



Let's build a smarter planet™

IBM Green Innovation Data Center helps developers build green technology

Overview

The Need

Consolidate disparate data into real-time dashboards that enable operations, developers and researchers to quickly assess the energy impact of new technologies.

The Solution

An energy management solution that integrates information from more than 150 sensors measuring temperature, air pressure and water flow along with power monitoring, and correlates it with infrastructure data.

What Makes it Smarter

Real-time energy, thermal and IT dashboards allow staff to conduct what-if scenarios on environmental and energy impact to improve products and services and gain new visibility to reduce energy use.

The Result

"Now we can view data through a consolidated dashboard and use it in a meaningful way to manage our data center and to deliver better solutions to our clients."

—Glendowlyn F. Howard, GIDC
Program Manager, IBM CIO Innovation
Initiatives Team

Energy efficiency is one of the most pressing issues facing the IT industry. As a leader in protecting the environment and innovative energy-efficiency initiatives, IBM is focused on providing offerings that can help reduce energy consumption and help its clients create "green" data centers. But to do this, IBM innovators need the ability to assess the energy and environmental impact of products under development.

Enter the IBM® Green Innovation Data Center (GIDC). Under the management of IBM's CIO Innovation Initiatives organization, and as part of a strategic alliance with IBM Corporate Environmental Affairs, Integrated Technology Delivery, T.J. Watson Research Center, Software Group, and Systems and Technology Group, the GIDC supports the validation of IBM's green product offerings, while providing low or no-cost opportunities for IBM innovators to build and test new applications and solutions.

This 2,000-square-foot facility also hosts hundreds of applications that are used by more than 300,000 IBM employees and provides a showcase for companies worldwide to view energy efficient technologies in action. It uses the latest hardware and systems from IBM and technology partners, including IBM Power Systems™, IBM System x® servers, IBM System x iDataPlex™, IBM BladeCenter® systems, IBM XIV® Storage System and IBM System Storage DS® technology.





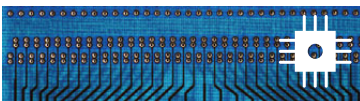
Business Benefits

- Arms researchers and developers with critical information to improve energy efficiency of new products
 - Achieved roughly four times the server capacity while power consumption remained almost flat
 - Provides showcase to demonstrate how companies can reduce their environmental impact while maximizing operational efficiency
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To help better understand the energy and environmental impact of new products, the GIDC has placed hundreds of sensors and power monitoring tools across the data center to measure power, temperature, air pressure and water flow. For example, all computer room air conditioning units and cooling distribution units have power and flow meters for calculating power use. The center's power distribution unit is connected to a monitoring system that displays the gross amount of power being consumed at each panel and at each branch circuit. Temperature sensors (approximately 150 in all) are located below the floor and on the ceiling to provide the data center's envelope thermals. Rack temperature sensors are located at specific heights (1.5, 3.0, 4.5 and 7 feet) to provide thermal slices through the data center and to monitor rack inlet and exhaust temperatures.

However, to make intelligent use of the information, the staff needed a way to integrate and correlate the information in real time. "One of the key evolutions for us has been taking the instrumentation we invested in and integrating the information so we can gain some intelligence out of it," explains Glendowyn F. Howard, GIDC Program Manager, CIO Innovation Initiatives Team. "Before we could view data and manage each piece of equipment, such as the air conditioning units, through the vendor's software. But without the ability to view the metrics across the data center we couldn't easily identify issues affecting cost, consumption and availability."

Smarter Infrastructure: Creating new energy efficient technologies



Instrumented

Energy and environmental data are captured from more than 150 sensors and metered power across the data center.



Interconnected

The solution correlates data from IT, infrastructure and facilities assets to provide insight into energy and environmental patterns and infrastructure performance.



Intelligent

Real-time dashboards enable data center staff, researchers and developers to quickly understand the energy impact of new technologies and adjust product designs and services accordingly.



Solution Components

Hardware

- IBM® BladeCenter® HS21, LS41
- IBM System x® 3950
- IBM System x iDataPlex™
- IBM Power Systems™
- IBM System Storage™ DS4800, DS6800
- IBM XIV® Storage System

Software

- IBM Maximo® Asset Management for Energy Optimization
 - IBM Systems Director Active Energy Manager
 - IBM Tivoli® Business Service Manager
 - IBM Tivoli Common Reporting
 - IBM Tivoli Data Warehouse
 - IBM Tivoli Directory Server
 - IBM Tivoli Identity Manager
 - IBM Tivoli Integrated Portal
 - IBM Tivoli Monitoring for Energy Management
 - IBM Tivoli Provisioning Manager
 - IBM Tivoli Storage Manager
 - IBM Tivoli Storage Productivity Center
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According to Howard, IBM energy management solutions have helped the organization consolidate this disparate data into real-time dashboards that enable developers and researchers to quickly assess the energy impact of new technologies. The solution, which uses IBM Tivoli® Monitoring for Energy Management, IBM Maximo® Asset Management for Energy Optimization, IBM Tivoli Business Service Manager, IBM Systems Director Active Energy Manager, IBM Tivoli Common Reporting and IBM Tivoli Data Warehouse, provides a comprehensive view of energy and environmental impact including:

- A high level view of how efficiently the data center is operating
- Energy reports that enable teams to drill down into power utilization effectiveness (PUE) and data center infrastructure efficiency (DCiE) metrics to understand power consumption and troubleshoot issues
- Energy management dashboards that group power and cooling by equipment types so IT and facilities personnel can understand the performance, utilization and availability aspects of each hardware type
- A real-time thermal map of the data center that allows teams to see the immediate impact of any cooling failures, identify “hot spots” and take corrective actions

Using the agent builder extension of IBM Tivoli Monitoring for Energy Management, the GIDC and Research teams created the necessary interfaces to integrate data from older sensor networks and non-standard technologies. Because the GIDC acts as a test bed for new products, these agents are now available through Tivoli software solutions—enabling other companies to benefit from an out-of-the-box interface instead of having to create it themselves.

“Through our consolidation, virtualization and energy management efforts we have roughly four times the server capacity occupying half the space and our power consumption has remained almost flat,” says Howard. “Before our consolidation we had approximately 380 physical servers located in four distinct locations and a virtualization capacity of 400 servers. Today we have approximately 500 servers in one location that uses half the space, and our virtualization capacity is approximately 1,600 servers.”



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Additionally, to gain the visibility, control and automation needed to deliver high-quality services the organization uses IBM Integrated Service Management solutions for provisioning, security and compliance, and storage management. For example, IBM Tivoli Provisioning Manager automates provisioning of servers in the organization's virtualized environment. IBM Tivoli Storage Productivity Center centralizes, simplifies and automates storage tasks for the organization's storage systems, and work is underway to deploy IBM Tivoli Identity Manager to automate lifecycle management of user roles, identities and access rights.

Developing greener products

How has this new insight helped? For Howard, the greatest impact can be seen in how workload is balanced in the data center and in IBM's delivery of new green products and services. For example, the data center operations team can proactively move workload when it sees resources are approaching their limits. Another example is that researchers have been able to experiment with new power-scaling technologies to further reduce energy consumption on IBM servers. They've been able to test rack “snorkel” technology to cost-effectively redirect rack airflow for better cooling. Using the thermal mapping capabilities of IBM Maximo Asset Management for Energy Optimization, the researchers have also been able to analyze how altering the physical layout and cooling set points affects the thermal map of the data center. This helps organizations determine the most energy efficient data center layout and facilities equipment settings.

“Before, we had a large amount of data but no way to really use it,” says Howard. “Now, we're able to view data through a consolidated dashboard and use it in a meaningful way to manage our data center and to deliver better solutions to our clients.”



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What's more, the information has helped the GIDC maximize operational efficiency as it hosts critical applications, such as the IBM Corporate Wiki, Blog and Media Library, which are used by more than 300,000 employees.

"If I have a server in a rack that's highly utilized, I can now see which resources are approaching their limits, how much power the server is pulling, how much heat it puts out, and understand the exact impact that it is having on the data center," says Howard. "This insight enables us to make intelligent choices about where applications run and how we can best support our users."

For more information

To learn more about how IBM can help you transform your business, please contact your IBM sales representative or IBM Business Partner.

Visit us at: ibm.com/tivoli/solutions/green



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