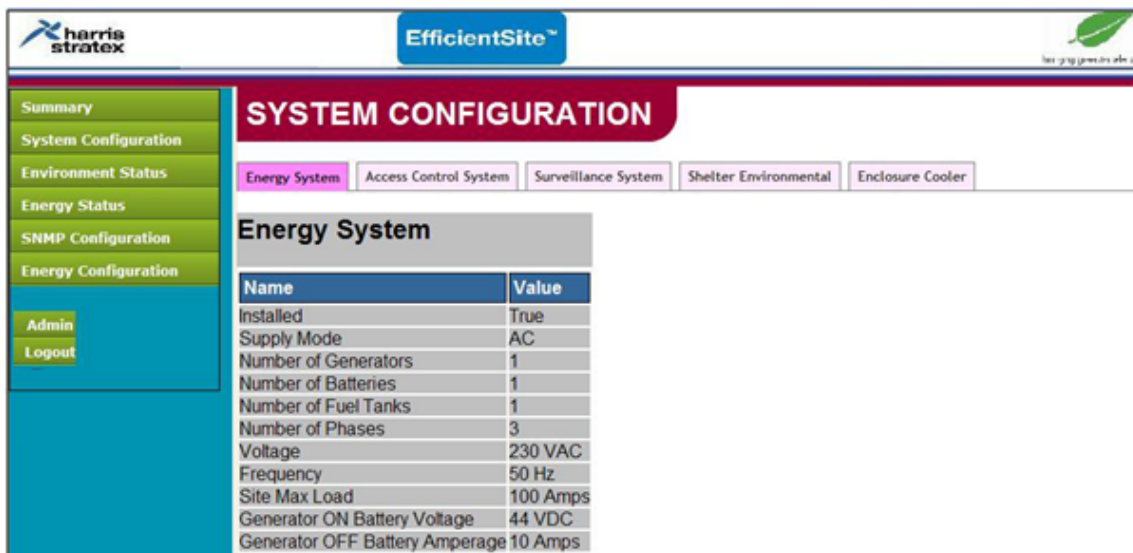
The *Enclosure Cooler* monitors and controls the temperature of the equipment enclosure, the housing of the Efficient Site hardware. As with the Shelter Environmental System, depending on the environment and system requirements, the most cost effecting cooling may be through convection cooling, with minimal use of an air conditioner.

System Configuration and Monitoring

Efficient Site Manager is configured for each energy site. For maximum performance, the current conditions, operations and system requirements must be known to effectively apply the best parameters to maximize production and reduce cost.

Energy System

The *Energy System* shows information of the energy site, an inventory, including number of batteries, voltage conditions, and so on. This information is necessary for setting parameters.



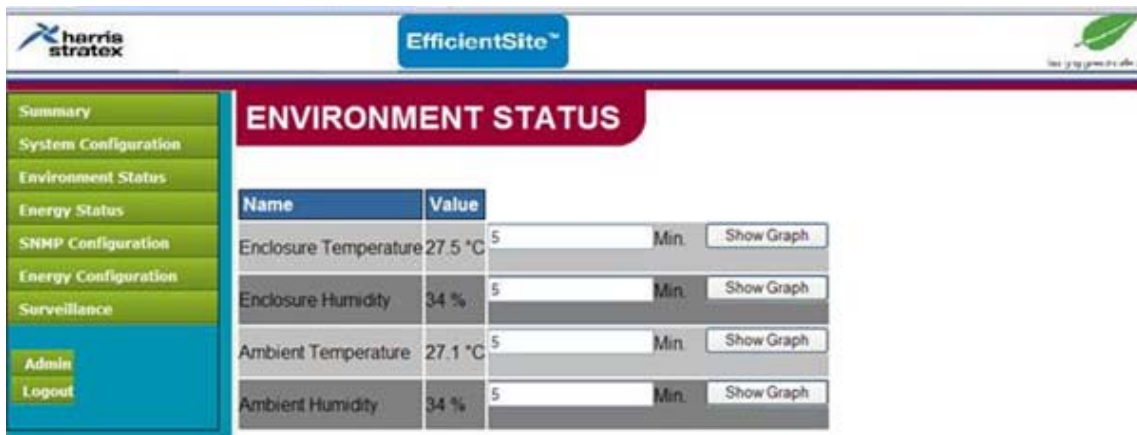
The screenshot shows the EfficientSite web interface. The main heading is "SYSTEM CONFIGURATION". Below this, there are several tabs: "Energy System" (selected), "Access Control System", "Surveillance System", "Shelter Environmental", and "Enclosure Cooler". The "Energy System" tab is active, displaying a table with the following data:

Name	Value
Installed	True
Supply Mode	AC
Number of Generators	1
Number of Batteries	1
Number of Fuel Tanks	1
Number of Phases	3
Voltage	230 VAC
Frequency	50 Hz
Site Max Load	100 Amps
Generator ON Battery Voltage	44 VDC
Generator OFF Battery Amperage	10 Amps

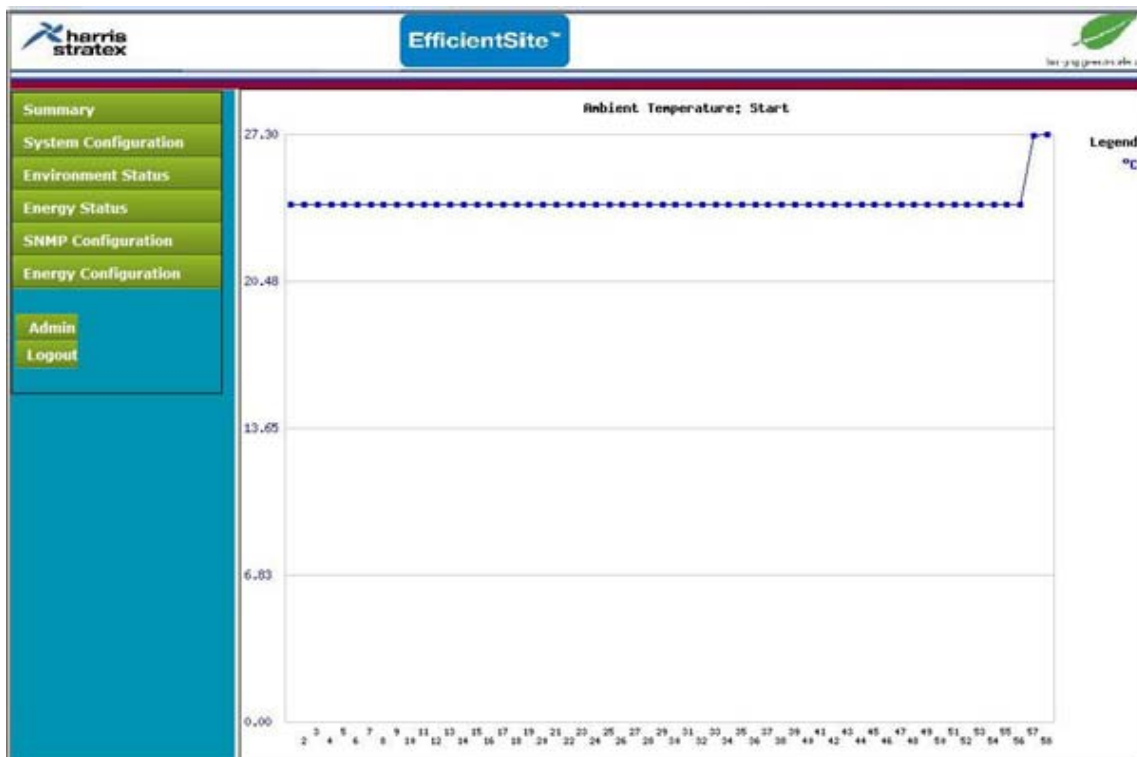
Environment Status

Environment Status shows the current temperature and humidity inside the enclosure and outside the enclosure (ambient).

- The *Value* column shows the current reading.
- The Show Graph option allows you to view the readings of the previous time that you select, such as 5 minutes as illustrated below.



Below is an example of viewing ambient temperature over a specified period of time.



Enclosure Thresholds—Internal Conditions

Enclosure Thresholds are parameters that are set for monitoring the energy site. Should a value exceed the programmed threshold, an alert will be sent out. A notification will then be delivered in the network of an issue that needs to be addressed.

Also, information is logged, enabling the analysis of trends and exceptions.

EfficientSite™					
ENERGY CONFIGURATION					
Enclosure Thresholds					
Name	Value	Label	Scale Factor	Active	State Change Value
Enclosure Temperature Max	310	C	10	0	0
Enclosure Temperature Min Exceeded	0	C	10	0	0
Enclosure Humidity Max Exceeded	95	%	1	0	0
Enclosure Humidity Min Exceeded	0	%	1	0	0
Shelter Temperature Max	300	C	10	0	0
Shelter Temperature Min Exceeded	0	C	10	0	0
Shelter Humidity Max Exceeded	95	%	1	0	0
Shelter Humidity Min Exceeded	0	%	1	0	0
Energy Grid Supply On	0		1	0	0
Energy Grid Supply Off	0		1	0	0
Energy Grid Supply Volts Max Exceeded	25000	V	1	0	0
Energy Grid Supply Volts Min Exceeded	20000	V	1	1	0
Energy Grid Supply Amps Max Exceeded	10000	A	1	0	0
Energy Grid Supply Amps Min Exceeded	0	A	1	0	0
Energy Generator Supply On	0		1	0	12
Energy Generator Supply Off	0		1	0	0
Energy Generator Supply Volts Max Exceeded	25000	V	1	0	0
Energy Generator Supply Volts Min Exceeded	20000	V	1	0	23127
Energy Generator Supply Amps Max Exceeded	10000	A	1	0	0
Energy Generator Supply Amps Min Exceeded	0	A	1	0	0
Energy Battery Supply On	0		1	1	11
Energy Battery Supply Off	0		1	0	0
Energy Battery Supply Volts Max Exceeded	-510	V	1	1	5009
Energy Battery Supply Volts Min Exceeded	-360	V	1	0	0
Energy Battery Supply Amps Max Exceeded	210	A	1	1	1615
Energy Battery Supply Amps Min Exceeded	25	A	1	0	0
Energy Shelter Supply On	0		1	1	11

The information monitored is extensive, showing power usage of the grid, generator, and battery, as well as the internal environment, which is a critical component of the performance of the equipment inside the enclosure.