White Paper

Cisco EnergyWise to Reduce Energy, Costs, and Carbon after JouleX Acquisition

Introduction

Corporate sustainability and enterprise energy management are pressing initiatives for organizations dealing with rising energy costs, government regulations, and environmental concerns. Before corporations can reduce and/or optimize energy usage across the enterprise, they need accurate measurement of current energy use throughout their different energy domains. Up to now, it's been difficult and cost prohibitive to capture these measurements in a central location with visibility by building, device, location, cost center, division, or time of day.

What's required is a comprehensive energy management solution that encompasses the entire enterprise across campuses and data centers, facilities and manufacturing. For the IT infrastructure, this would include desktops and laptops, VoIP phones, access points, physical and virtual servers, switches, and routers. In facilities, this would include heating, ventilating, and air conditioning (HVAC) and lighting systems; in manufacturing, process controls and industrial automation systems. Internet Protocol (IP) is the great homogenizer. With IP, organizations can extend the power of the network to see, measure, and manage energy use beyond IT to facilities and manufacturing. Because of the large scale and distributed nature of large enterprises, effective energy management solutions should also work without requiring installation of software agents on endpoint devices or systems. With an agentless and comprehensive solution, organizations will gain the ability to optimize and reduce energy use across their campuses, data centers, facilities, and manufacturing environments. They will also have the ability to:

- Identify and prioritize energy savings opportunities across their enterprise.
- Locate power hogs across the enterprise and upgrade to more power-efficient device models.
- Dynamically align capacity with demand across network and system infrastructure.
- Create policies to automatically and remotely regulate power.
- Provide business and energy context to capacity planning.
- Produce corporate sustainability reports.

Cisco EnergyWise

Cisco has introduced EnergyWise™, an energy management architecture designed to instrument energy information for devices connected to its network in order to measure power consumption and optimize power usage, resulting in effective delivery of power across the enterprise. Cisco EnergyWise™ measures current power consumption of devices and systems connected to its network, can automate and take actions to optimize their power levels, and can advise how much power is being consumed to demonstrate cost savings. Cisco® EnergyWise instruments energy measurement and regulation across the network for IT systems. For facilities and manufacturing systems, Cisco EnergyWise uses the network to interface with the existing energy instrumentation of those systems and devices.

New Cisco EnergyWise Management Software

The Cisco EnergyWise Management software, previously JouleX Energy Manager (JEM), is a network-based, agentless technology that identifies and prioritizes energy savings opportunities by seeing, measuring, and managing energy use across the enterprise. In addition, EnergyWise Management goes a step further by regulating energy usage of all network-connected devices and systems. Unlike other systems, Cisco EnergyWise is a single solution that provides a global view of energy consumption for a wide range of devices across all energy domains of the enterprise from the campus to the data center to facilities and manufacturing. As a network-based, agentless solution, the technology is much less expensive to deploy, configure, manage, and maintain than traditional agent-based energy management technologies.

Cisco EnergyWise Management uses an organization's existing network infrastructure and a unique agentless discovery method to automatically discover all devices on the corporate network. After discovery, EnergyWise Management continually monitors and reports energy use, enabling enterprises to see, measure, and manage their energy. Based on the energy metrics collected, EnergyWise Management provides energy intelligence that can be used to identify savings opportunities and develop policies and rules to optimize energy use and reduce costs on a massive scale. A typical enterprise can identify energy savings opportunities of up to 35 percent annually. Cisco EnergyWise Management also provides robust reporting to support compliance and corporate sustainability initiatives and show incremental improvements over time.

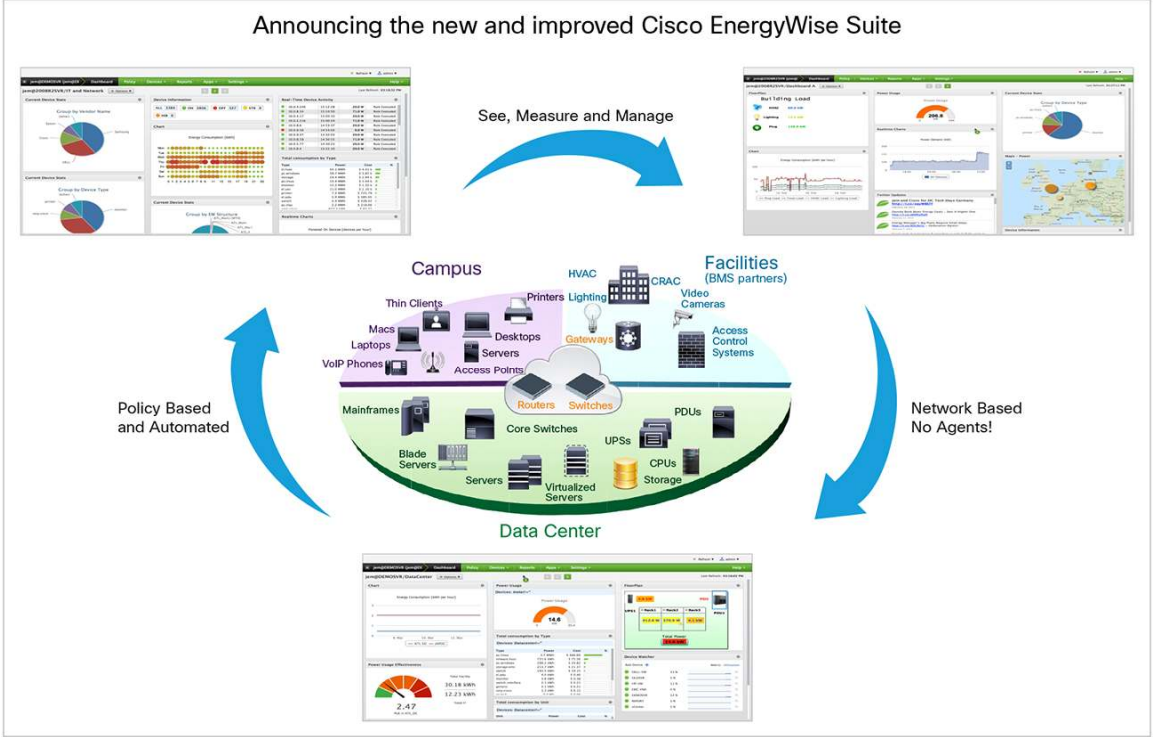
Cisco EnergyWise Management illustrates and provides visibility into all devices enabled by Cisco EnergyWise as well as legacy infrastructure. EnergyWise Management provides in-depth analysis and graphical reporting for Cisco EnergyWise connected devices and systems as well as for other devices and systems throughout the enterprise. It simplifies policy management and uses Cisco EnergyWise and other standard network protocols to regulate power to all network-connected devices and systems. Through Cisco EnergyWise Suite, Cisco is able to extend the network beyond IT into other energy domains (that is, facilities and manufacturing).

The Four Functions of Enterprise Energy Management

Cisco EnergyWise Management software gives organizations the ability to see, measure, and manage power across the enterprise through policy-based energy optimization. Four technology functions enable the see, measure, manage process, including:

- **Discovery and measurement:** Find all the network-connected devices, systems, and facilities assets in the enterprise.
- **Assessment and simulation:** Analyze energy use, temperature, carbon emissions, and costs by device, location, division, business unit, department, cost center, and more; simulate policy scenarios to determine highest cost savings and preserve productivity.
- **Policy and control:** Execute automated energy management policies or alerts by device, time, location, or event, resulting in energy that follows the productive user and cost savings.
- **Reporting:** Delivers comprehensive reporting about the way energy is used and cost/carbon savings for individual offices or the entire enterprise.

The figure shows how the Cisco EnergyWise Suite provides energy intelligence to help you gain new visibility into energy use and reduce energy costs.



Measure Energy Use Across the Enterprise by System or Device

The Cisco EnergyWise Management software uses the energy information that Cisco EnergyWise technology instruments, for all network-connected devices and systems, to automatically discover what assets exist on a network segment and then measure the energy consumption and utilization, costs, and carbon emissions of those assets.

The EnergyWise Management auto discovery feature provides unprecedented sight into energy use at a granular level through an inventory of what devices and systems are drawing energy. The systems use existing asset management systems and directories to provide meaningful business context behind the inventory.

Cisco EnergyWise Technology-enabled switches instrument endpoint devices and systems with energy information that EnergyWise Management then reads immediately upon discovery. The data is then rolled up to the EnergyWise Management dashboard, which communicates power use and system utilization and manages endpoints with time-of-day, event, or location-based policies to shed loads at certain times. The Cisco EnergyWise network protocol uses a unique neighbor relationship capability to locate and inventory power consumed by devices attached to the Cisco network. The Cisco EnergyWise network protocol is similar to IP routing protocols, allowing the network to quickly find the power consumed using a network wide approach and query mechanism. There is a parent and child relationship among devices in which one device can relay the power consumed by its neighbors. This mechanism might be useful for an HVAC controller reporting the power consumed by attached air handlers.

Analyze and Report on Energy Usage

Cisco EnergyWise Management specifically determines energy reduction opportunities by analyzing energy data (use, costs, carbon, potential savings, and so on) by any grouping (date, time, location, device, application, cost center, business unit, and so on). EnergyWise Management also enables enterprises to simulate energy saving scenarios with “what-if” capabilities.

Using the Cisco EnergyWise query mechanisms, EnergyWise Management can advise enterprises of power consumption or changes in power consumption within a building at any given time. The query mechanisms include the ability to summarize the power for a set of devices or retrieve individual device power based on a device location. For example, EnergyWise Management can report the power consumed by all lobby-located phones across a series of campus buildings to help enterprises understand what the power savings would be if the power level of certain devices were changed in the network without actually implementing the change to the network. Alarms are available if power exceeds power expectations wanted by the customer.

Cisco EnergyWise Management provides interactive, drill-down reporting capability. Use EnergyWise Management to view energy use, cost, carbon, and potential or real-time savings by location, cost center, business unit, device, system, or group. EnergyWise Management also enables cost and usage comparisons over time for specific devices, locations, and so on.

Regulate Energy Consumption through Automated Policies

Cisco EnergyWise Management enables enterprises to create policies that automatically regulate energy consumption using its time-based, location-based, and robust event-based policy engine. EnergyWise Management's execution proxies use existing network and systems management infrastructure to automatically manage energy use of devices and systems.

These policies can be implemented by device type, device location, priority of the device, and other parameters. A scheme of priority and power levels is available within the Cisco EnergyWise protocols, allowing fine-grained control of how endpoints react to network-based signals. The priority of the devices tells the EnergyWise solution if a device should be affected by a signal to optimize the power. Highest priority devices will not have power reduced, while lower priority devices can be shut down or have power reduced.

For example, enterprises can use EnergyWise Management to change low-priority devices to a level of sleep state, while IP phones with high priority may not be shut down. Optimization can provide cost savings by saving energy but also by sizing wiring closets and building resources to appropriate values, giving customers long-term and short-term cost reduction.

Cisco EnergyWise Management customers have the ability to verify and change policies over time to make sure the enterprise's power-saving goals are being achieved. On a network enabled by Cisco EnergyWise, a single switch in a domain can query power consumption for a group of devices in a network. This network-based query mechanism provides scalability without requiring the EnergyWise Management software to contact all endpoints directly. For example, a single query to one Cisco switch can change the priority or retrieve the power consumption of all IP phones in a Cisco EnergyWise domain.

This intelligence is produced by the network knowing which devices are connected and where they are located, enabling a query result to be sent back to the switch originating the query and up to the EnergyWise Management software. All devices enabled by Cisco EnergyWise technology communicate using a common message format, simplifying energy management. Cisco EnergyWise Technology and Management maintain network security by using authentication between management systems and the network, between clients, and between network devices.

Features of Cisco EnergyWise Management Software

- Agentless network-based system: Simple deployment with no maintenance overhead for agents.
- EnergyWise Management energy policy: Align energy information with your business and apply rules to govern usage.
- Multivendor support to support IP enabled and legacy infrastructure today.
- Support for multiple energy sources, prices, and currencies for the most accurate energy accounting.
- Flexible rules engine: Use simple rules such as time-, event-, or location-based rules to eliminate energy waste.
- Powerful reporting module: Understand historical and current energy usage for decision making.
- Corporate energy dashboard: Transparent view of energy costs across your enterprise.
- Carbon emissions reporting: Complies with emerging regulatory environment.

Benefits of Cisco EnergyWise Technology and Management

- Simplicity: Fast and easy deployment, management, and ongoing maintenance.
- Comply with emerging regulatory environment: Start tracking carbon savings today.
- Energy transparency: See the way energy is used across your enterprise.
- Identify savings opportunities across the enterprise: Save 60 percent or more of your energy costs.

What EnergyWise Management Provides by Working with Cisco EnergyWise

- A centralized interface for measuring, analyzing, reporting, and regulating the energy use of all devices connected to the network using existing infrastructure
- Sophisticated policies for optimizing energy throughout your enterprise without affecting operations
- Simulation capabilities for analyzing the savings potential for implementing policies before turning them on
- Reports for energy analytics, policy optimization, troubleshooting, and energy savings
- Enterprise-level scalability, security, and reliability
- Minimal operating overhead with easy setup, configuration, and administration

End-to-End Energy Intelligence and Analytics

Cisco EnergyWise Management is a network-based, agentless software solution that enables a complete lifecycle of enterprise energy management using the Cisco EnergyWise protocol, which transports energy usage information from endpoints and systems across the network through switches and routers enabled by Cisco EnergyWise. First, EnergyWise Management uses a unique, agentless discovery and monitoring method to automatically discover and remotely measure all devices and systems on the corporate network by using standard protocols used by those devices and systems.

After discovery, EnergyWise Management continually measures, analyzes, and reports energy use and system utilization captured by Cisco EnergyWise, enabling enterprises to develop policies to regulate energy consumption across the enterprise. The Cisco EnergyWise protocol can put devices into different power states, based on policies and rules developed and controlled using EnergyWise Management.

Cisco EnergyWise Management has a network-based architecture and is managed via a web-based dashboard rather than a heavy agent. The dashboard can be customized to deliver views of energy usage metrics and energy management data by device, department, location, and many other criteria. The savings opportunities EnergyWise identifies can be significant. In many countries saving energy for the business is mandated by the government, and proof of saving energy can provide financial incentives. A typical enterprise can identify energy savings opportunities of 30 to 60 percent annually with this solution.

See the Power with Automated Energy Analytics and Performance-Based Energy Optimization

With Cisco EnergyWise technology and software, the network is used to intelligently and proactively manage power consumption and consistently enforce policies to reduce energy consumption. The Cisco EnergyWise Management software has the ability to measure, analyze, and regulate energy use by providing detailed metrics on how electricity is used. Via the Cisco EnergyWise protocol, management software can turn devices from always on, drawing maximum power, to always available, drawing an optimal amount of power, based on business needs.

Cisco EnergyWise Suite enables coordinated power management utilizing Cisco Borderless Networks for scalability and communication. For example, when an employee enters a building, a series of events takes place that can be harnessed to enhance power efficiency. An employee's badge access might trigger the office phone, lights, computers, and wireless access point associated with that employee to power up and raise the temperature of the office to a proper level. At the end of the workday, the employee's badge triggers the process in reverse, powering down components when they are idle or not needed. When applied across the enterprise, on-demand power management can result in significant energy savings.

Coordination is a primary requirement for dynamic energy allocation in the scenarios described earlier. Many enterprises have individual management systems dedicated to each type of device in a building: one for building controls, another for phones, and another for access points. Normally all of these systems would need to be integrated together to coordinate events for power management. But integrating disparate systems can be difficult and expensive. The Cisco EnergyWise solution can control power across disparate devices and systems, eliminating the need for costly integration.

By using the Cisco EnergyWise protocol, the Cisco management software captures automated energy analytics. This valuable energy intelligence supports corporate sustainability initiatives, such as procurement of energy-efficient devices, and helps enterprises identify energy-saving virtualization opportunities. EnergyWise Management's automated energy analytics can also produce enterprise sustainability reporting on any number of metrics, including energy consumption by device, energy savings, carbon savings, and more. With accurate readings of energy usage, enterprises can apply energy context to power capacity planning in the data center and across the campus environment and building facilities.

Cisco EnergyWise Management goes beyond simple monitoring to provide organizations with policy-based energy optimization capabilities powered by the Cisco EnergyWise protocol. As Cisco EnergyWise injects energy usage information into each packet traversing the network, the management software makes it possible to power manage campus IT equipment, optimize virtualization and cloud computing energy in the data center, and provide automated demand response capabilities. In addition, Cisco EnergyWise Management enables load-adaptive computing to allocate the right amount of power only to those devices that need to perform productive work, minimizing the amount of energy supplied when idle or operating at less than full capacity.

Summary

With automated energy analytics and policy-based optimization, Cisco helps enterprises see, measure, and manage energy consumption. Using a unique, network-based approach that uses Cisco EnergyWise technology, EnergyWise Management software continually tracks and reports energy usage for every device connected to the network, enabling customers to baseline, monitor, and control energy consumption across the enterprise.

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