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 consumption and utilization throughout their different energy domains including IT (across their corporate campuses and data centers), facilities and manufacturing. Up to now, it’s been difficult and cost-prohibitive to capture these measurements in a central location with drill-down visibility by building, device, location, cost center, division or time of day.

What’s required is a comprehensive enterprise energy management solution that encompasses the entire enterprise; across the organization’s 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 primarily HVAC and lighting systems and in manufacturing process controls and industrial automation systems and much more. Internet Protocol (IP) is the great homogenizer and as such, organizations can extend the power of the network to instrument and control power consumption beyond IT to facilities and manufacturing. Due to the large scale and distributed nature of large enterprise, effective enterprise energy management solutions should also work without having to install software agents on endpoint devices or systems. With an agentless and comprehensive solution, organizations will gain the ability to optimize and reduce energy consumption 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.
- Optimize virtualization and cloud computing environments.
- Support demand response programs with policies that include IT equipment.
- 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 leverages the network to interface with the existing energy instrumentation of those systems and devices.

**JouleX Energy Manager**
The JouleX Energy Manager (JEM) is a network-based, agentless technology that identifies and prioritizes energy savings opportunities by monitoring, measuring, and analyzing energy use across the enterprise. In addition, JEM goes a step further by regulating energy usage of all network-connected devices and systems, including IP-connected heating, ventilating and air conditioning (HVAC) systems. Unlike other systems, JEM 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.

JouleX Energy Manager leverages an organization’s existing network infrastructure and a unique agentless discovery method to automatically discover all devices on the corporate network. After discovery, JEM continually monitors and reports energy usage and utilization, enabling enterprises to monitor, analyze and control energy consumption. Based on the energy metrics collected, JEM provides energy intelligence that can be used to identify savings opportunities and develop policies and rules to optimize energy usage and reduce costs on a massive scale. A typical enterprise can identify energy savings opportunities of 30-60 percent annually. JEM also provides robust reporting to support compliance and corporate sustainability initiatives and show incremental improvements over time.

JouleX Energy Manager illustrates and provides visibility into all Cisco EnergyWise enabled devices as well as legacy infrastructure. JEM 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 leverages Cisco EnergyWise and other standard network protocols to regulate power to all network-connected devices and systems. Through Cisco EnergyWise, JouleX is able to extend the network beyond IT into other energy domains (i.e. facilities and manufacturing).

**Primary Functions for Enterprise Energy Management: Measure, Analyze and Report, Regulate**

The JouleX and Cisco solution performs four primary functions to automatically measure, analyze and report, and regulate energy consumption on all network-connected devices and systems across the enterprise without the complexity and cost of deploying agents:
1. Measure energy usage across the enterprise by system or device
The JouleX Energy Manager leverages the energy information that Cisco EnergyWise 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 JouleX Energy Manager auto-discovery feature provides unprecedented visibility into energy consumption at a granular level through an inventory of what devices and systems are drawing energy. The systems leverage existing asset management systems and directories to provide meaningful business context behind the inventory.

Cisco EnergyWise-enabled switches instrument endpoint devices and systems with energy information that JouleX Energy Manager then reads immediately upon discovery. The data is then rolled up to the JEM dashboard, which communicates power usage, system utilization, and controls endpoints with time-of-day, event or location-based policies to shed loads at certain times. The Cisco EnergyWise network protocols use 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 a heating, venting, and air conditioning (HVAC) controller reporting the power consumed by attached air handlers.

2. Analyze and report on energy usage
The JouleX Energy Manager pinpoints energy reduction opportunities by analyzing energy data (consumption, costs, carbon, savings, etc.) by any grouping (date, time, location, device, application, cost center, business unit, etc.). JEM also enables enterprises to simulate energy saving scenarios.
Using Cisco EnergyWise query mechanisms, JouleX Energy Manager 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, JEM 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.

JouleX Energy Manager provides interactive, drill-down reporting capability. Use JEM to view energy usage, cost, carbon and potential or real-time savings by location, cost center, business unit, device, system or group. JEM also enables cost and usage comparisons over time for specific devices, locations, etc.

3. Regulate energy consumption through automated policies
JouleX Energy Manager enables enterprises to create policies that automatically regulate energy consumption using JEM’s time-based, location-based and robust event-based policy engine. JEM’s execution proxies use existing network and systems management infrastructure to automatically control energy usage 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 JouleX Energy Manager and the Cisco EnergyWise system if a device should be affected by a signal to optimize the power. Highest priority devices will not shed load, and lower priority devices can be shut down or have power reduced.

For example, enterprises can use the JouleX Energy Manager 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.

JouleX Energy Manager 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 JouleX Energy Manager 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 JouleX Energy Manager. A common message format is used by all devices enabled by Cisco EnergyWise to communicate, simplifying energy management. JEM and Cisco EnergyWise maintain network security by using authentication between management systems and the network, between clients, and between network devices.

**Features of JouleX Energy Manager (JEM)**

- Agentless network-based system – simple deployment with no maintenance overhead for agents.
- JEM energy policy – align energy information with your business and apply rules to govern usage.
- Multi-vendor 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 – leverage 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 and JouleX Energy Manager
• 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.
• Identifies savings opportunities across the enterprise – save 60% or more of your energy costs!

By working with the Cisco EnergyWise, JouleX Energy Manager provides:
• A centralized interface for measuring, analyzing and reporting, and regulating the energy consumption and utilization of all devices connected to the network leveraging existing infrastructure
• Sophisticated policies for optimizing energy throughout your enterprise without impacting 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 (analysis)

How does it work?
The JouleX Energy Manager (JEM) 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 Cisco EnergyWise enabled switches and routers. First, JEM leverages a unique, agentless discovery and monitoring method to automatically discover and remotely measure all devices and systems on the corporate network by leveraging standard protocols used by those devices and systems.

After discovery, JouleX Energy Manager continually measures, analyzes and reports energy usage 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 JEM.

JouleX Energy Manager 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 JEM 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 30-60 percent annually with this solution. JEM also provides robust reporting which can be used in a variety of countries that now require carbon usage monitoring.

See the power—with automated energy analytics and performance-based energy optimization
With JouleX and Cisco EnergyWise, the network is used to intelligently and proactively manage power consumption and consistently enforce policies to reduce energy consumption. The JouleX Energy Manager has the ability to measure, analyze, regulate energy use by providing detailed metrics on how electricity is consumed. Via the Cisco
EnergyWise protocol, JEM can turn devices from always-on, drawing maximum power, to always-available, drawing an optimal amount of power, based on business needs.

JouleX Energy Manager and Cisco EnergyWise enable coordinated power management utilizing Cisco Borderless Networks for scalability and communication. For example, when an employee enters a building, a series of events take 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 work day, 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 above. 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. Cisco EnergyWise network-wide policies and the JouleX Energy Manager can control power across disparate devices and systems, eliminating the need for costly integration.

By leveraging Cisco EnergyWise, the JouleX Energy Manager 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. JEM’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, across the campus environment and building facilities.
JouleX Energy Manager 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 JouleX Energy Manager 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, JEM 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, JouleX helps enterprises visualize, analyze and control energy consumption. Using a unique, agentless approach that leverages Cisco EnergyWise, JouleX 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.

This innovative solution uses the network intelligently to help enterprises actively manage and reduce power consumption across the entire corporate infrastructure. By harnessing the power of the network, JouleX and Cisco EnergyWise can identify, manage, and reduce energy consumption and lower energy costs.

**For more information**

For more information about JouleX Energy Manager and Cisco EnergyWise, please contact [Cisco-sales@joulex.net](mailto:Cisco-sales@joulex.net).