



**eco Sensors
eco PDU Power Management Software
V1.3.1
User Manual**

User Information

Online Registration

Be sure to register your product at our online support center:

International	http://eservice.aten.com
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Telephone Support

For telephone support, call this number:

International	886-2-8692-6959
China	86-10-5255-0110
Japan	81-3-5615-5811
Korea	82-2-467-6789
North America	1-888-999-ATEN ext 4988
United Kingdom	44-8-4481-58923

User Notice

All information, documentation, and specifications contained in this manual are subject to change without prior notification by the manufacturer. The manufacturer makes no representations or warranties, either expressed or implied, with respect to the contents hereof and specifically disclaims any warranties as to merchantability or fitness for any particular purpose. Any of the manufacturer's software described in this manual is sold or licensed *as is*. Should the programs prove defective following their purchase, the buyer (and not the manufacturer, its distributor, or its dealer), assumes the entire cost of all necessary servicing, repair and any incidental or consequential damages resulting from any defect in the software.

The manufacturer of this system is not responsible for any radio and/or TV interference caused by unauthorized modifications to this device. It is the responsibility of the user to correct such interference.

The manufacturer is not responsible for any damage incurred in the operation of this system if the correct operational voltage setting was not selected prior to operation. PLEASE VERIFY THAT THE VOLTAGE SETTING IS CORRECT BEFORE USE.

PE Device Safety Notice



- ◆ Set the maximum permissible breaker protection in the building circuitry to the current rating specified on the rating plate. Observe all national regulations and safety codes as well as deviations for breakers.
- ◆ Only connect the PE Device to a grounded power outlet or a grounded system!
- ◆ Make sure that the total current input of the connected systems does not exceed the current rating specified on the rating plate of the PE Device.
- ◆ There is a risk of explosion if the battery is replaced with an incorrect type. Dispose of used batteries according to the relevant instructions.

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Chapter 1

Introduction

Overview

NRGence eco Sensors software has been developed to work with ATEN's new generation of NRGence PE series green energy power distribution units (PDUs) to effectively increase the efficiency of data center power usage. With the use of dynamic Rack Cooling Index (RCI) and Return Temperature Index (RTI) by zone, NRGence eco Sensors software, in conjunction with sensor-enabled eco PDUs*, gives you the means to assess, diagnose and estimate how much energy you can save. Following the suggestions generated by the sensor-enabled system allows you to optimize energy usage to save energy without harming your IT equipment's reliability. The NRGence eco Sensors utility provides secure and centralized (single portal, single login) access, administration and management of up to 1000 PE devices over the network – local and worldwide – anywhere and anytime.

Because NRGence eco Sensors offers a single, integrated window-based application program to manage all your devices, users no longer need to learn the interface for each individual device or remember every device's IP addresses, making system management easier and more efficient.

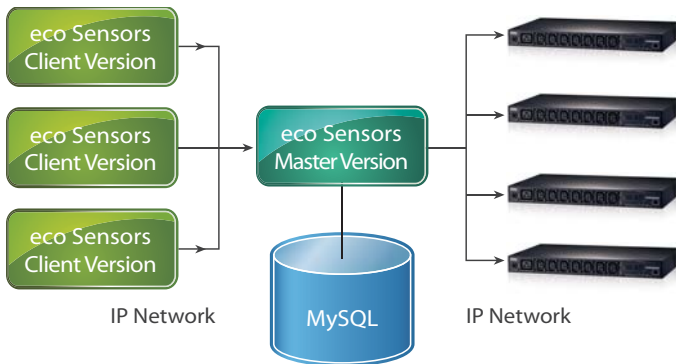
By consolidating the management of your NRGence devices, NRGence eco Sensors allows every NRGence device to be accessed and controlled by means of a single IP address. All outlets in different NRGence devices are integrated into a single tree view, making eco Sensors ideal for the power management of large data centers and branch office server rooms located in several remote locations within the same intranet.

NRGence eco Sensors is able to automatically discover all NRGence devices within the same intranet and has the ability to monitor/manage these devices. This software provides monitoring/managing of PE device outlet power ON/OFF/Reboot, sequential ON/OFF of outlet, current / kWh / environmental monitoring at PDU/outlet level, name of outlet, current / kWh / environment sensor threshold setting/alert, etc. through SNMP. Threshold exceed alerts are also available through Syslog/SMTP.

* See *Supported NRGence Devices*, page 5, for a list of compatible NRGence sensor-enabled eco PDUs.

ATEN's eco Sensors is available as a Master Version and Client Version. The Master Version offers the full functionality of eco Sensors, and is capable of managing the PDU through SNMP and the client node through TCP/IP. This allows multiple users to log into the master node* concurrently to manage PDUs in different authorized zones, making distributed PDU management much more efficient under one centralized environment. With the Client Version, users are allowed to log into a master node to monitor PDU status and control each outlet on the PDUs. Having both Master and Client versions allows data centers to optimize their performance and centralize their management.

- * This feature is only available with the Master Version of NRGence eco Sensors (available on the ESC100 CD-ROM and ATEN website). It is not available with the Single User version that is found on the included CD-ROM.



Features

- ◆ Automatic discovery of all NRGence devices within the same intranet
- ◆ Remote real-time power measurement and monitoring
 - ◆ PDU level current / voltage / power dissipation / power consumption
 - ◆ Outlet ON / OFF / Recycle status
 - ◆ Circuit breaker status monitoring
- ◆ Remote real-time power outlet management*
 - ◆ Power outlet ON / OFF / Cycle switching by outlet
 - ◆ User-defined outlet level delays for sequential power up
 - ◆ Current / Voltage / Power Dissipation / Power Consumption threshold level setting
 - ◆ User access assignment for every outlet
 - ◆ Name assignment to individual outlets
- ◆ Remote real-time environment sensor monitoring
 - ◆ Temperature / Temperature + Humidity reading
 - ◆ Temperature and Humidity threshold level setting
- ◆ Plotting/Monitoring of all NRGence devices
 - ◆ Add data center server racks
 - ◆ Add NRGence devices for each server rack
 - ◆ Manage device/device outlet status for each plot
- ◆ Exceed threshold alert through SMTP and Syslog
- ◆ Supports VMWare ESXi 5.1
- ◆ 10240 line event log provision
- ◆ Syslog provision
- ◆ Client version available
 - ◆ Allows access to Dash Board, Power Control and Group Control

Note: Not all functions are supported by all NRGence eco PDU PE models. Please see *Supported NRGence Devices*, page 5, and your eco PDU PE User Manual for further details.

Requirements

Systems that the eco Sensors software will be installed on should meet the following requirements:

	Master Version	Client Version
Operating System	Windows 7/Windows Server 2003 and above	Windows 7/Windows Server 2003 and above
CPU	2.5 GHz Quad Core	2.0 GHz Dual Core
Resolution	Larger than 1024x768	Larger than 1024x768
Memory	4GB	2GB
Disk	500GB	100GB
Network	10/100/1000 Mbps Ethernet	10/100/1000 Mbps Ethernet

Sensors

For complete energy management of an instrumented data center with the use of the NRGence eco PDU and eco Sensors software, you should install 4 sensors for each of the racks in your data center in order to generate a complete energy-efficient data chart. Higher sensor installation density is helpful to generate more accurate data. 8-port models have 2 sensor ports. In this case, Sensor 1 needs to be installed at the intake of the rack (EA1140 or EA1240) and sensor 2 needs to be placed at the exhaust of the IT equipment of the rack (EA1140 or EA1240) or the floor (EA1340).

To get the most complete eco Sensors Dashboard data, the recommended 2 eco PDU unit per rack sensor setup is show in the table, below:

eco PDU	Port	Location	Part Number	Sensor
eco PDU 1	Sensor 1	Intake	EA1240	Temperature / Humidity
	Sensor 2	Floor	EA1340	Differential Pressure / Temperature
eco PDU 2	Sensor 1	Intake	EA1240	Temperature / Humidity
	Sensor 2	Exhaust	EA1240	Temperature / Humidity

Supported NRGence Devices

Model	Outlets	Metering Level
PE1108A / B / G	NEMA 5-15R / IEC C13	PDU
PE1208A / B / G	NEMA 5-20R / IEC C13 / C19	
PE3108A / B / G	NEMA 5-15R / IEC C13	Outlet
PE3208A / B / G	NEMA 5-20R / IEC C13 / C19	
PE52220sA / B / G	NEMA 5-15R / IEC C13	Bank
PE5312sGR / GL	UK BS1363	Bank
PE5340sB / J / G	IEC 320 C13	Bank
PE6108A / B / G	NEMA 5-15R / IEC C13	PDU
PE6208A / B / G	NEMA 5-20R / IEC C13 / C19	
PE8108A / B / G	NEMA 5-15R / IEC C13	Outlet
PE8208A / B / G	NEMA 5-20R / IEC C13 / C19	
PE5216 / 6216	IEC 320 C19 + IEC 320 C13	Bank x 1
PE5324 / 6324		Bank x 2
PE7216 / 8216 / 9216		Outlet
PE7324 / 8324 / 9324		Outlet
PE7328B / J / G	IEC 60320 C13 / IEC 60320 C19	PDU / 2 x Bank / Outlet
PE5324kJA	NEMA 5-15R Twist Lock	Bank
PE7324kJA	NEMA 5-15R Twist Lock	PDU / 2 x Bank / Outlet
PE8121kJ	IEC 320 C13 with lock	PDU / 1 x Bank / Outlet
PE8316G	IEC 320 C19 + IEC 320 C13	PDU / 2 x Bank Outlet
PE8324A / JA	NEMA 5-15R	PDU / 2 x Bank Outlet
PE9222B / G	IEC320 C13 / IEC320 C19	Outlet
PE9330B / J / G	IEC 60320 C13 / IEC 60320 C19	PDU / 2 x Bank / Outlet
EC1000 / EC2004	Depends on PDU models attached – PE1216 / PE1324	Bank x 1/2

Note: For detailed outlet information as well as the complete specifications of an individual model, please reference the respective user manual.

Chapter 2

Installation

Before You Begin

The Single User version of NRGence eco Sensors can be downloaded from the ATEN website. The download link for this can be found on the software CD provided with the NRGence eco PDU package. The Master and Client versions can be found on the ESC100 CD-ROM and ATEN website. For more information on the different software versions available, see *Overview*, page 1.

Once you have downloaded and saved the installation file to a convenient location, follow the instructions below:

Installing eco Sensors

1. Double click on the eco Sensors exe file to open the installer. The Welcome window appears:



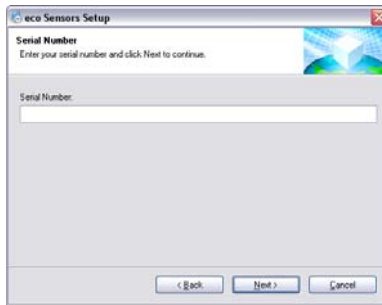
Click **Next** to continue.

2. The License Agreement window appears:



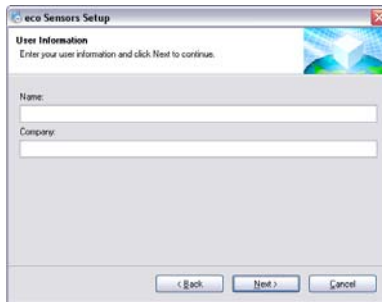
Enable the “I agree to the terms of this license agreement” radio button, and then click **Next** to continue.

3. The Serial Number window appears:



Enter your serial number (which can be found on the cover of the bundled CD-ROM) and click **Next** to continue.

4. The User Information window appears:



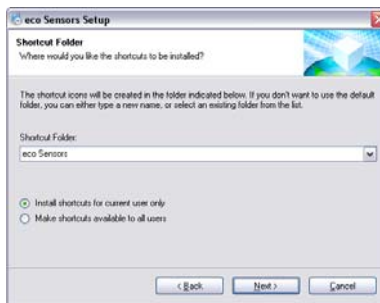
Enter your user information and click **Next** to continue.

5. The Installation Folder window appears:



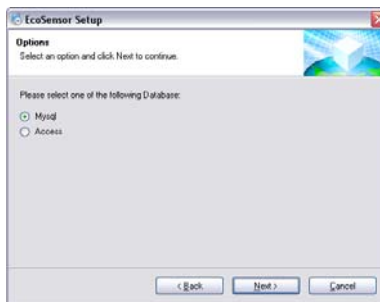
Choose the folder where you would like eco Sensors to be installed, and click **Next** to continue.

6. The Shortcut Folder window appears:



Choose the folder where you would like eco Sensors shortcuts to be installed, and click **Next** to continue.

7. The Database Option window appears:



Make your database selection (options are Access or MySQL) and click **Next** to continue.

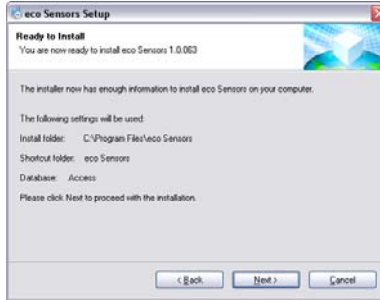
Note: We strongly recommend you choose MySQL for formal data center applications. See *Database Considerations*, page 10, for details.

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8. The Ready to Install window appears:

Check the information and click **Next** to proceed with the installation.



9. When the installation is complete, the eco Sensors icon appears on your desktop (or wherever you specified).

Note: For Windows 7 use, it is recommended to run eco Sensors with administrator privileges.

Database Considerations

If your data center is small (10 or fewer eco PDU units) and you only require the system to record, store and access approximately 3 months of data history (\pm 1 million data records or files totaling 200 MB), Access performance will remain satisfactory.

For larger data centers, and for complete storage of all data history, we strongly recommend you select MySQL.

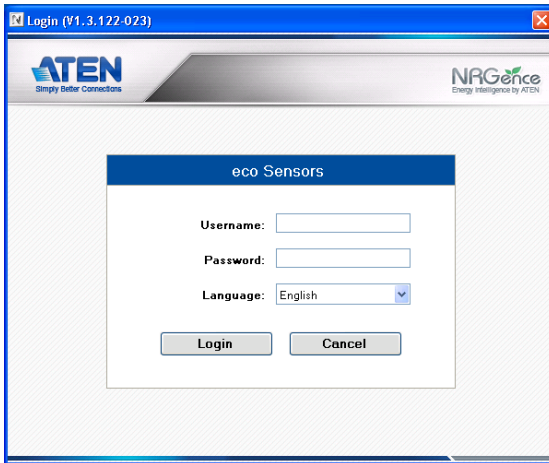
Note: If you decide to select MySQL, please ensure that you have MySQLDatabase 5.5 installed before you install eco Sensors. Visit the MySQL website for installation information.

Chapter 3

First-time Setup

Logging In

Open the eco Sensors program and the Login screen appears:



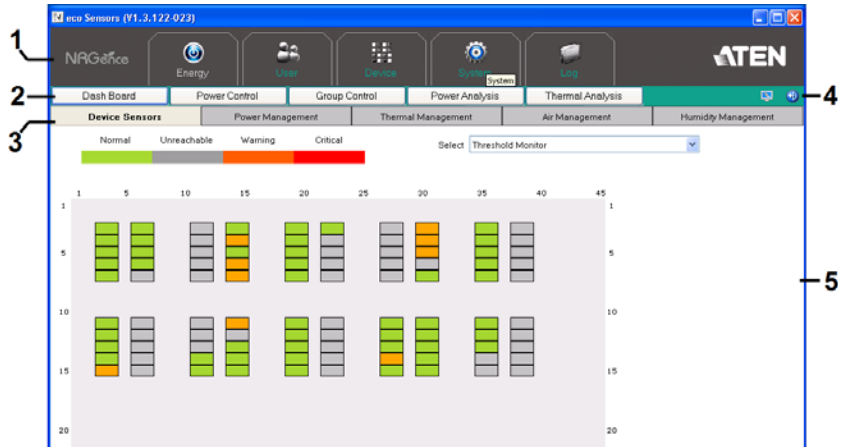
1. Provide a valid User ID and Password.

Note: Since this is the first time you are logging in, use the default User ID: *administrator*; and the default Password: *password*. For security purposes, we recommend changing them to something unique.

2. Select your language. (Options are: English [default]; Traditional Chinese; Simplified Chinese; Japanese; German; Italian and French).
3. Then Click **Login** to bring up the interface's Main Page.

The eco Sensors Main Page

After you have successfully logged in, the eco Sensors Main Page comes up with the Energy Management *Dashboard* page displayed:



Page Components

The screen components are described in the table, below:

No.	Item	Description
1	Tab Bar	The tab bar contains the eco Sensor's main operation categories.
2	Menu Bar	The menu bar contains operational sub-categories that pertain to the item selected in the tab bar.
3	Dashboard Alert Bar	The Dashboard Alert bar is a special feature of the Dashboard page. Similar to the Menu Bar, it contains operational sub-categories that pertain to the item selected in the tab bar, but it also has an extra color-coded function that allows you to instantly see the category status: RED: Critical ORANGE: Warning GRAY: Offline GREEN: Normal
4	Logout / Monitor	Click the far right button to log out of your eco Sensors session. Click on the Monitor icon to start the real-time Energy Performance Indicator.
5	Interactive Display Panel	This is your main work area. The screens that appear reflect your menu choices.

Quick View Step-by-Step Setup

Once you have logged in, you need to define your data center and configure various parameters before you can begin to use eco Sensors to monitor and manage your devices. The steps below provide a quick reference to the sections of the user manual you should refer to in order to do this smoothly.

1. Plot the position of the individual racks in your data center. See *Rack Install*, page 38.
2. Establish the threshold settings and other parameters for your NRGence devices at the device and outlet level. See *Device Setup*, page 39.

Note: Not all PE models support outlet level monitoring (see *Supported NRGence Devices*, page 5, and your eco PDU User Manual for details)

3. Group the racks in your data center into zones. See *Zone Define*, page 36.
4. Establish your System parameters, event notification and database preferences (see *System Management*, page 49).
5. Set your Log preferences (see *Log*, page 68).

Once you have completed these basic setup steps, please proceed to *Energy Management*, page 14.

Chapter 4

Energy Management

Overview

The Energy Management section displays the real-time power measurements and environment monitoring information of your data center in a variety of formats, at the zone, rack, device, and outlet level. You can also generate customized reports about your data center's status that include energy saving suggestions.

Dashboard

The Dashboard Alert bar is a special feature of the Dashboard page that features color-coded tabs that allows you to instantly see a category's status: RED: Critical; ORANGE: Warning; GRAY: Offline; GREEN: Normal.

Device Sensors

The PDU Sensors tab displays collated data in formats that provide an overall view of the various levels being monitored by your sensors. In combination with the four-color dashboard scheme (outlined above), you can easily assess the overall status of the groups/devices at a glance.

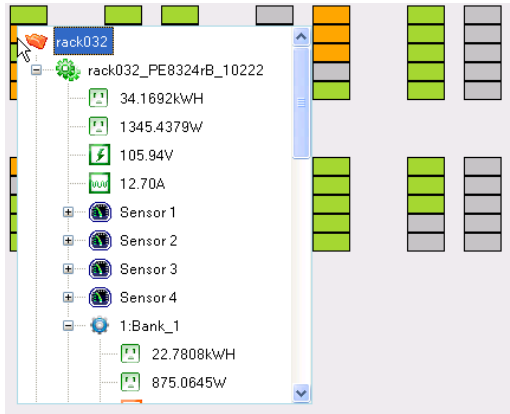
Threshold Monitor













This displays the overall threshold monitoring information. See *Device Setup*, page 39, for information on setting the thresholds.

◆ **Real-time Measurements**

Hover your mouse over a rack in the display for real-time power measurement and monitoring information, as below:

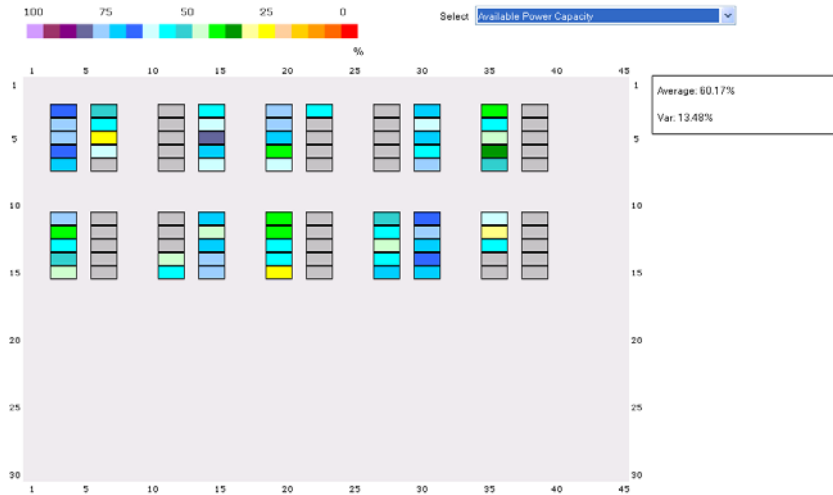


The meanings of the icons are show in the table, below:

Icon	Device	Icon	Reading	Unit
 	PDU		Power Dissipation	KWh (Kilowatt-Hour)
			Power	W (Watt)
	Bank		Voltage	V (Volt)
			Current	A (Ampere)
	Sensor		Humidity	% RH (Relative Humidity)
			Temperature	°C / °F (Celsius / Fahrenheit)
			Pressure	Pa (Pascal) 1 Pa = 1 N/m2

Note: The icons are color-coded so you can instantly see a category’s status:
 RED: Critical; ORANGE: Warning; GREEN: Normal; GRAY: Offline

Available Power Capacity

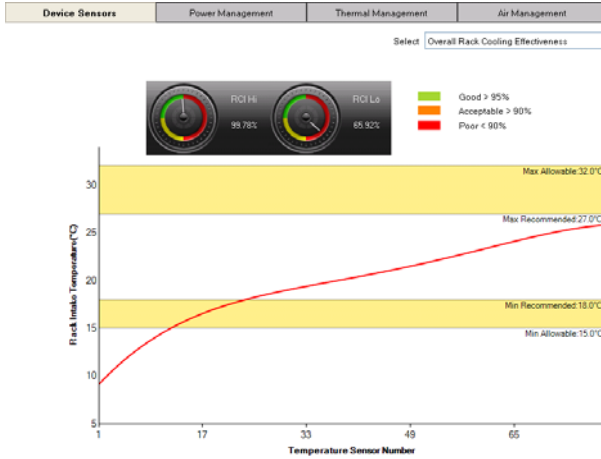


The *Available Power Capacity* displays the available power using a standard formula for rack devices:

$$\text{Total Power Capacity (KWh)} - \text{Power in Use (KWh)} = \text{Available Power Capacity (KWh)}.$$

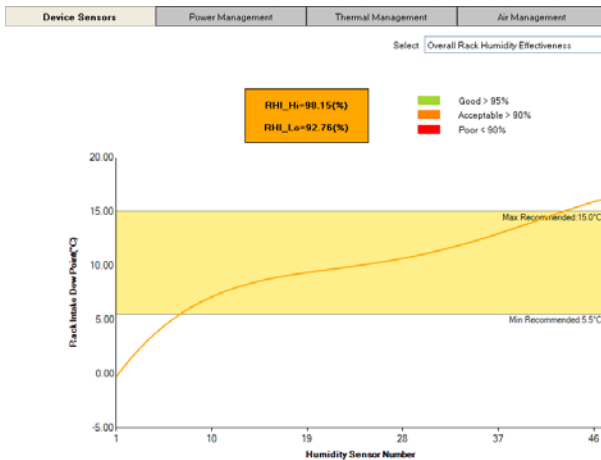
The box at the top right corner of the page displays the Average % of available power for all the racks. The Var % uses the formula: $\text{Var}(X) = E [(X-\mu)^2]$ to calculate the variance value of all devices. You can move the mouse over each rack to display the percentage of available power for that rack. The colors represent the available power capacity for each rack displayed in 5% increments.

Overall Rack Cooling Effectiveness



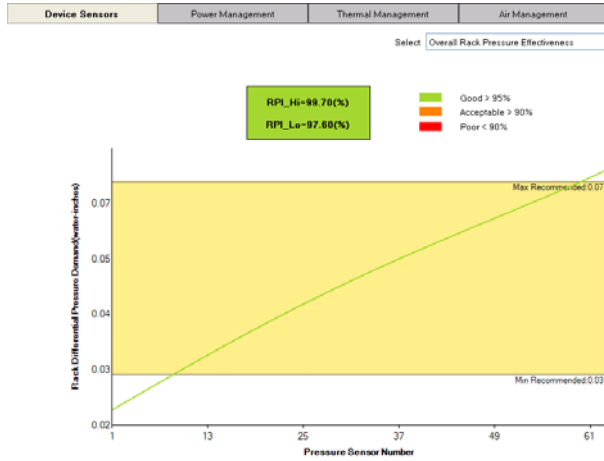
This displays the Rack Cooling Index (RCI). RCI is a measure of how effectively equipment racks are cooled and maintained within industry temperature guidelines and standards, and functions as a useful cooling performance metric. In addition to a graphical representation, this page also provides you a ‘Hi’ and a ‘Lo’ for quick reference.

Overall Rack Humidity Effectiveness



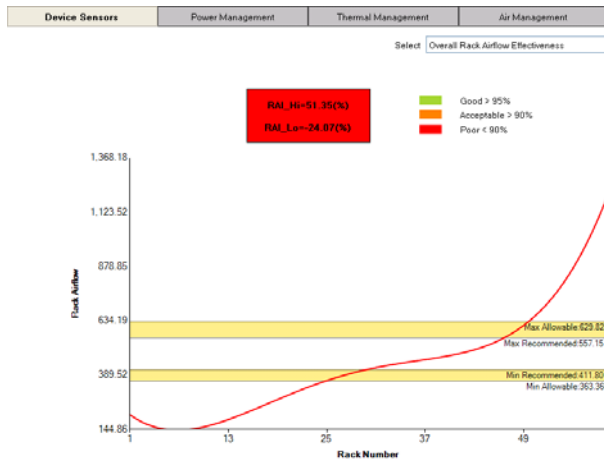
This displays the Return Temperature Index (RTI). RTI is a measure of the performance of the air-management system, and functions as a useful airflow performance metric.

Overall Rack Pressure Effectiveness



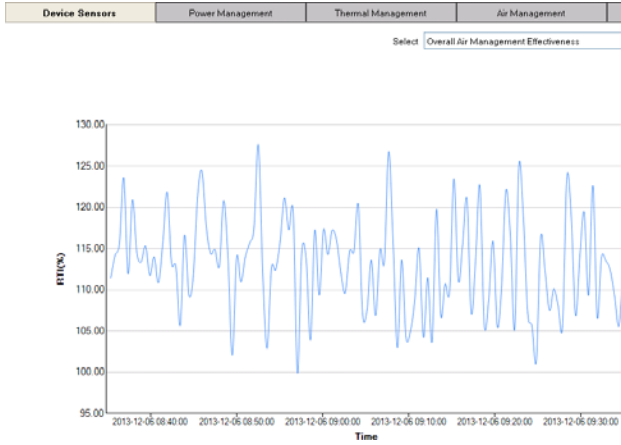
This displays the RPI.

Overall Rack Airflow Effectiveness



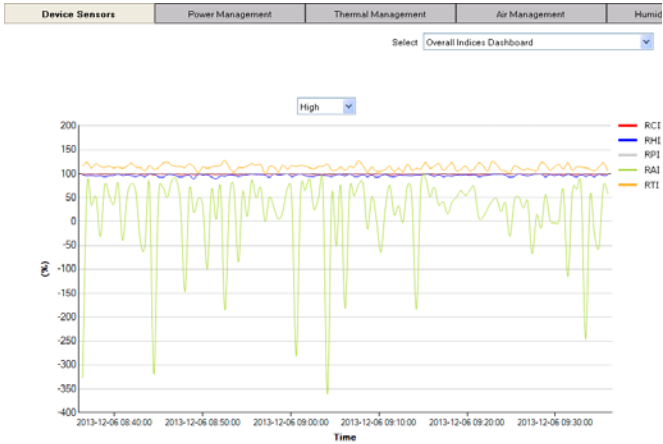
This displays the RAI.

Overall Air Management Effectiveness



This displays the RTI.

Overall Indices Dashboard



This displays all five indices (RCI, RHI, RPI, RAI, RTI) for the last hour.

Energy Saving Estimation



This displays energy savings estimates for Fan Energy (measured/potential) and Chiller Energy (measured/potential/aggressive).

Rack Door Status



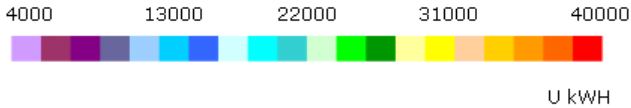
The *Rack Door Status* displays the open/close status of each cabinet door installed with an eco Sensors door sensor (EA1440, EA1441, or EA1442).

GREEN: Rack Door is Closed. GRAY: No Door Sensor Installed. ORANGE: Rack Door is Open.

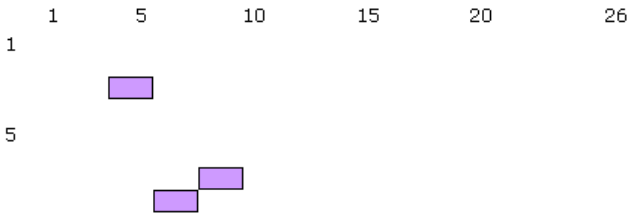
Quick View Color Scale

The **Power Management**, **Thermal Management**, **Air Management**, and **Humidity Management** tabs use the same color scale, but with different units for each reading.

For example, the *Heat Load Dissipation* page, under the **Power Management** tab, displays a scale from 4000–40000 kWh, as shown below:



For quick view purposes, the racks in the data center are displayed in a color related to their status on the various scales. For example, the racks below are currently registering in the region of 4000 kWh for Heat Load Dissipation:



Power Management

This tab provides detailed real-time information related to Power Management, as outlined in the following sections.

Heat Load Dissipation

The page displays the real-time Heat Load Dissipation values, the current average, and the variance [in kWh]. Detailed readings for Heat Load Dissipation can also be viewed in daily, weekly, monthly, quarterly, or yearly formats. The color scale displays a range from 4000–40000 kWh.

Heat Load Density

This page displays the real-time Heat Load Density values, the current average, and the variance [in W]. The color scale displays a range from 500–4500 W.

Thermal Management

This tab provides detailed real-time information related to Thermal Management, as outlined in the following sections.

Cold Intake Temperature

This page displays the real-time Cold Intake Temperature values, the current average, and the variance [in °C]. The color scale displays a range from 10–45 °C.

Intake Differential Temperature

This page displays the real-time Intake Differential Temperature values, the current average, and the variance [in °C]. The color scale displays a range from 2–20 °C.

Hot Exhaust Temperature

This page displays the real-time Hot Exhaust Temperature values, the current average, and the variance [in °C]. The color scale displays a range from 2–20 °C.

Exhaust Differential Temperature

This page displays the real-time Exhaust Differential Temperature values, the current average, and the variance [in °C]. The color scale displays a range from 10–45 °C.

Cold-Hot Across Temperature Rise

This page displays the real-time Cold-Hot Across Temperature Rise values, the current average, and the variance [in °C]. The color scale displays a range from 5–55 °C.

Air Management

This tab provides detailed real-time information related to Air Management, as outlined in the following sections.

Intake Differential Pressure Distribution

This page displays the real-time Intake Differential Pressure Distribution values, the current average, and the variance [in Pa]. The color scale displays a range from 10–200 Pa.

Heat Load Airflow Across Distribution

This page displays the real-time Heat Load Airflow Across Distribution values, the current average, and the variance [in v_{equip} (cfm)]. The color scale displays a range from 10–200 cfm.

Floor Plenum Airflow Supply Distribution

This page displays the real-time Floor Plenum Airflow Supply Distribution values, the current average, and the variance [in Q_{floor} (cfm)]. The color scale displays a range from 500–2500 cfm.

Heat Load Airflow Supply Distribution

This page displays the real-time Heat Load Airflow Supply Distribution values, the current average, and the variance [in Q (cfm)]. The color scale displays a range from 500–2500 cfm.

Hot Recirculation/Airflow w Distribution

This page displays the real-time Hot Recirculation/Airflow w Distribution values, the current average, and the variance [in ΔA_{circk} (%)]. The color scale displays a range from 10–50 %.

Cold Bypass/Airflow Distribution

This page displays the real-time Cold Bypass/Airflow Distribution values, the current average, and the variance [in ΔA_{bypas} (%)]. The color scale displays a range from 10–50 %.

Humidity Management

This tab provides detailed real-time information related to Humidity Management, as outlined in the following sections.

Cold Intake Relative Humidity

This page displays the real-time Cold Intake Relative Humidity values, the current average, and the variance [in h_rel (%)]. The color scale displays a range from 10–90 %

Cold Intake Dew Point Temperature

This page displays the real-time Cold Intake Dew Point Temperature values, the current average, and the variance [in t_dew (C)]. The color scale displays a range from 0–15 °C

Power Control

The Power Control tab allows you to perform manual power management at the device or outlet level.

Note: Not all NRGence eco PDU PE models support outlet level power management. Please see *Supported NRGence Devices*, page 5, and your User Manual for further details.

Click on the device in the side bar and its page appears, as below:

The screenshot displays the 'Power Control' tab in a web interface. On the left is a sidebar with a list of devices, including 'rack006_FE8208G_10170' which is selected. The main content area shows the 'Device Status' for this device, with IP address 127.0.0.1. It includes a table for device metrics, a 'Sensor Status' table, and an 'Outlet Status' table. The 'Outlet Status' table lists 8 outlets with their respective status, act, reboot options, and power metrics.

Device Name	Voltage	Current	Power	Power Dissipation
rack006_FE8208G_10170	105.4	3.37	255.198	11.8343

Sensor ID	Humidity	Temperature	Pressure
1	40.4	21.29	N/A
2	N/A	11.52	10.57

Outlet Name	Status	Act	Reboot	Voltage	Current	Power	Power Dissipation
1 Outlet_1	ON	OFF	<input checked="" type="checkbox"/>	105.4	0.1	10.54	1.4593
2 Outlet_2	ON	OFF	<input type="checkbox"/>	105.4	0.12	12.648	1.437
3 Outlet_3	ON	OFF	<input type="checkbox"/>	105.4	0.5	52.7	1.4615
4 Outlet_4	ON	OFF	<input type="checkbox"/>	105.4	0.88	92.752	1.4524
5 Outlet_5	ON	OFF	<input type="checkbox"/>	105.4	0.24	25.296	1.469
6 Outlet_6	ON	OFF	<input type="checkbox"/>	105.4	0.6	63.24	1.4482
7 Outlet_7	ON	OFF	<input type="checkbox"/>	105.4	0.15	15.81	1.4632
8 Outlet_8	ON	OFF	<input type="checkbox"/>	105.4	0.78	82.212	1.4437

Device Status

Use the ON, OFF and Reboot options to manually power manage the device

Sensor Status

This section is view only and provides status information about the sensors.

Outlet Status

Use the ON, OFF and Reboot options to manually power manage the individual outlet.

Group Control

The Group Control tab allows you to perform simultaneous manual power management at the outlet level on data groups that you have already created.

- Note:** 1. See *Define Data Group*, page 47, for details about creating groups for power management control.
2. Not all NRGence models support outlet level power management. Please see *Supported NRGence Devices*, page 5, and your User Manual for further details.

Click on a group in the side bar and its page appears, as below:

No.	Name	Outlet	Status	Device Name	Rack Name	Zone Name
1	Outlet_1	1	ON	rack001_FE61088_101...	rack001	
2	Outlet_2	2	ON	rack001_FE61088_101...	rack001	
3	Outlet_3	3	ON	rack001_FE61088_101...	rack001	
4	Outlet_4	4	ON	rack001_FE61088_101...	rack001	
5	Outlet_5	5	ON	rack001_FE61088_101...	rack001	
6	Outlet_6	6	ON	rack001_FE61088_101...	rack001	
7	Outlet_7	7	ON	rack001_FE61088_101...	rack001	
8	Outlet_8	8	ON	rack001_FE61088_101...	rack001	
9	Outlet_1	1	ON	rack002_FE61080_101...	rack002	
10	Outlet_2	2	ON	rack002_FE61080_101...	rack002	
11	Outlet_3	3	ON	rack002_FE61080_101...	rack002	
12	Outlet_4	4	ON	rack002_FE61080_101...	rack002	
13	Outlet_5	5	ON	rack002_FE61080_101...	rack002	
14	Outlet_6	6	ON	rack002_FE61080_101...	rack002	
15	Outlet_7	7	ON	rack002_FE61080_101...	rack002	
16	Outlet_8	8	ON	rack002_FE61080_101...	rack002	
17	Outlet_1	1	ON	rack002_FE6208A_101...	rack002	

- ◆ The **Outlets in Group** section displays information about how many outlets in the group are controllable or non-controllable.
- ◆ The **Power Control** section allows to power on, off or reboot all of the controllable outlets in the group simultaneously.
- ◆ The **Controllable Outlet Information** section displays information about the outlets in the group, such as their power status, device/rack/zone location.

Power Analysis

Generate Report

The **Generate Report** section allows you to establish the parameters and schedule for your reports. The fields are explained in detail in the following table:

Field	Explanation
Report Info	<p>Fill in the report name and the writer in the <i>Title</i> and <i>Author</i> fields.</p> <p>Enter the <i>Time</i> and <i>Start from</i> (when you want the report to begin), and then enter the <i>Period</i> (options are hour, day, week, month, or quarter) and the <i>Duration</i> (1–24).</p> <p>Note: How far back the system stores data depends on your database type. See <i>Database Considerations</i>, page 10, for details.</p>
Group	In this field, select the date group that is the subject of the report. See <i>Report Management</i> , page 31, for details.
Chart	In this field, check the analysis that components that you want to be included in the report and enter values for CO2/KG, /1KWH, and 1KG.

After filling in the information, click **Generate** and the *Set Group Total Power* window will appear, as shown on the next page.

Set Group Total Power

Group Name	Group Type	Total Power (KWh)
(Built-in) All Devices	Device	<input type="text"/>
(Built-in) All Outlets	Outlet	<input type="text"/>
(Built-in) All Racks	Rack	<input type="text"/>

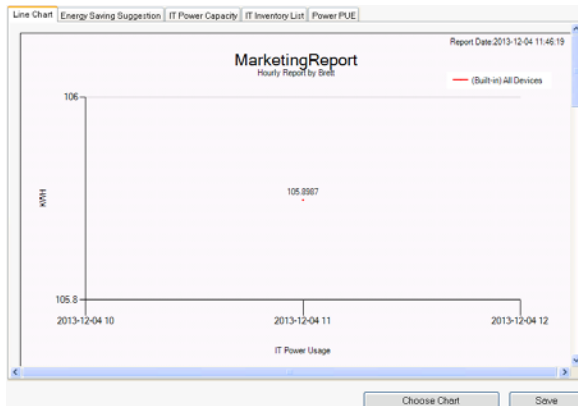
OK Cancel

Enter the Total Power (KWh) use of the data center. This information will be used to calculate the Power Usage Effectiveness (PUE) of IT equipment in the data center by subtracting the IT energy use from the Total Power (KWh) use.

Note: eco Sensors automatically loads the current system time as report time. To generate a report based on the current status / latest available analysis, leave the *Report Period*, *Begin Report*, and *Duration* fields as default, complete the *Group* and *Chart* fields, and click **Generate**

Report Result

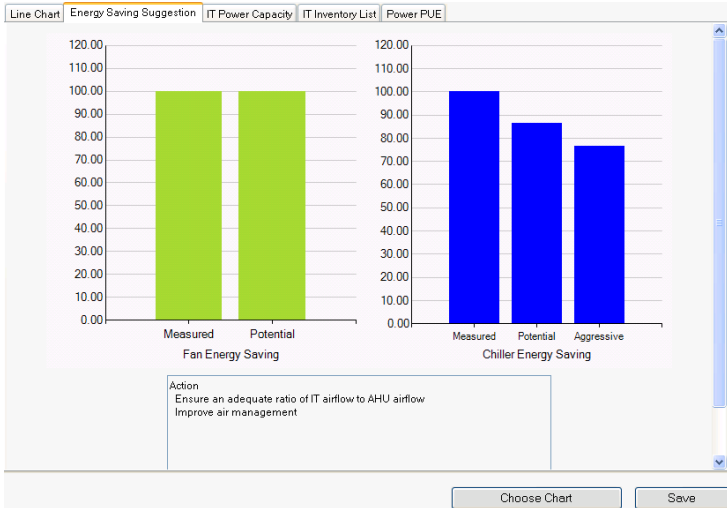
After you **Generate** the report it appears in a tabbed format in four parts – *Line Chart*, *Energy Saving Suggestion*, *IT Power Capacity*, *IT Inventory List*, and *Power PUE* as shown below. If chosen, the **Line Chart** is the first to appear:



Note: In any of the tabs, click **Save** to save the report in your desired location (see *Report Management*, page 31, for specifying the location); or click **Choose Chart** to return to the Generate Report page to adjust parameters or exit.

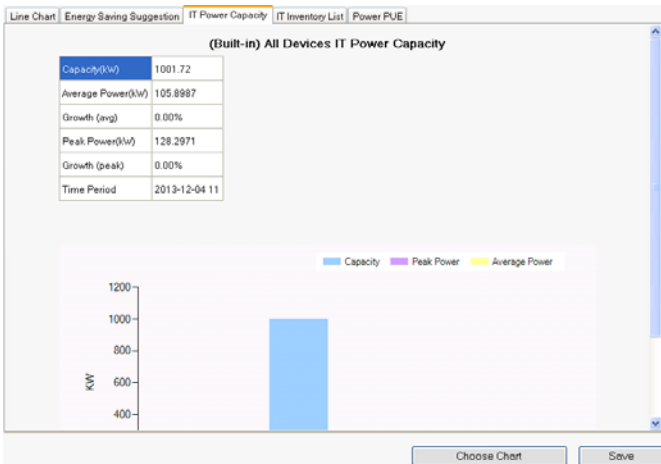
Energy Saving Suggestion

This report tab provides energy saving suggestions in the form of charts displaying measured and potential savings for fan energy and chiller energy, and a list of actions that you can undertake to improve your data center's energy efficiency, as shown below:



IT Power Capacity

This report tab provides information about the IT capacity of your data center (or specified areas in the data center) in the form of tables and charts, as shown in the following illustrations:



IT Inventory List

This report tab provides a breakdown of all power usage and cost data for each piece of IT inventory that you have listed in groups and/or individual servers, as shown below:

Group Name	Rack Name	Server	Peak Watts (KW)	Power Dissipation (KWH)	Peak CO2Hrs (KG)	Power PUE
(Built-in) All De...	rack001	rack001_FE6108A_10160	0.6264	0.3774	0.25	0.04
(Built-in) All De...	rack001	rack001_FE6108B_10161	0.5753	0.3969	0.26	0.04
(Built-in) All De...	rack002	rack002_FE6108G_10162	0.6013	0.3991	0.25	0.04
(Built-in) All De...	rack002	rack002_FE6208A_10163	0.6338	0.377	0.25	0.04
(Built-in) All De...	rack003	rack003_FE6208B_10164	0.6357	0.3883	0.25	0.04
(Built-in) All De...	rack003	rack003_FE6208G_10165	0.5628	0.3868	0.25	0.04
(Built-in) All De...	rack007	rack007_FE5220a_10172	1.3723	0.9815	0.64	0.1
(Built-in) All De...	rack007	rack007_FE5220a_10173	1.3622	0.9519	0.62	0.1
(Built-in) All De...	rack008	rack008_FE5216A_10174	1.1544	0.7867	0.51	0.08
(Built-in) All De...	rack008	rack008_FE5216B_10175	1.1681	0.8036	0.52	0.08
(Built-in) All De...	rack009	rack009_FE5216G_10176	1.153	0.7805	0.51	0.08
(Built-in) All De...	rack009	rack009_FE5220a_10177	1.3742	0.9568	0.62	0.1
(Built-in) All De...	rack010	rack010_FE5220a_10178	1.4326	0.9573	0.62	0.1
(Built-in) All De...	rack010	rack010_FE5216A_10179	1.1392	0.8004	0.52	0.08
(Built-in) All De...	rack011	rack011_FE6216B_10180	1.0665	0.7647	0.5	0.08
(Built-in) All De...	rack011	rack011_FE6216G_10181	1.12	0.767	0.5	0.08

Power PUE

This report tab provides the Power Usage Effectiveness (PUE), which calculates how much energy is used by IT equipment in the data center. It subtracts *IT Power* from *Total Power* to give you the **PUE**, as shown below:

Region	Total Power (KWh)	IT Power (KWh)	PUE
(Built-in) All Devices	500	127.8501	3.9108
(Built-in) All Outlets	500	40.2735	12.4151
(Built-in) All Racks	500	127.8501	3.9108

Report Management

Generate Report
Report Management

Location

Report folder: Browse... Save

Search

Search by: Time

Time Range: From: 2013-12-01 00:00:00 To: 2013-12-31 23:59:59 Search Show All

Reports					
No.	Title	Author	Time	Reports	
1	Test1AlphaAAD	Brett	12/5/2013 10:48:10 AM	Open HTML	
2	BrettTest1AAD	Brett	12/5/2013 10:47:41 AM	Open HTML	
3	BrettTest1	Brett	12/5/2013 10:47:19 AM	Open HTML	
4	BrettTest1	Brett	12/5/2013 10:14:59 AM	Open HTML	
5	BrettTest1	Brett	12/5/2013 10:13:11 AM	Open HTML	

Delete

This page allows you to select the **Location** where you want to save reports, and also provides various **Search** options, as detailed in the following table:

Field	Explanation
Report Folder	Use this field to specify the folder where the reports are saved. Use Browse to locate a folder; click Save to save the location.
Search By	Search parameters in the drop-down menu allow you search for reports using Time, Title, or Author. Enter the Title or Author in the field on the right.
Time Range	Enter a time range for your report search and click Search .
Reports	The main window displays the reports. Here, you can select to Show All or Delete reports.

After clicking **Search**, a list of Reports are displayed. Click **Open HTML** to open the report in a browser to display it on a single page. You can also go to the Report folder and open the individual CSV and PDF report files.

Thermal Analysis

Generate Report

The **Generate Report** section allows you to establish the parameters and schedule for your Thermal Analysis reports. The fields are explained in detail in the following table:

Field	Explanation
Report Info	<p>Fill in the report name and the writer in the <i>Title</i> and <i>Author</i> fields.</p> <p>Enter the <i>Time</i> and <i>Start from</i> (when you want the report to begin), and then enter the <i>Period</i> (options are hour, day, week, month, or quarter) and the <i>Duration</i> (1–24).</p> <p>Note: How far back the system stores data depends on your database type. See <i>Database Considerations</i>, page 10, for details.</p>
Group	In this field, select the date group that is the subject of the report. See <i>Report Management</i> , page 31, for details.
Chart	In this field, check the analysis that components that you want to be included in the report.

Report Result and Report Management

The report results can be managed in exactly the same way as those generated in the **Power Analysis** tab. Please reference sections *Report Result*, page 28, and *Report Management*, page 31, for details.

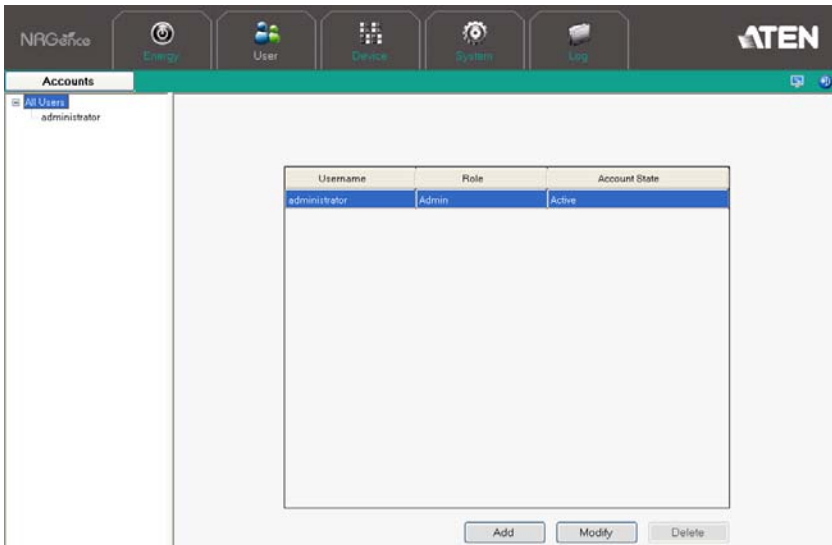
Chapter 5

User Management

Overview

When you select the *User Management* tab the screen comes up with *Accounts* and *All Users* displayed in the main panel. eco Sensors supports up to eight local user accounts with administrator.

Note: eco Sensors does not support concurrent login sessions.



User Information

To add a user, do the following:

1. Click **Add**. The New User page appears:

The screenshot shows a 'New User' dialog box with the following fields and options:

- General:** Username, Password, and Confirm password input fields.
- User Type:** Radio buttons for Administrator and User (selected).
- Permissions:** Checkboxes for User Management, System Management, Select All, Device Management, and Log.
- Buttons:** Save and Cancel.

2. In the *General* section, key in a name and password in the User and Password fields, and confirm the password.

Note: The default username and password length is six characters; this is configurable to from 1–16 characters.

3. In the *User Type* section, select the user type. Options are Administrator and User.

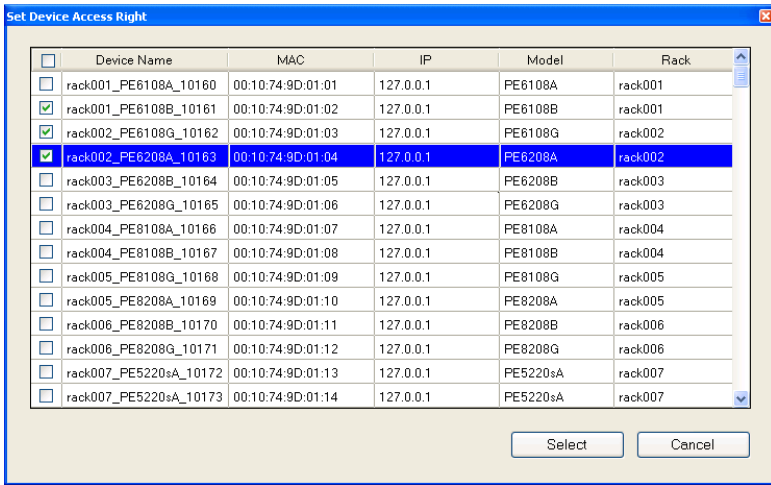
Note: Administrators have full access rights by default; users have no access rights by default.

4. In the *Permissions* section, set the broad permissions of the user. To set the device-by-device permissions for a User account, see *Device Access Rights*, below.
5. Click *Save* to save your settings.

Device Access Rights

Click on the *Device Access Rights* button to bring up a list of all the NRGence devices in the installation. The list displays Device Name, MAC and IP address, Model type and Rack information.

Use this page to set which individual NRGence devices the user has access to. Put a checkmark in the box next to the device name to enable access, and then click **Save** to save your settings.



The screenshot shows a window titled "Set Device Access Right" with a table of device information. The table has columns for Device Name, MAC, IP, Model, and Rack. Each row has a checkbox in the first column. The row for "rack002_PE6208A_10163" is selected and highlighted in blue, and its checkbox is checked. Other rows have unchecked checkboxes. At the bottom right of the window are "Select" and "Cancel" buttons.

<input type="checkbox"/>	Device Name	MAC	IP	Model	Rack
<input type="checkbox"/>	rack001_PE6108A_10160	00:10:74:9D:01:01	127.0.0.1	PE6108A	rack001
<input checked="" type="checkbox"/>	rack001_PE6108B_10161	00:10:74:9D:01:02	127.0.0.1	PE6108B	rack001
<input checked="" type="checkbox"/>	rack002_PE6108G_10162	00:10:74:9D:01:03	127.0.0.1	PE6108G	rack002
<input checked="" type="checkbox"/>	rack002_PE6208A_10163	00:10:74:9D:01:04	127.0.0.1	PE6208A	rack002
<input type="checkbox"/>	rack003_PE6208B_10164	00:10:74:9D:01:05	127.0.0.1	PE6208B	rack003
<input type="checkbox"/>	rack003_PE6208G_10165	00:10:74:9D:01:06	127.0.0.1	PE6208G	rack003
<input type="checkbox"/>	rack004_PE8108A_10166	00:10:74:9D:01:07	127.0.0.1	PE8108A	rack004
<input type="checkbox"/>	rack004_PE8108B_10167	00:10:74:9D:01:08	127.0.0.1	PE8108B	rack004
<input type="checkbox"/>	rack005_PE8108G_10168	00:10:74:9D:01:09	127.0.0.1	PE8108G	rack005
<input type="checkbox"/>	rack005_PE8208A_10169	00:10:74:9D:01:10	127.0.0.1	PE8208A	rack005
<input type="checkbox"/>	rack006_PE8208B_10170	00:10:74:9D:01:11	127.0.0.1	PE8208B	rack006
<input type="checkbox"/>	rack006_PE8208G_10171	00:10:74:9D:01:12	127.0.0.1	PE8208G	rack006
<input type="checkbox"/>	rack007_PE5220sA_10172	00:10:74:9D:01:13	127.0.0.1	PE5220sA	rack007
<input type="checkbox"/>	rack007_PE5220sA_10173	00:10:74:9D:01:14	127.0.0.1	PE5220sA	rack007

Chapter 6

Device Management

Overview

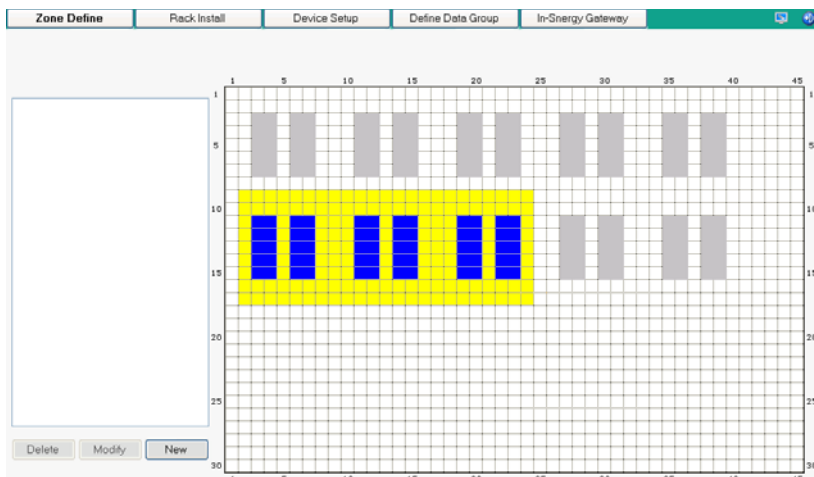
The **Device Management** tab allows you to define your data center layout by rack and zone grouping for customized power analysis. You can also define detailed parameters, such as Device Threshold Settings, at the PDU and outlet level. See the following sections for more detailed information.

- Note:**
1. Defining zones is optional; but at least one rack must be installed and defined for eco Sensors to work.
 2. Not all functions (such as outlet level monitoring) are supported by all NRGence models. Please see *Supported NRGence Devices*, page 5, and your eco PDU User Manual for details
-

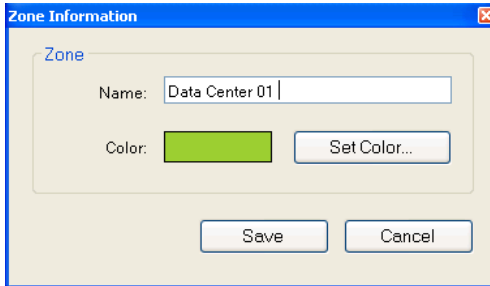
Zone Define

The **Zone Define** section allows you to group racks in your data center into zones, or define areas that you wish to get readings for.

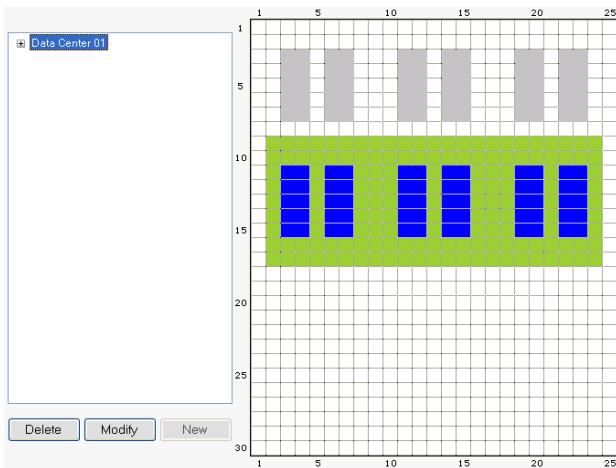
1. To define a zone, use your mouse to highlight a rack, group of racks, or any area in your data center – the highlighted area will display yellow – and then click **New**.



- In the window that appears, give the group a name and set a color, and click **Save**:



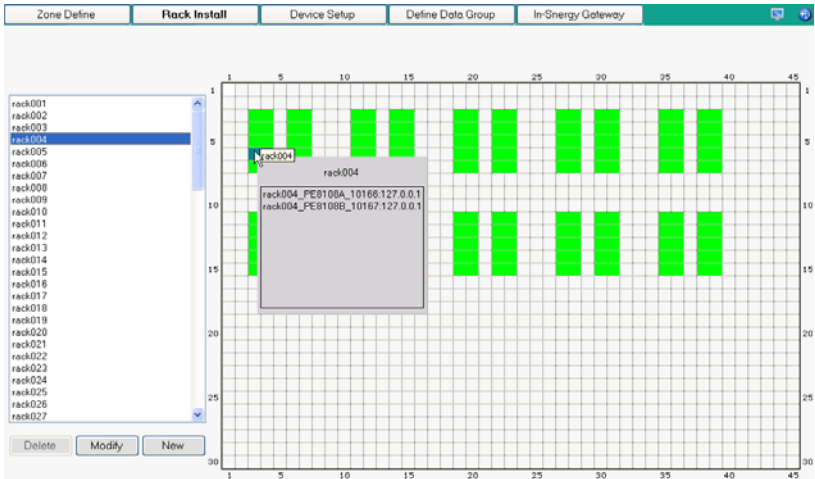
- The group appears as a Zone in the data center layout and its name appears in the sidebar.



-
- Note:**
- Once a zone has been defined in the data center layout, you cannot modify its position or move it (you can only modify its name or color). You must delete the zone by selecting it in the sidebar and clicking **Delete**. Then, define a new zone.
 - For easy reference when there are multiple zones, when an individual zone is selected in the list, the zone area flashes in the diagram.
-

Rack Install

The **Rack Install** section allows you to plot the position of the individual racks in your data center:



1. Click **New** to add a rack.
2. Give the rack a name and plot its position using the parameters, as shown below:

Rack Information ✖

Rack name:

Direction

Horizontal Vertical

Location

Row: Column:

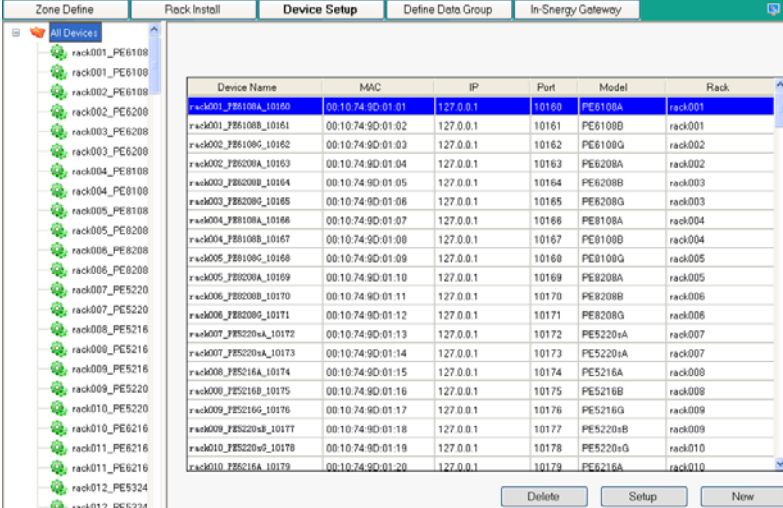
3. Click **Save**. The rack appears in the data center layout and its name appears in the sidebar.

Note: 1. Once a rack has been defined in the data center layout, highlight its name and click **Modify** to change its position or orientation.

2. You can also move it by clicking on it and dragging it to its new position.

Device Setup

The **Device Setup** section displays a list of the NRGence devices on your installation and allows you to set detailed parameters for all the NRGence devices – at the device, bank, outlet and sensor levels.



The screenshot shows the 'Device Setup' tab in a software interface. On the left is a tree view under 'All Devices' listing various rack devices. The main area displays a table of these devices with the following columns: Device Name, MAC, IP, Port, Model, and Rack. Below the table are 'Delete', 'Setup', and 'New' buttons.

Device Name	MAC	IP	Port	Model	Rack
rack001_F85108A_10160	00-10-74-9D-01-01	127.0.0.1	10160	PE6108A	rack001
rack001_F85108B_10161	00-10-74-9D-01-02	127.0.0.1	10161	PE6108B	rack001
rack002_F85109C_10162	00-10-74-9D-01-03	127.0.0.1	10162	PE6109C	rack002
rack002_F85208A_10163	00-10-74-9D-01-04	127.0.0.1	10163	PE6208A	rack002
rack002_F85208B_10164	00-10-74-9D-01-05	127.0.0.1	10164	PE6208B	rack003
rack003_F85208G_10165	00-10-74-9D-01-06	127.0.0.1	10165	PE6208G	rack003
rack004_F85108A_10166	00-10-74-9D-01-07	127.0.0.1	10166	PE6108A	rack004
rack004_F85108B_10167	00-10-74-9D-01-08	127.0.0.1	10167	PE6108B	rack004
rack005_F85109C_10168	00-10-74-9D-01-09	127.0.0.1	10168	PE6109C	rack005
rack005_F85208A_10169	00-10-74-9D-01-10	127.0.0.1	10169	PE6208A	rack005
rack006_F85208B_10170	00-10-74-9D-01-11	127.0.0.1	10170	PE6208B	rack006
rack006_F85208G_10171	00-10-74-9D-01-12	127.0.0.1	10171	PE6208G	rack006
rack007_F85220a_10172	00-10-74-9D-01-13	127.0.0.1	10172	PE5220a	rack007
rack007_F85220a_10173	00-10-74-9D-01-14	127.0.0.1	10173	PE5220a	rack007
rack008_F85216A_10174	00-10-74-9D-01-15	127.0.0.1	10174	PE5216A	rack008
rack009_F85216B_10175	00-10-74-9D-01-16	127.0.0.1	10175	PE5216B	rack008
rack009_F85216G_10176	00-10-74-9D-01-17	127.0.0.1	10176	PE5216G	rack009
rack009_F85220b_10177	00-10-74-9D-01-18	127.0.0.1	10177	PE5220b	rack009
rack010_F85220c_10178	00-10-74-9D-01-19	127.0.0.1	10178	PE5220c	rack010
rack010_F85216A_10179	00-10-74-9D-01-20	127.0.0.1	10179	PE6216A	rack010

- Note:** 1. Click on the + sign next to *All Devices* in the side bar to expand the tree.
2. Double click on a device in the side bar tree or main page list to go directly to the device's *Device Settings* page.

Adding New Devices

eco Sensors software can automatically discover all NRGence devices located on the same intranet. Click **New** to bring up the *New Device* window:

Method

Setup the subnet to be scanned or specific the IP address, and click *Search*. The devices will then be displayed in a list.

Device SNMP Agent

This section allows you to set up your SNMP and system parameters so that eco Sensors can connect to the NRGence devices in your installation:

1. Enter a Username/Community, Port ID and Trap Port for the events.
2. Set the timeout and retry values.
3. Select the SNMP version, Privacy, and Authentication protocols from the drop-down menus.
4. Key in the Privacy and Authentication passwords.

Note: Certain parameters in this section must match those of all the eco PDU devices in the installation. See *Synchronizing SNMP Parameters*, page 53.

5. Select the *Device type* and Click *Search*. The devices will then be displayed in a list.

Configuration Levels

Once a device is selected, available tabs are *Device*, *Bank*, *Outlet*, and *Sensor*, depending on the device's features and level of configuration. See the following sections for details.

Device Level

1. Highlight the device you want to configure, and click **Setup**.
2. In the window that appears with the *Device* tab open, enter the *Device Settings* (Basic/Advanced), as in the diagram and table below:

Device Basic Settings:

The screenshot shows the 'Device Setup' window with the 'Device' tab selected. The left sidebar lists various devices, with 'rack001_FE6108' selected. The main panel displays 'Device Basic Settings' for the selected device. The settings are as follows:

Section	Field	Value
Device Info	Name	rack001_FE6108A_101E
	IP	127.0.0.1
	Model	PE6108A
	Rack	rack001
SNMP Agent	Username/community	administrator
	Port	10160
	Timeout (ms)	100
	Retry	1
	SNMP version	v1
	Auth protocol	None
Sensor Location Type	Sensor 1	Intake
	Sensor 2	Floor

Advanced Settings:

The screenshot shows the 'Device Setup' window with the 'Advanced Settings' tab selected. The settings are as follows:

Section	Field	Value	Unit	Range
Threshold	Aggregate current (min-max)	17.9	A	(0.0~18.0)
	Voltage (min-max)	100.1	V	(90.0~260.0)
	Aggregate power (min-max)	9999.9	W	(0.0~9999.9)
	Aggregate power dissipation (min-max)	99999.9	kWh	(0.0~99999)

Device Info	This section displays the <i>Name</i> , <i>IP</i> , <i>Model</i> and <i>Rack</i> information for configuration.
SNMP Agent	Configure the SNMP Agent here (see <i>Device SNMP Agent</i> , page 40, for further details).
Sensor Location Type	Select the sensors' locations from the drop-down menus.
Threshold	Set the device threshold settings (min.–max), using the parameters provided, for: <ul style="list-style-type: none">◆ Aggregate Current◆ Voltage◆ Aggregate Power◆ Aggregate Power Dissipation Note: For these settings to appear click the Advanced Settings radio button.

3. There are two save options: Click **Apply** to save these settings for the specified device; or click **Apply to same Model** (*Advanced Settings*) to save and apply these settings to all devices of the same model as the specified device.

Bank Level

1. Highlight the device you want to configure, and click **Setup**.
2. In the window that appears with the *Device* tab open, enter the *Device Settings* and other parameters, as in the diagram and table below:

The screenshot shows the 'Device Setup' window for a selected device. The 'Device Info' section includes:

- Name: rack074_EC2004_2023
- IP: 127.0.0.1
- Model: EC2004
- Rack: rack074

Four bank selection buttons are visible: Bank 1, Bank 2, Bank 3, and Bank 4. The 'Bank' section shows 'Bank_1' as the selected name. The 'Threshold' section contains the following settings:

	Minimum	Maximum	Range
Current	A	10 A	(0.0~32.0)
Voltage	90 V	280 V	(0.0~280.0)
Power	W	9999.9 W	(0.0~9999.9)
Power dissipation	kWh	99999 kWh	(0.0~99999)

Buttons for 'Apply to all Banks' and 'Apply' are located at the bottom right.

Device Info	This section displays the device <i>Name</i> , <i>IP</i> , <i>Model</i> and <i>Rack</i> information.
Bank	Select an individual bank by clicking on the bank icon, and then proceed to configure its parameters, as below.
Name	Give the bank a name (optional)
Threshold	Set the outlet threshold settings (min.–max), using the parameters provided, for: <ul style="list-style-type: none"> ◆ Current ◆ Voltage ◆ Power ◆ Power Dissipation <p>Note: Depending on your NRGence device, not all these options may be available.</p>

3. There are two save options: Click **Apply** to save these settings for the specified device; or click **Save Apply to All Banks** to save and apply these settings to all banks on the same model as the specified device.

Outlet Level

If your device supports outlet level monitoring (see *Supported NRGence Devices*, page 5, and your User Manual for details), you can also set detailed parameters for all the devices in your installation at the outlet level.

1. Click on the *Outlet* tab, highlight the device/outlet you want to configure, and click **Setup**.
2. In the window that appears, enter the *Outlet Settings*, as below:

The screenshot shows the 'Device Setup' window with the 'Outlet' tab selected. The left sidebar lists various devices, with 'rack041_PE8108B_201' highlighted. The main panel displays the 'Outlet Settings' for this device, including fields for Name, IP, Model, and Rack. Below this are buttons for outlet selection (1-8), a 'Kill the Power' dropdown menu, a MAC address field, and 'Delay Time' settings for ON and OFF. A 'Threshold' section contains input fields for Minimum and Maximum values for Current (A), Voltage (V), Power (W), and Power dissipation (kWh).

Device Info	This section displays the device <i>Name</i> , <i>IP</i> , <i>Model</i> and <i>Rack</i> information.
Outlet	Select an individual outlet by clicking on the outlet icon, and then proceed to configure its parameters, as below.
Name	Give the outlet a name (optional)
Configuration	<ul style="list-style-type: none"> ◆ Select one of the three choices for the <i>Shutdown Method</i> from the drop-down menu – see <i>Shutdown Methods</i>, page 45, for details. ◆ Set MAC address and Delay Time On/Off for the selected method.
Threshold	Set the outlet threshold settings (min.–max), using the parameters provided, for: <ul style="list-style-type: none"> ◆ Aggregate Current ◆ Voltage ◆ Aggregate Power ◆ Aggregate Power Dissipation

- There are two save options: Click **Save** to save these settings for the specified outlet; or click **Apply to all Outlets** to save and apply these settings to all outlets of the specified device.

Shutdown Methods

The three available shutdown methods are explained in detail below:

- ♦ **Kill the Power** – If this option is selected, the NRGence device waits for the amount time set in the *Power Off Delay* field, and then turns the Outlet's power Off. Turning the power off performs a cold (non-safe) shutdown.
- ♦ **Wake on LAN** – This is a Safe Shutdown and Restart option. If this is selected, when an Outlet is turned Off, the NRGence device first sends a message to the computer telling it to prepare for a shutdown; it then waits for the amount time set in the *Power Off Delay field* to give the OS time to close down before the computer is powered down to standby mode.

Likewise, when the Outlet is turned On, the NRGence device waits for the amount time set in the *Power On Delay* field, then sends an Ethernet message to the computer connected to the Outlet telling the computer to turn itself On.

Note: For Safe Shutdown and Restart, the computer must be running Windows (Windows 98 or higher), and the *Safe Shutdown* program (available by download from our website), must be installed and running on the computer.

- ♦ **System after AC Back** – This is a Safe Shutdown and Restart option. If this is selected, when an Outlet is turned Off, the NRGence Device first sends a message to the computer telling it to prepare for a shutdown; it then waits for the amount time set in the *Power Off Delay* field to give the OS time to close down before the computer is powered down.

When the Outlet is turned On, the NRGence device waits for the amount time set in the *Power On Delay* field, then sends power to the server.

When the server receives the power, it turns itself on.

Note: For Safe Shutdown and Reboot, the computer must be running Windows (Windows 98 or higher), and the *Safe Shutdown* program (available by download from our website), must be installed and running on the computer.

Sensor Level

1. Highlight the device with the sensors you want to configure, and click **Setup**.
2. In the window that appears with the *Device* tab open, enter the *Device Settings* and other parameters, as in the diagram and table below:

The screenshot shows the 'Device Setup' window with the 'Sensor' tab selected. The 'Sensor Threshold Settings' section is visible, containing the following information:

- Device Info:** Name: rack073_EC1000_2023, IP: 127.0.0.1, Model: EC1000, Rack: rack073
- Sensor 1:** Temperature (min-max): -19.9 - 59.9 °C (-20.0~60.0), Humidity (min-max): 15.1 - 94.9 % (15.0~95.0), Pressure (min-max): -249 - 249 Pa (-250.0~250.0)
- Sensor 2:** Temperature (min-max): -19.9 - 59.9 °C (-20.0~60.0), Humidity (min-max): 15.1 - 94.9 % (15.0~95.0), Pressure (min-max): -249 - 249 Pa (-250.0~250.0)
- Sensor 3:** Temperature (min-max): -19.9 - 59.9 °C (-20.0~60.0), Humidity (min-max): 15.1 - 94.9 % (15.0~95.0), Pressure (min-max): -249 - 249 Pa (-250.0~250.0)
- Sensor 4:** Temperature (min-max): -19.9 - 59.9 °C (-20.0~60.0), Humidity (min-max): 15.1 - 94.9 % (15.0~95.0), Pressure (min-max): -249 - 249 Pa (-250.0~250.0)

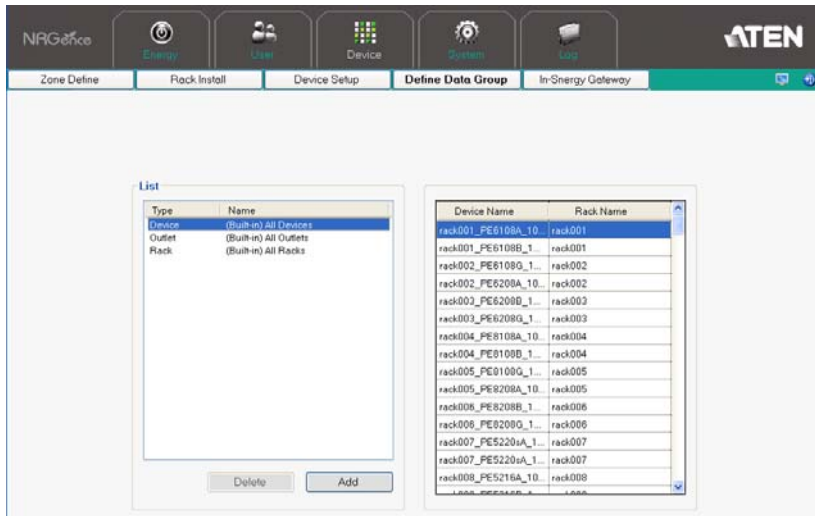
Buttons at the bottom include 'Apply to same Model' and 'Apply'.

Device Info	This section displays the device <i>Name</i> , <i>IP</i> , <i>Model</i> and <i>Rack</i> information for configuration.
Sensor 1, 2, 3, 4	Set the sensor threshold settings (min.–max), using the parameters provided, for: <ul style="list-style-type: none"> ◆ Temperature ◆ Humidity ◆ Pressure

3. There are two save options: Click **Apply** to save these settings for the specified device; or click **Save Apply to same Model** to save and apply these settings to all devices' sensors of the same model as the specified device.

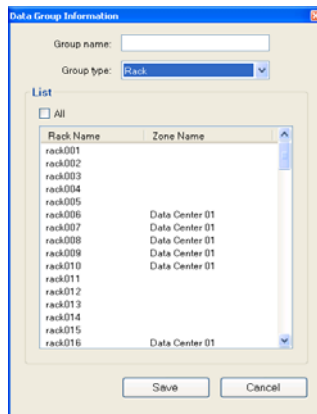
Define Data Group

The **Define Data Group** section allows you to create groups of zones, racks, devices or outlets for power management control. The *List* section displays the *Type* of group (zone, rack, device, or outlet) and its *Name*, and the *Members* section displays the individual zones, racks, devices or outlets that are in that group.



To define a group, do the following:

1. Click **Add** to bring up the Data Group Information window, as below:



2. Give the group a name in the Group Name field.

3. Select the type of group from the options in the drop-down menu. Options are *Zone*, *Rack*, *Device* and *Outlet*.

Note: Zones must be defined before they appear in the List. See *Zone Define*, page 36, for details.

4. Select the members of the group by clicking on them, or select everything in the list by putting a check in the All checkbox.
5. Click **Save** to create the group. It now appears in the List on the main opening page.

Chapter 7

System Management

Overview

The Sys Management tab allows you to set up the parameters for eco Sensors software System settings and to use the SNMP protocol to connect to the NRGence devices in your installation, as well as perform other maintenance, database and task related functions.

Sys Settings

This section allows you to set up the eco Sensors software system parameters:

The screenshot shows the NRGence web interface. At the top, there are navigation tabs for Energy, User, Device, System, and Log. Below these are sub-tabs for Sys Settings, Maintenance, Database, Tasks, and Billing. The 'Sys Settings' sub-tab is active, showing 'System Parameters' as the selected option. The main content area is titled 'System Parameters' and contains several settings:

- Service delay:** A text input field with the value '30' and a unit '(s)'.
- Data Center layout:** A dropdown menu with the value '90 x 60'.
- Voltage for Energy Box:** A section with three radio button options:
 - User define: A text input field with the value '0'.
 - Link to a device: A text input field with the value 'N/A' and a 'Browse...' button.
 - Link to a random device.
- Others:** A section with several settings:
 - 1kWh generate: 0.65 KG CO2
 - Electricity cost = 0.10 \$/KWH
 - CO2 cost = 23.00 \$/ton
 - Currency: 5 (dropdown)
 - Enable rack full name
- Temperature Unit:** A section with two radio button options:
 - Celsius
 - Fahrenheit

A 'Save' button is located at the bottom right of the form.

System Parameters

- ◆ Enter the *Service Delay* time in seconds that the software will wait before it requests new data from the Energy Box.
- ◆ Enter the total size for the *Data Center Layout*, this will set the maximum parameters for the devices in your eco Sensors software installation, as displayed on the **Energy** and **Device** tabs.

- ◆ Enter a *User Defined* or *Link to a (random) Device* to set a Voltage value for the Energy Box.

Note: The EC1000 measures current only. Enter a reference voltage value here to calculate power and power dissipation in EC installations.

- ◆ In the *Others* section you can set the default values that the eco Sensors software will use for generating data.
- ◆ The *Currency* drop-down menu allows you to select the type of currency symbol to use.
- ◆ Select the Temperature Unit: *Celsius* or *Fahrenheit*, to use for all environmental calculations.
- ◆ Check *Enable rack full name* to enable multi-language rack names. For example, this feature allows you to use Chinese, Japanese, and other characters when creating a rack's name.

SNMP Settings

This section allows you to set up your SNMP and system parameters so that eco Sensors can connect to the eco PDU's in your installation:

Sys Settings	Maintenance	Database	Tasks	Billing
System Parameters	SNMP Settings	SMTP Settings	Other Settings	Sessions

Default SNMP Agent Settings

Username/community: Port:

Timeout: (ms) Retry:

SNMP version:

Auth protocol: Auth password:

Privacy protocol: Privacy password:

SNMP Trap Receiver

Username/community: Port:

SNMP version:

Auth protocol: Auth password:

Privacy protocol: Privacy password:

Default SNMP Agent Settings

This section allows you to set up your default SNMP and system parameters so that eco Sensors can connect to the NRGence devices in your installation:

1. Enter a Username/Community, Port ID and Trap Port for the events.
2. Set the timeout and retry values.
3. Select the SNMP version, Privacy, and Authentication protocols from the drop-down menus.
4. Key in the Privacy and Authentication passwords.

Note: Certain parameters in this section must match those of all the NRGence devices in the installation. See *Synchronizing SNMP Parameters*, page 53.

5. Click *Search*. The devices will then be displayed in a list.

SNMP Trap Receiver

To be notified of SNMP trap events, do the following:

1. Enter a Username, Port ID and Trap Port for the events.
2. Set the timeout and retry values.
3. Select the SNMP version, Privacy, and Authentication type from the drop-down menus.
4. Key in the Privacy and Authentication passwords.

Note: Certain parameters in this section must match those of all the eco PDU devices in the installation. See *Synchronizing SNMP Parameters*, page 53.

Synchronizing SNMP Parameters

In order for eco Sensors to access the NRGence devices on the installation, it is essential that three of the SNMP parameters are the same. These parameters are *Username*, *Privacy PW*, and *Authen PW*. The default values, which are the same for eco Sensors and eco PDU units, are shown in the following table:

Parameter	Default	Web UI
Username	<i>administrator</i>	Administrator Account ID
Privacy PW	<i>privacypwd</i>	SNMP Privacy PW
Authen PW	<i>password</i>	Administrator Account Password

If any of these parameters are modified on the Web GUI of the eco PDU device(s), the same parameters in eco Sensors must also be modified.

Note: eco Sensors will only access eco PDUs with the same parameters, so it is essential that these parameters are synchronized for all eco PDUs in your installation. Reference the **Browser Operation** chapter of your eco PDU User Manual for further information.

SMTP

Sys Settings	Maintenance	Database	Tasks	Billing
System Parameters	SNMP Settings	SMTP Settings	Other Settings	Sessions

SMTP Settings

Enable report from the following SMTP server

Server:

Port:

Send from:

Send to:

SMTP server requires authentication

Account name:

Password:

To have eco Sensors email reports from the SMTP server, do the following:

1. Enable the *Enable report from the following SMTP server*, and key in the IP address and port number of your SMTP server.
2. Key in the email address of where the report is being sent from in the *Send From* field.

Note: 1. Only one email address is allowed in the *From* field, and it cannot exceed 64 Bytes.

2. 1 Byte = 1 English alphanumeric character.
-

3. Key in the email address (addresses) of where you want the SMTP reports sent to in the *Email List* field.

Note: 1. If you are sending the report to more than one email address, separate the addresses with a semicolon. The total cannot exceed 256 Bytes.

2. 1 Byte = 1 English alphanumeric character.
-

4. If your server requires authentication, put a check in the *Server requires authentication* checkbox, and key in the appropriate account information in the Account Name and Password fields.
-

Other Settings

The Other Settings page allows you to enable the *Enquiry Service*, and set the Service port and Security string. This page is used to establish a connection to a third party software's billing service.

Sys Settings	Maintenance	Database	Tasks	Billing
System Parameters	SNMP Settings	SMTP Settings	Other Settings	Sessions

Enable Enquiry Service

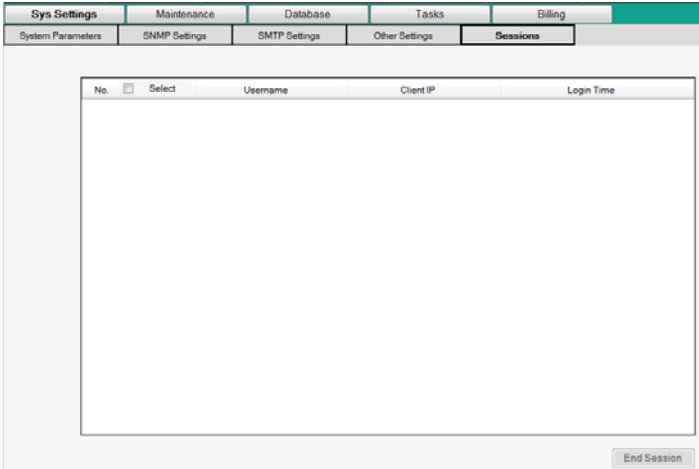
Service port:

Security string:

eco Sensors service port:

Sessions

The Sessions page lists the clients that are connected to eco Sensors across the network. **SEE PAGE** This page displays the username, client node IP address and the time that the user logged in. Use the box to the left to select a client's session and click **End Session** to disconnect the user from the master node.



Maintenance

The *Maintenance* function allows you to use eco Sensors to upgrade the firmware of the connected NRGence device's firmware. When you click the Maintenance tab, the display opens with *Firmware Upgrade* page, as below:

The Main Panel

A description of the items shown in this panel are given in the table, below:

Item	Description
Check Main Firmware Version	If you enable <i>Check Main Firmware Version</i> , the device's current firmware level is compared with that of the upgrade file. If the current version is equal to or higher than the upgrade version, a popup message appears, to inform you of the situation and stops the upgrade procedure.
Firmware File	As new versions of the firmware become available, they are posted on our website and can be downloaded to a convenient location on your computer. Click the <i>Browse</i> button to select the downloaded upgrade file.
Device Name	Lists all of the NRGence devices. In the <i>Select</i> column, select the device's whose firmware you want to upgrade.
Firmware Version	Displays the device's current firmware version.
IP Address	Displays the IP address of the selected NRGence device.
Upgrade Status	Displays the upgrade status of the selected devices.
Upgrade	Click this button to perform the upgrade on the selected devices.

Upgrading the Firmware

To upgrade the firmware refer to the screenshot on the preceding page, and do the following:

1. Go to our website and download the new firmware file to a convenient location on your computer.
2. Click the *Browse* button; navigate to where the firmware file is located and select it.
3. Click **Upgrade** to start the upgrade procedure.
 - ◆ If you enabled *Check Main Firmware Version* the current firmware level is compared with that of the upgrade file. If the current version is equal to or higher than the upgrade version, a popup message appears, to inform you of the situation and stops the upgrade procedure.
 - ◆ If you didn't enable *Check Main Firmware Version*, the upgrade file is installed without checking what its level is.
 - ◆ Once the upgrade completes successfully, the switch resets itself.
4. Log in again, and check the firmware version to be sure it is the new one.

Database

Database Settings

This section allows you to set *MySQL database* and *Database Clean up Options*:

Sys Settings	Maintenance	Database	Tasks	Billing
DB Settings	DB Capacity	DB Maintenance		

Use MySQL database

Port:

Username:

Password:

Database Clean up Options

Keep data for Months

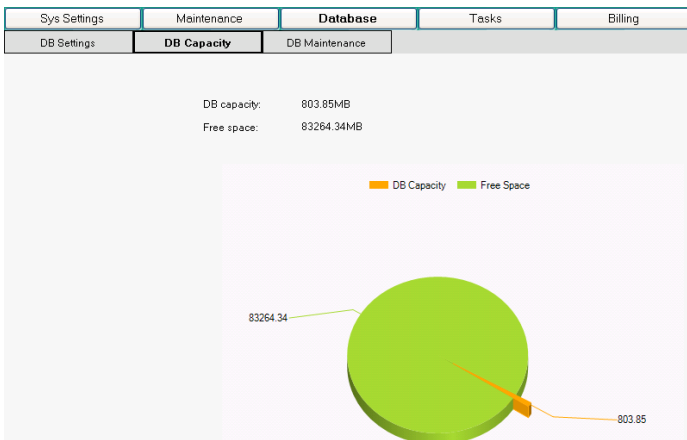
Delete oldest data

Save

Use the **Database Clean up Options** to maintain your database size. Check *Keep data for* and enter the number of months for the system to log data before it begins to purge files. Check *Delete oldest data* to delete older data files first.

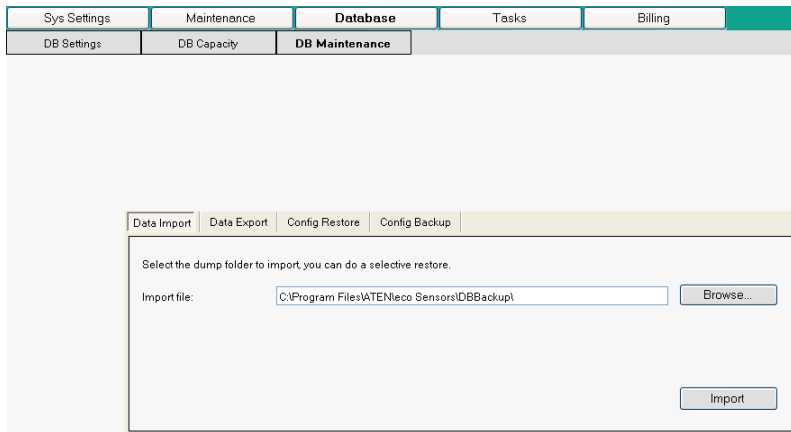
Database Capacity

This section gives you information about your current database capacity:



Database Maintenance

This section allows you to backup and restore the systems database and configuration information.



The screenshot shows a web interface with a top navigation bar containing tabs for Sys Settings, Maintenance, Database, Tasks, and Billing. Below this, a sub-navigation bar includes DB Settings, DB Capacity, and DB Maintenance. The DB Maintenance tab is active, displaying a form with the following elements:

- Sub-tabs: Data Import, Data Export, Config Restore, and Config Backup.
- Instructional text: "Select the dump folder to import, you can do a selective restore."
- Label: "Import file:"
- Text input field: "C:\Program Files\ATE\Neco Sensors\DBBackup\"
- Button: "Browse..."
- Button: "Import"

Data Import / Export

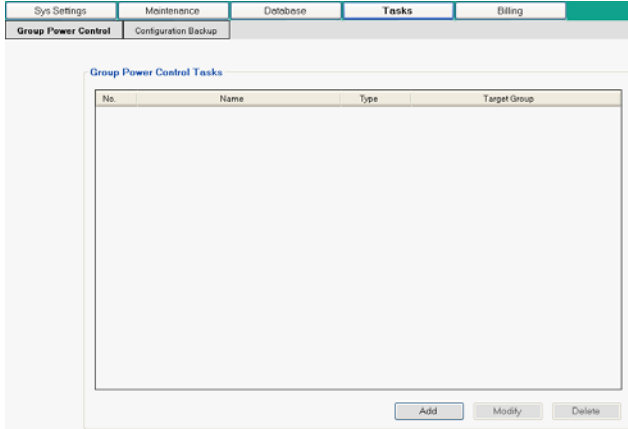
The *Data Import* and *Data Export* tabs allow you to import and export data tables related to the Power Analysis, Thermal Analysis, and Billing information.

Config Restore / Backup

The *Config Restore* and *Config Backup* tabs allow you to restore and backup configuration data related to the eco Sensors software settings found in the **User** and **Device** tabs, which include user account and device information.

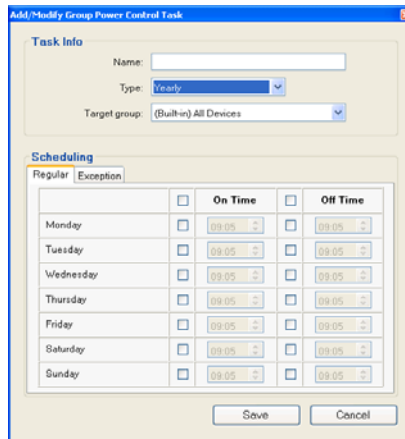
Tasks

This section allows you to schedule Group Power Control tasks (On/Off) using built-in group parameters and schedule Configuration Backup tasks, which automatically backup configuration data.



Group Power Control

These tasks can be performed on all devices, all racks, or all outlets. On the main page, click **Add** to open the *Add/Modify Task* window, as shown below:



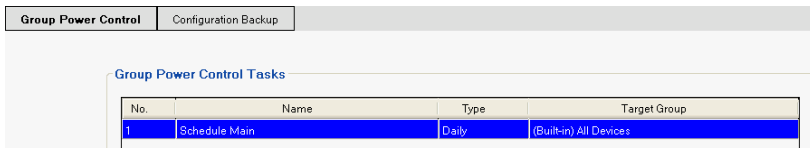
To schedule a group power control task, do the following:

1. Key in a *Name* for the task.
2. Select the task *Type* from the drop-down menu (Daily, Weekly, or Yearly).

3. Select the *Target Group* from the drop-down menu.
4. Use the *Scheduling* section to set the power on and power off times, and to add *Exceptions* to Yearly tasks.

Note: *Exceptions* will override all scheduling parameters.

5. Click **Save** to save the task. It now appears on the main page:



Select a task in *Group Power Control Tasks* main page and use the buttons to **Modify** or **Delete**.

Configuration Backup

These tasks are set on a daily or weekly basis to automatically backup the eco Sensors configuration data. On the main page, click **Add** to open the *Add/Modify Configuration Backup Task* window, as shown below:

Task Info

Name: Weekly Backup

Type: Weekly

Save in folder Save via FTP

Save in folder: _____

Username: _____

Password: _____

Scheduling

	<input type="checkbox"/>	Start Time
Monday	<input type="checkbox"/>	17:28
Tuesday	<input type="checkbox"/>	17:28
Wednesday	<input type="checkbox"/>	17:28
Thursday	<input type="checkbox"/>	17:28
Friday	<input type="checkbox"/>	17:28
Saturday	<input type="checkbox"/>	17:28
Sunday	<input type="checkbox"/>	17:28

To schedule a configuration backup task, do the following:

1. Key in a *Name* for the task.
2. Select the task *Type* from the drop-down menu (Daily, or Weekly).
3. Select *Save in folder* or *Save via FTP*, and fill in the related information:

- ◆ **Save in folder:** Browse to select a location where backup is saved. Provide the Username and Password for the folder if it is set with security that requires authentication*.
- ◆ **Save via FTP:** Enter the FTP Server, Port number, FTP Directory and check the box to Log on anonymously. Provide the Username and Password for the folder if it is set with security that requires authentication*.

Note: If you provide a Username/Password for the folder, and the folder is not set with username/password security, the Configuration Backup task will not save the data.

4. Use the *Scheduling* section to set the days of the week (Weekly) and time of day (Weekly/Daily) for the configuration backup task to begin.
5. Click **Save** to save the task.

Billing

The Billing section allows you to calculate energy costs using actual usage to create data and generate billing reports.

Settings

Sys Settings	Maintenance	Database	Tasks	Billing
Settings	Generate Report	Report Management		

Settings

Single-Rate: \$/KWH

Dual-Rate:

	From	Duration (H)	Rate (\$/KWH)
Peak	<input type="text" value="14"/>	<input type="text" value="1"/>	<input type="text" value="0.00"/>
Non-Peak			<input type="text" value="0.00"/>

- ◆ **Single Rate:** Enter the KW/per hour rate that you wish to use to calculate your data center's billing costs.
- ◆ **Dual-Rate:** Use this option if your energy costs are split into *peak* and *non-peak* hours. **Peak:** Enter the time of day (*From*) that the peak-rate begins, how many hours (*Duration*) the peak-rate occurs, and the *Rate (\$/KWH)* per hour. **Non-Peak:** Enter the non-peak *Rate (\$/KWH)* per hour.
- ◆ Click **Save**.

Generate Report

The **Generate Report** section allows you to establish the parameters for your billing reports. The fields are explained in detail in the following table:

Field	Explanation
Report Info	<p>Fill in the report name and the creator in the <i>Title</i> and <i>Author</i> fields.</p> <p>Enter the <i>Time</i> which will represent when the report was created.</p> <p>Enter the <i>Type</i>: <i>Total</i>: will give you a report that is an accumulation of all the energy costs for all the racks. <i>Rack</i>: will give you a break down of the energy costs accumulated by each rack.</p> <p>Select a <i>Month</i> for which you wish to calculate the billing data for.</p> <p>Note: Rack reports will take longer to generate as much more data is required to provide the detailed billing information.</p>
Group	<p>In this field, click Add to select the data group(s) that is the subject of the billing report.</p>

After filling in the information, click **Generate** and a new window will appear with the Total or Rack Billing Information, as shown on the next page.

Total Report

Billing Information

Bill Report by Brett Report Date: 2013-12-05 15:55:11

Group	Month	Avg. Amp.	Volts	Avg. KW	KWh	Rate (\$/KWh)	Fee (\$)
(Built-in) All Devices	Nov 2013	285.91A	105.34V	30.12	21684.4104	0.00	0.00
(Built-in) All Outlets	Nov 2013	89.83A	108.00V	9.70	6984.9808	0.00	0.00
(Built-in) All Racks	Nov 2013	285.91A	105.34V	30.12	21684.4104	0.00	0.00

From this page click **Save** to save the billing information, or **Choose Chart** to return to the previous page and reconfigure the parameters for your billing report.

Rack Report

Billing Information

Bill Report by Brett Report Date: 2013-12-05 15:50:51

Group	Rack Name	Month	Avg. Amp.	Volts	Avg. KW	KWh	Rate (\$/KWh)	Fee (\$)
(Built-in) All Devices	rack001	Nov 2013	3.42A	105.73V	0.36	260.6760	0.00	0.00
	rack002	Nov 2013	4.95A	105.11V	0.52	374.7624	0.00	0.00
	rack003	Nov 2013	3.69A	108.80V	0.40	288.6816	0.00	0.00
	rack004	Nov 2013	4.63A	106.10V	0.49	353.5824	0.00	0.00
	rack005	Nov 2013	4.01A	106.57V	0.43	307.9368	0.00	0.00
	rack006	Nov 2013	4.71A	105.73V	0.50	358.7832	0.00	0.00
	rack008	Nov 2013	6.60A	110.78V	0.73	526.4400	0.00	0.00
	rack009	Nov 2013	3.78A	109.98V	0.42	299.3520	0.00	0.00
	rack010	Nov 2013	3.62A	106.36V	0.38	277.1808	0.00	0.00
	rack011	Nov 2013	6.05A	105.26V	0.64	458.1384	0.00	0.00
	rack012	Nov 2013	7.93A	107.84V	0.85	615.5472	0.00	0.00
	rack014	Nov 2013	10.18A	108.92V	1.11	798.6408	0.00	0.00
	rack016	Nov 2013	N/A	N/A	0.05	37.2960	0.00	0.00
	rack017	Nov 2013	N/A	N/A	0.26	189.9528	0.00	0.00
	rack018	Nov 2013	N/A	N/A	0.53	383.5272	0.00	0.00
	rack021	Nov 2013	N/A	N/A	0.19	133.2384	0.00	0.00
	rack022	Nov 2013	N/A	N/A	0.37	263.3688	0.00	0.00
	rack023	Nov 2013	N/A	N/A	0.12	84.1176	0.00	0.00

From this page click **Save** to save the billing information, or **Choose Chart** to return to the previous page and reconfigure the parameters for your billing report.

Report Management

Location

Report folder: C:\Program Files\ATE\Neco Sensors\BillReportFile

Search

Search by: Time

Time Range: From: 2013-12-01 00:00:00 To: 2013-12-31 23:59:59

Reports				
No.	Title	Author	Time	Reports
1	DecemberBilling	Brett	12/5/2013 3:50:49 PM	Open HTML
2	DecemberBilling	Brett	12/5/2013 3:41:33 PM	Open HTML
3	DecemberBilling	Brett	12/5/2013 2:55:41 PM	Open HTML

This page allows you to select the **Location** where you want to save reports, and also provides various **Search** options, as detailed in the following table:

Field	Explanation
Report Folder	Use this field to specify the folder where the reports are saved. Use Browse to locate a folder; click Save to save the location.
Search By	Search parameters in the drop-down menu allow you search for reports using Time, Title, or Author. Enter the Title or Author in the field on the right.
Time Range	Enter a time range for your report search and click Search .
Reports	The main window displays the reports. Here, you can select to Show All or Delete reports.

After clicking **Search**, a list of Reports are displayed. Click **Open HTML** to open the billing report in a browser and display it on a single page. You can also go to the Report folder and open the individual CSV and PDF report files.

Overview

eco Sensors keeps a record of transactions that take place on its installation, and stores up to 128 events at one time. The *System Log* page provides a powerful array of filters and functions that allow you to view and export the log file data, as well as be informed by email of specified events as they occur.

The screenshot shows the 'System Log' interface. At the top, there are tabs for 'System Log', 'Log Options', and 'Events'. Below the tabs, there is a search bar with a 'Keyword:' label and a 'Search' button. A 'Time range:' section includes radio buttons for 'All', 'Include', and 'Exclude', and 'From' and 'To' date pickers. The 'Page: 1 / 59' indicator and a 'Save all pages' checkbox are also visible. The main area is a table titled 'Log List' with the following data:

No	Date/Time	Category	Severity	Event	Log Info
1	2013-12-05 09:51:19	System task	Information	Delete task	Task (Name: Schedule Main) has been deleted.
2	2013-12-05 09:51:15	System task	Information	Delete task	Task (Name: Brett Test3) has been deleted.
3	2013-12-05 09:51:14	System task	Information	Delete task	Task (Name: Brett Test2) has been deleted.
4	2013-12-05 09:51:11	System task	Information	Delete task	Task (Name: Brett Test1) has been deleted.
5	2013-12-05 09:35:50	System task	Information	Start task	Scheduled task (Name: Brett Test3) has started.
6	2013-12-05 09:33:33	System task	Information	Add task	Task (Name: Brett Test3) has been added.
7	2013-12-05 09:27:50	System task	Information	Start task	Scheduled task (Name: Brett Test2) has started.
8	2013-12-05 09:25:14	System task	Information	Add task	Task (Name: Brett Test2) has been added.
9	2013-12-05 09:23:50	System task	Information	Start task	Scheduled task (Name: Brett Test1) has started.
10	2013-12-05 09:21:41	Authentication	Information	User login	User (Name: administrator) logged in successfully.
11	2013-12-05 09:21:32	Authentication	Information	User logout	User (Name: administrator) logged out.
12	2013-12-05 09:21:14	System task	Information	Modify task	Task (Name: Brett Test1) has been modified.
13	2013-12-05 09:19:51	System task	Information	Start task	Scheduled task (Name: Brett Test1) has started.
14	2013-12-05 09:17:45	System task	Information	Add task	Task (Name: Brett Test1) has been added.
15	2013-12-05 09:10:15	System task	Information	Add task	Task (Name: Schedule Main) has been added.
16	2013-12-05 09:02:13	Authentication	Information	User login	User (Name: administrator) logged in successfully.
17	2013-12-04 17:47:28	Authentication	Information	User logout	User (Name: administrator) logged out.

System Log

- ♦ Clicking on a device in the Sidebar displays its log events in the main panel's log event list.
- ♦ Clicking the **Refresh** button brings the log list up to date with the latest events.
- ♦ The entry box to the right of the Refresh button lets you set the number of events to display per page. Simply key in the number of your choice.
- ♦ The top right of the main panel shows the total number of pages in the log file, and what page you are currently viewing.
- ♦ The buttons on the bottom row function as follows:
 - ♦ **Clear** – click to erase the contents of the log event list
 - ♦ **First Page** – click to go to the first page of the log event list

- ◆ **Previous Page** – click to move to the previous page of the log event list
- ◆ **Next Page** – click to move to the next page of the log event list
- ◆ **Last Page** – click to move to the last page of the log event list
- ◆ **Export Log** – click to save the contents of the log event list to file

Log Options

Use this tab to set your log *Maintenance* and *Display* options:

Log Options

Maintenance:

By period (days, 7-366)

By records (100-99999)

Display:

Log records in each page (10-100)

Events

Use this tab to set the Events that you want the system to log locally and/or be sent out by email via SMTP. Check the events to *Log* or *Email*. For events to be sent via email you must configure the SMTP settings (see *SNMP Settings*, page 51).

No.	<input checked="" type="checkbox"/> Log	<input type="checkbox"/> Email	Category	Severity	Event
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Critical	Low disk space
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Critical	Write data failure
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Warning	Failed to send email
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Warning	Database cleanup
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	Start service
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	Stop service
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	Device online
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	Device offline
9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	Change DB setting
10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	Change SMTP setting
11	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	Change SNMP setting
12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	Change system setting
13	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	Change log option
14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	Door open
15	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	Door close
16	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	IS-Gateway online
17	<input checked="" type="checkbox"/>	<input type="checkbox"/>	System	Information	IS-Gateway offline
18	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Authentication	Warning	User login failure
19	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Authentication	Information	User login
20	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Authentication	Information	User logout

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Chapter 9

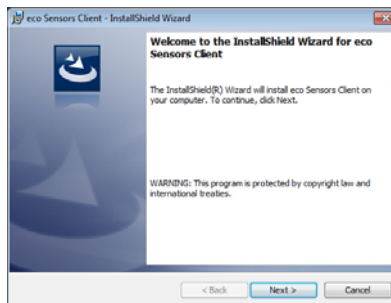
Client

Overview

The eco Sensors Client software is installed on secondary computers and allows access to the data provided by PDUs through the eco Sensors Master (server) software. The eco Sensors Client connects over the LAN to log into the eco Sensors Server to receive data about the PDUs. The eco Sensors Client computers can access PDU information and energy usage, and have power outlet control of the PDUs.

Installing eco Sensors Client

1. Double click on the eco Sensors Client exe file to open the installer. The Welcome window appears:



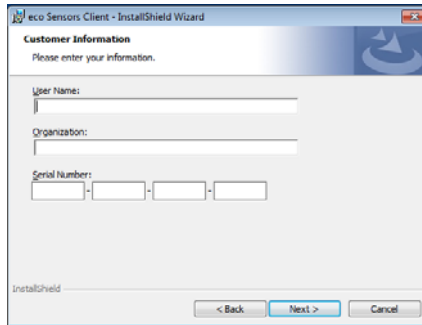
Click **Next** to continue.

2. The License Agreement Windows appears:



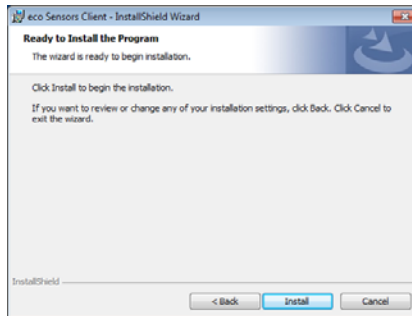
Click the “I accept the terms in the license agreement” button, and then click **Next** to continue.

3. The Customer Information window appears:



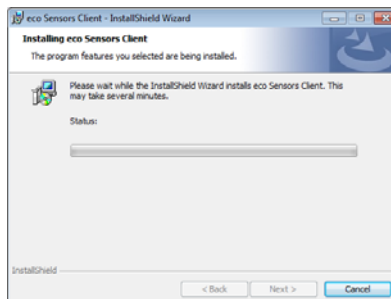
Enter a User Name and Organization (optional), then the Serial Number (which can be found on the cover of the bundled CD-ROM) and click **Next** to continue.

4. The Ready to Install the Program window appears.

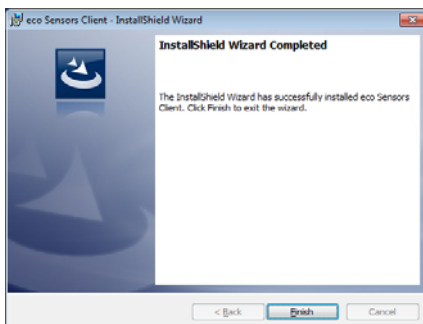


Click **Next** to continue.

5. As the client software installs a bar appears to show the Status:



- When the installation is finished the InstallShield Wizard Completed window appears:



Click **Finish** to exit.

- When the installation is complete, the eco Sensors Client icon appears on the desktop and in the Start Menu → All Programs → ATEN → eco Sensors Client folder.

Logging In

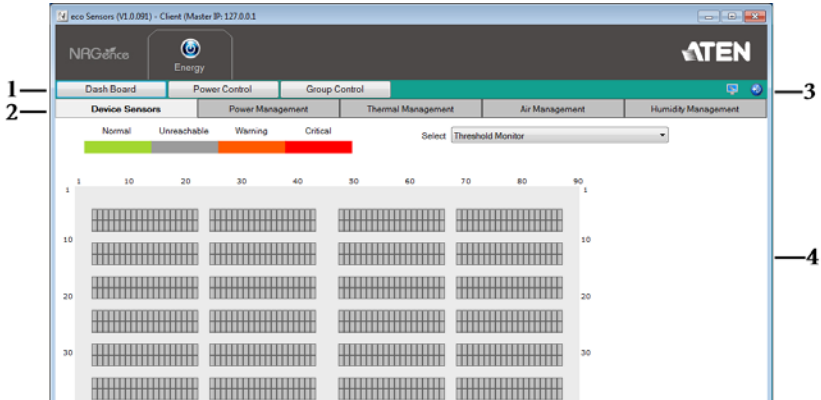
Open the eco Sensors Client program by clicking the icon from the desktop or start menu and the Login screen appears:



1. Enter the following information:
 - Server IP: The IP address of the computer running the eco Sensors Server software.
 - Port: Port number of the eco Sensors Master computer. Default is 19999.
 - Username / Password: A username and password created on the eco Sensors Server (see *User Management*, page 33).
2. Select your language. Options are: English (default); German; Spanish; French; Italian; Japanese; Korean; Portuguese; Russian; Traditional Chinese; or Simplified Chinese.
3. Click **Login** to bring up the Main Page.

The eco Sensors Client Main Page

After you have successfully logged in, the eco Sensors Client Main Page comes up with the Energy Management *Dashboard* page displayed:



Page Components

The screen components are described in the table below:

No.	Item	Description
1	Menu Bar	The menu bar contains three operational categories: Dash Board, Power Control and Group Control.
2	Dashboard Alert Bar	The Dashboard Alert bar is a special feature of the Dashboard page. Similar to the Menu Bar, it contains operational sub-categories that pertain to the item selected in the tab bar, but it also has an extra color-coded function that allows you to instantly see the category status: RED: Critical ORANGE: Warning GRAY: Offline GREEN: Normal
3	Logout / Monitor	Click on the far right button to log out of your eco Sensors session. Click on the Monitor icon to start the real-time Energy Performance Indicator.
4	Interactive Display Panel	This is your main work area. The screens that appear reflect your menu choices.

Dashboard

The Dashboard Alert bar is a special feature of the Dashboard page that features color-coded tabs that allows you to instantly see a category's status: RED: Critical; ORANGE: Warning; GRAY: Offline; GREEN: Normal.

Device Sensors

The PDU Sensors tab displays collated data in formats that provide an overall view of the various levels being monitored by your sensors. In combination with the four-color dashboard scheme (outlined above), you can easily assess the overall status of the groups/devices at a glance.

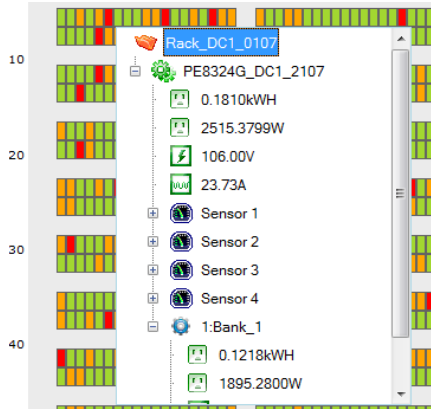
Threshold Monitor













This displays the overall threshold monitoring information. See *Device Setup*, page 39, for information on setting the thresholds.

◆ **Real-time Measurements**

Hover your mouse over a rack in the display for real-time power measurement and monitoring information, as below:

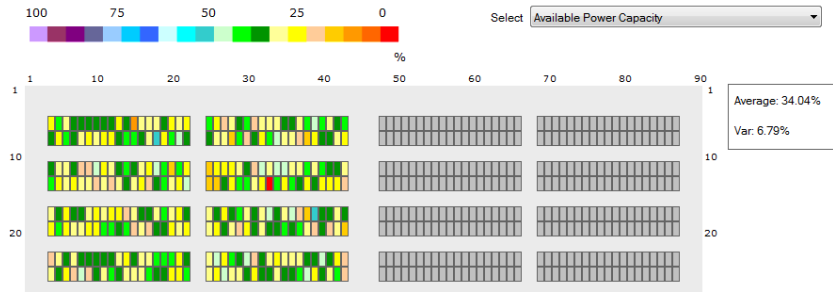


The meanings of the icons are show in the table, below:

Icon	Device	Icon	Reading	Unit
 	PDU		Power Dissipation	KWh (Kilowatt-Hour)
			Power	W (Watt)
	Bank		Voltage	V (Volt)
			Current	A (Ampere)
	Sensor		Humidity	% RH (Relative Humidity)
			Temperature	°C / °F (Celsius / Fahrenheit)
			Pressure	Pa (Pascal) 1 Pa = 1 N/m2

Note: The icons are color-coded so you can instantly see a category’s status:
 RED: Critical; ORANGE: Warning; GREEN: Normal; GRAY: Offline.

Available Power Capacity

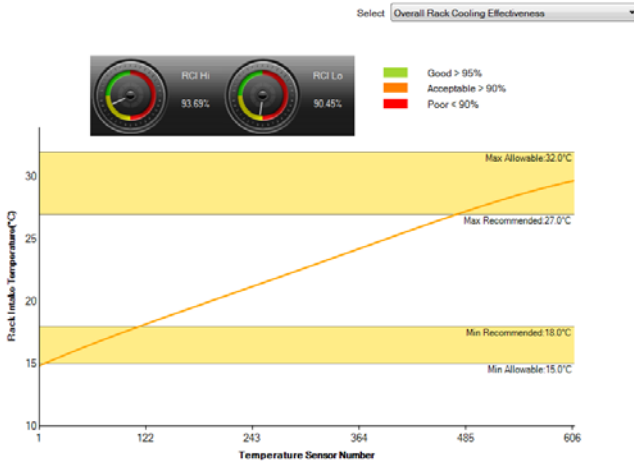


The *Available Power Capacity* displays the available power using a standard formula for rack devices:

Total Power Capacity (KWh) - Power in Use (KWh) = Available Power Capacity (KWh).

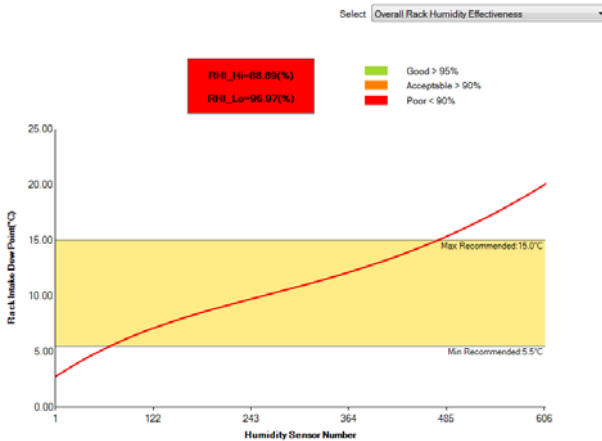
The box at the top right corner of the page displays the Average % of available power for all the racks. The Var % uses the formula: $\text{Var}(X) = E [(X-\mu)^2]$ to calculate the variance value of all devices. You can move the mouse over each rack to display the percentage of available power for that rack. The colors represent the available power capacity for each rack displayed in 5% increments.

Overall Rack Cooling Effectiveness



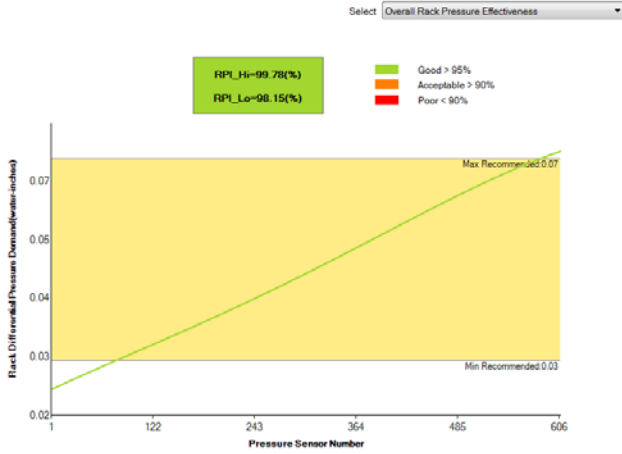
This displays the Rack Cooling Index (RCI). RCI is a measure of how effectively equipped racks are cooled and maintained within industry temperature guidelines and standards, and functions as a useful cooling performance metric. In addition to a graphical representation, this page also provides you a ‘Hi’ and a ‘Lo’ for quick reference.

Overall Rack Humidity Effectiveness



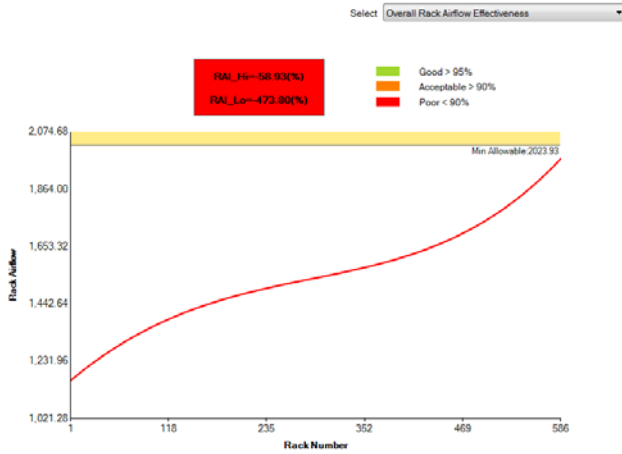
This displays the Return Temperature Index (RTI). RTI is a measure of the performance of the air-management system, and functions as a useful airflow performance metric.

Overall Rack Pressure Effectiveness



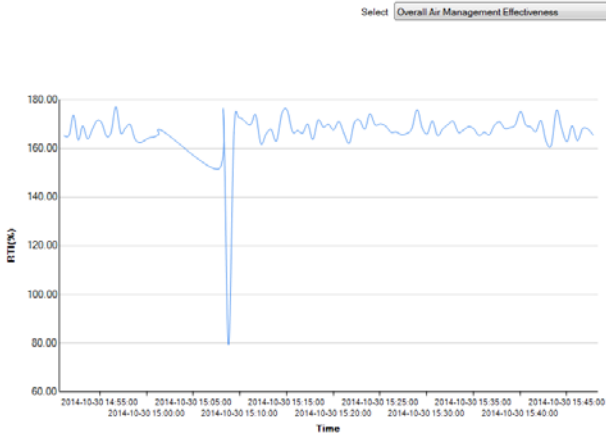
This displays the RPI.

Overall Rack Airflow Effectiveness



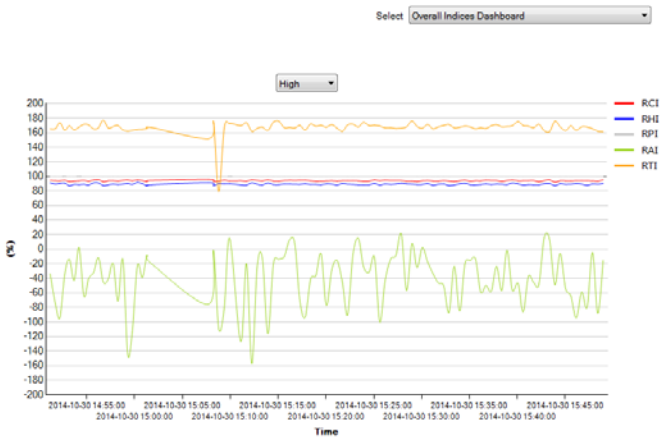
This displays the RAI.

Overall Air Management Effectiveness



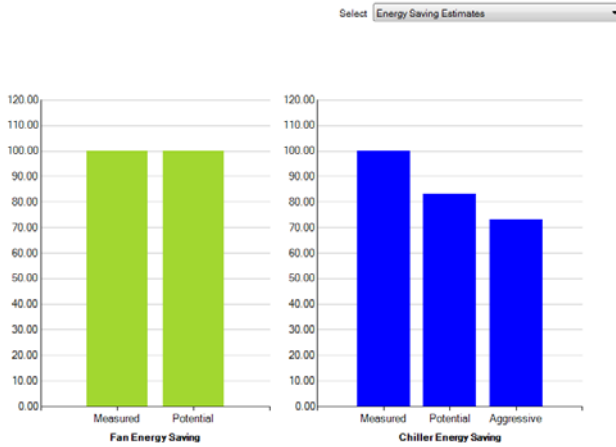
This displays the RTI.

Overall Indices Dashboard



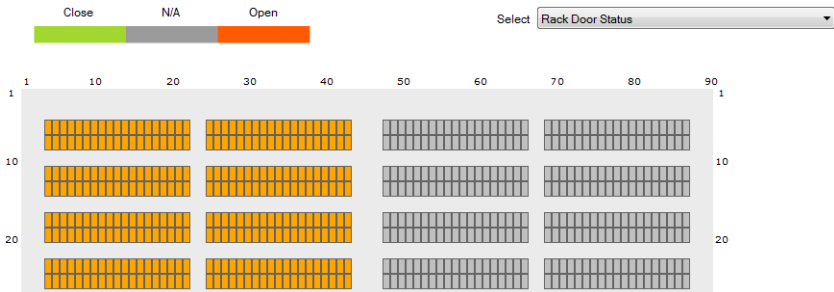
This displays all five indices (RCI, RHI, RPI, RAI, RTI) for the last hour.

Energy Saving Estimation



This displays energy savings estimates for Fan Energy (measured/potential) and Chiller Energy (measured/potential/aggressive).

Rack Door Status



The *Rack Door Status* displays the open/closed status of each cabinet door installed with an eco Sensors door sensor (EA1440, EA1441 or EA1442).

GREEN: Rack Door is Closed. GRAY: No Door Sensor Installed. ORANGE: Rack Door is Open.

Quick View Color Scale

The **Power Management**, **Thermal Management**, **Air Management** and **Humidity Management** tabs use the same color scale, but with different units for each reading.

For example, the *Heat Load Dissipation* page, under the **Power Management** tab, displays a scale from 0.5–4.5 U kWh per hour, as shown below:



For quick view purposes, the racks in the data center are displayed in a color related to their status on the various scales. For example, the racks below are currently registering in the region of 1.5 U kWh for Heat Load Dissipation:



Power Management

This tab provides detailed real-time information related to Power Management, as outlined in the following sections.

Heat Load Dissipation

The page displays the real-time Heat Load Dissipation values, the current average and the variance [in kWh]. Detailed readings for Heat Load Dissipation can also be viewed in daily, weekly, monthly, quarterly or yearly formats. The color scale displays a range from 4000–40000 U kWh.

Heat Load Density

This page displays the real-time Heat Load Density values, the current average and the variance [in W]. The color scale displays a range from 500–4500 W.

Thermal Management

This tab provides detailed real-time information related to Thermal Management, as outlined in the following sections.

Cold Intake Temperature

This page displays the real-time Cold Intake Temperature values, the current average and the variance [in °C]. The color scale displays a range from 10–45 °C.

Intake Differential Temperature

This page displays the real-time Intake Differential Temperature values, the current average and the variance [in °C]. The color scale displays a range from 2–20 °C.

Hot Exhaust Temperature

This page displays the real-time Hot Exhaust Temperature values, the current average and the variance [in °C]. The color scale displays a range from 2–20 °C.

Exhaust Differential Temperature

This page displays the real-time Exhaust Differential Temperature values, the current average and the variance [in °C]. The color scale displays a range from 10–45 °C.

Cold-Hot Across Temperature Rise

This page displays the real-time Cold-Hot Across Temperature Rise values, the current average and the variance [in °C]. The color scale displays a range from 5–55 °C.

Air Management

This tab provides detailed real-time information related to Air Management, as outlined in the following sections.

Intake Differential Pressure Distribution

This page displays the real-time Intake Differential Pressure Distribution values, the current average and the variance [in Pa]. The color scale displays a range from 10–200 Pa.

Heat Load Airflow Across Distribution

This page displays the real-time Heat Load Airflow Across Distribution values, the current average and the variance [in v_{equip} (cfm)]. The color scale displays a range from 10–200 cfm.

Floor Plenum Airflow Supply Distribution

This page displays the real-time Floor Plenum Airflow Supply Distribution values, the current average and the variance [in Q_{floor} (cfm)]. The color scale displays a range from 500–2500 cfm.

Heat Load Airflow Supply Distribution

This page displays the real-time Heat Load Airflow Supply Distribution values, the current average and the variance [in Q (cfm)]. The color scale displays a range from 500–2500 cfm.

Hot Recirculation/Airflow w Distribution

This page displays the real-time Hot Recirculation/Airflow w Distribution values, the current average and the variance [in ΔA_{circk} (%)]. The color scale displays a range from 10–50 %.

Cold Bypass/Airflow Distribution

This page displays the real-time Cold Bypass/Airflow Distribution values, the current average and the variance [in ΔA_{bypas} (%)]. The color scale displays a range from 10–50 %.

Humidity Management

This tab provides detailed real-time information related to Humidity Management, as outlined in the following sections.

Cold Intake Relative Humidity

This page displays the real-time Cold Intake Relative Humidity values, the current average and the variance [in h_rel (%)]. The color scale displays a range from 10–90 %

Cold Intake Dew Point Temperature

This page displays the real-time Cold Intake Dew Point Temperature values, the current average and the variance [in t_dew (C)]. The color scale displays a range from 0–15 °C

Power Control

The Power Control tab allows you to perform manual power management at the device or outlet level.

Note: Not all NRGence eco PDU PE models support outlet level power management. Please see *Supported NRGence Devices*, page 5, and your User Manual for further details.

Click on the device in the side bar and its page appears, as below:

The screenshot displays the Power Control interface for a device named PE8324G_DC1_2001. The interface is divided into several sections:

- Device Status:** Shows the device name, IP address (127.0.0.1), and a table with columns: Device Name, Voltage, Current, Power, and Power Dissipation. The values are: PE8324G_DC1_2001, 108.23, 16.61, 1797.7, and 1.7891. There are ON and OFF buttons and a Reboot checkbox.
- Sensor Status:** A table with columns: Sensor ID, Humidity, Temperature, and Pressure. The data is as follows:

Sensor ID	Humidity	Temperature	Pressure
1	45.57	26.81	N/A
2	N/A	N/A	N/A
3	45.26	37.12	N/A
4	N/A	9.89	6.75
- Outlet Status:** A table with columns: Outlet Name, Status, Act, Reboot, Voltage, Current, Power, and Power Dissipation. The data is as follows:

Outlet Name	Status	Act	Reboot	Voltage	Current	Power	Power Dissipation
Outlet_1	ON	OFF	<input type="checkbox"/>	108.23	0.88	95.2424	0.0756
Outlet_2	ON	OFF	<input type="checkbox"/>	108.23	0.35	37.8805	0.0711
Outlet_3	ON	OFF	<input type="checkbox"/>	108.23	0.98	106.0654	0.0702
Outlet_4	ON	OFF	<input type="checkbox"/>	108.23	0.3	32.489	0.0705
Outlet_5	ON	OFF	<input type="checkbox"/>	108.23	0.16	17.3188	0.0783
Outlet_6	ON	OFF	<input type="checkbox"/>	108.23	0.21	22.7283	0.0896
Outlet_7	ON	OFF	<input type="checkbox"/>	108.23	0.19	20.5837	0.0716
Outlet_8	ON	OFF	<input type="checkbox"/>	108.23	0.77	83.3371	0.0816
- Bank Status:** A table with columns: Bank Name, Act, Act, Reboot, Voltage, Current, Power, and Power Dissipation. The data is as follows:

Bank Name	Act	Act	Reboot	Voltage	Current	Power	Power Dissipation
Bank_1	ON	OFF	<input type="checkbox"/>	108.23	11.18	1210.011	1.1656
Bank_2	ON	OFF	<input type="checkbox"/>	108.23	5.43	587.6889	0.6049

Device Status

Use the ON, OFF and Reboot options to manually manage device power.

Sensor Status

This section is view only and provides status information about the sensors.

Outlet Status

Use the ON, OFF and Reboot options to manually manage individual outlet power.

Group Control

The Group Control tab allows you to perform simultaneous manual power management at the outlet level on data groups that you have already created.

- Note:**
1. See *Define Data Group*, page 47, for details about creating groups for power management control.
 2. Not all NRGence models support outlet level power management. Please see *Supported NRGence Devices*, page 5, and your User Manual for further details.

Click on a group in the side bar and its page appears, as below:

The screenshot displays the Group Control interface. On the left is a sidebar with a tree view showing the hierarchy: Zone > Rack > Device > Outlet. The 'Rack' node is selected, and '(Built-in) All Racks' is highlighted. The main panel is divided into three sections:

- Outlets in Group:** Shows 'Controllable Outlets: 14592' and 'Non-Controllable Outlets: 0'.
- Power Control:** Contains 'ON' and 'OFF' buttons, and a 'Reboot' checkbox.
- Controllable Outlet Information:** A table listing 17 outlets with their status and location details.

No.	Name	Outlet	Status	Device Name	Rack Name	Zone Name
1	Outlet_1	1	ON	PE8324G_DC1_2001	Rack_DC1_0001	
2	Outlet_2	2	ON	PE8324G_DC1_2001	Rack_DC1_0001	
3	Outlet_3	3	ON	PE8324G_DC1_2001	Rack_DC1_0001	
4	Outlet_4	4	ON	PE8324G_DC1_2001	Rack_DC1_0001	
5	Outlet_5	5	ON	PE8324G_DC1_2001	Rack_DC1_0001	
6	Outlet_6	6	ON	PE8324G_DC1_2001	Rack_DC1_0001	
7	Outlet_7	7	ON	PE8324G_DC1_2001	Rack_DC1_0001	
8	Outlet_8	8	ON	PE8324G_DC1_2001	Rack_DC1_0001	
9	Outlet_9	9	ON	PE8324G_DC1_2001	Rack_DC1_0001	
10	Outlet_10	10	ON	PE8324G_DC1_2001	Rack_DC1_0001	
11	Outlet_11	11	ON	PE8324G_DC1_2001	Rack_DC1_0001	
12	Outlet_12	12	ON	PE8324G_DC1_2001	Rack_DC1_0001	
13	Outlet_13	13	ON	PE8324G_DC1_2001	Rack_DC1_0001	
14	Outlet_14	14	ON	PE8324G_DC1_2001	Rack_DC1_0001	
15	Outlet_15	15	ON	PE8324G_DC1_2001	Rack_DC1_0001	
16	Outlet_16	16	ON	PE8324G_DC1_2001	Rack_DC1_0001	
17	Outlet_17	17	ON	PE8324G_DC1_2001	Rack_DC1_0001	

- ◆ The **Outlets in Group** section displays information about how many outlets in the group are controllable or non-controllable.
- ◆ The **Power Control** section allows to power on, off or reboot all of the controllable outlets in the group simultaneously.
- ◆ The **Controllable Outlet Information** section displays information about the outlets in the group, such as their power status and device/rack/zone location.