Incentive programs for data center thermal analysis, energy assessments and server consolidation projects

Reduce your data center power and cooling costs, demonstrate your commitment to the environment and possibly qualify for an incentive for your efforts.

Point of view

Technology advances in IT systems deliver more and more computing power for your dollar, but they can also stress your power and cooling infrastructures and, in some cases, your local utility grid. With virtualization offering increased performance per watt of power and advanced thermal diagnostics delivering pinpoint control for your cooling infrastructure, you can regain control of your energy and cooling requirements. And in addition to the reduction in operating costs you may achieve, your company may be eligible for an incentive from local utilities and/or state energy funds. As a result, you may be able to improve the efficiency of your business, free up data center space and increase capacity for future growth while maintaining current costs, reduce your cooling and take actions that demonstrate your company's commitment to a better environment.

Current focus and trends

Computing technologies are becoming increasingly powerful and power hungry. While the enhanced capabilities of new server, storage and networking equipment help you deliver bottom line results to your business, this new equipment can stress the power and cooling infrastructure of your data center and your utility company. This stress creates a range of potential demands for your data center operations:

- *Your data center may not be able accommodate new equipment due to power and cooling capacity limitations or space.*
- *Your data center may have hot spots that cause reliability issues.*
- *The cost of power and cooling for your data center is increasing.*
- *Your company may have made a commitment to reduce its carbon footprint, but increasing power demands in your data center(s) make it difficult to achieve this commitment.*
- *Your utility company is attempting to reduce existing demand to meet new service requirements and is actively seeking ways to make its current customers more efficient.*

An imposing list of concerns—yet solutions are readily available today that can help free up capacity and improve the efficiency of your data center operations. These solutions can deliver cost reductions through improved utilization of your space, higher productivity of your staff and decreased energy requirements. In addition, you may possibly qualify for project incentives or subsidies available through your state or utility energy efficiency fund.

The solution

Advanced computing capability and increased performance of next generation IT equipment offer significantly improved power efficiency and cooling capacity for your data center.

Generation to generation IT equipment requires more power and cooling per unit of space, but it delivers more computing power per unit of applied energy. Properly configured, new server equipment can help you to do more work on less equipment, reclaiming power and cooling capacity for your data center operation.

Industry figures show that many servers have low utilization rates. In x86-based server environments, Windows® and Linux® server utilization often falls below 15% of CPU resources[1]. Many UNIX® servers are only 15 – 25% utilized[2]. This means that your servers can be spending as much as 75 – 90% of their time consuming your power and cooling resources without delivering any work. Virtualization and consolidation capabilities enable you to consolidate the workload from multiple servers onto a single server, driving server utilization rates up to 50 to 70% and potentially delivering as much as four to six times the work on x86 and UNIX servers at reduced costs. For example, PG&E and IBM announced on May 10, 2007, that PG&E will consolidate nearly 300 UNIX servers onto 6 IBM System p5 servers, helping to reduce 80 percent of its energy and facilities consumption, and will use IBM virtualization technologies to boost utilization of the systems from 10 percent capacity to over 80 percent. This server consolidation project will result in $25 Million payback over three years and includes savings in personnel, application maintenance, hardware support and energy. The energy savings alone are projected to be $2.8 Million[3].

IBM server virtualization solutions can support successful server virtualization by combining expertise, tools and methods for your workloads. Using a phased set of activities to build, pilot, deploy and validate business expectations along the way, our solutions tap into IBM technical and industry experience to help deliver a focused and responsive solution. IBM's expertise in virtualizing and consolidating IT infrastructures helps you to realize the benefits of aggregating and accessing underutilized computing power:

- *Reducing or eliminating unneeded equipment*
- *liberating power and cooling capacity and valuable floor space*
- *improving systems management*
- *reducing operating costs*

All of these benefits can help position your business to respond more quickly to new business demands and opportunities.

Many data centers are 10 to 15 years old, and critical infrastructure equipment is reaching the end of its useful life. New infrastructure equipment can deliver improved energy efficiency, freeing more power and cooling for the IT equipment in your data center. Older data centers can benefit from a check-up, a real time profile and modeling of the data center thermal conditions. Based on this customized profile, data center professionals can help you modify equipment and cooling unit layout and air flow characteristics to deliver potential savings of up to 40% in airflow and cooling costs[4]. Power and cooling may be an issue in your data center, but there are steps that you can take today to "cool" things off, take back control of your data center and deliver improved value to your business.

Data center efficiency services

As a major provider of IT equipment and data center services, IBM offers a wealth of expertise to help you assess the health and efficiency of your current data center. Available services include:

- **IBM Data Center and Facilities Strategy Services**–*data center energy efficiency assessment–provides a comprehensive, fact-based analysis that prioritizes tactical plans across your data center to assist in improving energy efficiency and reducing energy related costs.*
- **IBM IT Facilities Assessment, Design and Construction Services**–*data center stored cooling solution–provides a turnkey, patented thermal storage solution to help improve the efficiency of the cooling system to dramatically reduce data center energy costs between 40 – 50 percent.*
- **Thermal Analysis for High Density Computing**–*assists in identifying and resolving heat-related problems within existing data centers and provides options for cost savings and future expansions.*
- **Total Cost of Power (TCP) Rapid Assessment of IT Systems Energy Efficiency**–*investigates and analyzes a client's IT power, cooling and space utilization.*
- **Server and Storage Power/Cooling Trends and Data Center Best Practices**–*review power/cooling trends of the current IBM product line; provide future power/cooling trends (under non-disclosure agreement); and show how they impact the data center. Provides state-of-the-art data center designs and potential ventilation schemes used in cooling high density racks.*
- **IT Systems Performance and Power Evaluation**–*examine the power profile of all server and storage equipment to develop total data center power levels, technical solutions and business cases for optimization.*

IBM data center efficiency services can help increase the productivity of your data center and provide power and cooling capacity to support your future business needs.

The opportunity

Your utility or state energy efficiency program may have available incentives that could potentially cover a portion of the cost to install new energy efficient equipment, virtualize your systems or profile and improve the thermal characteristics of your data center. Let's explore this further.

Here are the steps that *typically are* involved in preparing the information required to make an energy incentive request from your utility or an energy efficiency incentive program. This represents the general approach to preparing an incentive application, but specific requirements may vary by utility or program:

1. **Identify available programs:** Contact your electrical utility or state energy efficiency program to determine what energy efficiency incentives may be available for IT consolidation or data center energy efficient improvement projects. It is important to complete this step early in the process. Some incentive programs have detailed application procedures and require project pre-notification.

2. **Assess existing power usage:** Determine the power usage for the total data center or the system or hardware to which you are going to make the improvement. Specific measurements may include the chillers, the air handling units (HVAC) and your IT equipment. The chosen measurement point will depend on the power monitoring capabilities at your facility, the expertise of your facilities team and the recommendations of the *utility or state* energy efficiency team. Also consider the time period for the assessment. Electrical draw from IT equipment or Uninterruptible Power Supplies (UPSs) will be fairly constant, while chiller or HVAC energy usage will vary over the year with outdoor temperature and humidity conditions.

3. **Work with available project design and energy efficiency teams:** Many energy efficiency groups will provide project support to help you maximize the energy efficiency gains, cost savings and incentives in your project. Partnering with your utility also helps you assure that you are meeting all of the requirements for the program.

4. **Calculate the energy savings from your project:** Perform direct measurements of your power usage after your project is implemented or perform calculations of the energy savings benefits. Your utility or efficiency program can help you with this requirement.

5. **Submit a final incentive application:** Enjoy the benefits of your energy saving project, submit your request for your incentive payment and publicize your efforts to be more energy efficient and help the environment. Incentive amounts generally will depend on the amount of energy saved and vary by program.

Energy efficiency incentive program examples

There are currently over 80 energy efficiency incentive or rebate programs offered by local utilities or state energy efficiency programs in the United States alone. The criteria and acceptable projects will vary by program, but an increasing number of energy efficiency programs are recognizing IT consolidation and data center improvement projects for incentives or rebates. Here are three examples of potential applications[5]:

1. **PG&E Virtualization/Server Consolidation Projects Incentive:** For example, PG&E offers financial incentives to customers who undertake IT virtualization projects that result in the removal of computing equipment. The incentive is based on the amount of energy saved, predicted through a calculation model.[6]

2. **Xcel Energy Incentive Program:** Under the Xcel custom project program, a customer can receive $200 per kW of demand savings. A project that removes 4 racks of servers, 7 DASD units and 10 tape units and replaces them with 2 server racks and 2 DASD units could reduce the data center demand profile by 98.9 kW[7]. This project could be eligible for an incentive or rebate of as much as $19,780.

3. **Efficiency Vermont Incentive Program:** Customers may receive incentives or rebates for studies or assessments that result in operational energy savings. A data center thermal assessment that results in reduced cooling costs through air flow and delivery optimization could be eligible for an incentive or rebate of some or all of the study cost.

The results

Your data center operations do not have to succumb to the increasing challenges of escalating power and cooling demands. Instead, you can harness technology to deliver improved results for your business, the environment and your local electrical utility while financing a portion of the project through an energy efficiency incentive.

Server consolidation and upgrade projects and data center thermal profile improvement projects can let you reclaim power, cooling and space in your data center. These efforts can deliver costs savings and room for future growth.

In addition, reducing your power usage can reduce the carbon dioxide emissions from your operations. With increasing governmental, public and business focus on addressing the challenges of climate change, better energy efficiency in your data center can help the environment by reducing your carbon footprint.

Finally, reducing your power demand can assist your local utility in satisfying the requirements of state demand-side management programs, allowing them to add system capacity without expensive capital investment in generating facilities. Your reward: an energy efficiency incentive.

For more information

To learn more about potentially optimizing your IT infrastructure and the IBM Energy Efficiency Initiative, please contact your IBM marketing representative or IBM Business Partner, or visit the following Web sites: **ibm.com**/systems/optimizeit/cost_efficiency/energy_efficiency/

IBM Corporation
New Orchard Road
Armonk, NY 10504
U.S.A.

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Incentives or rebates are available vary by utility and are subject to the terms and conditions of the applicable incentive program. IBM does not represent the incentive or rebates for individual customer situations. Customers are responsible for evaluating and preparing their own incentive or rebate requests.

Customer examples cited represent how some customers have used IBM products and services and the results they may have achieved. Actual costs and savings and performance characteristics will vary depending on individual customer configurations and conditions.

[1] Gartner's Top Predictions for IT Leaders, 2007 and Beyond, Gartner, Inc. 1 December 2006, p. 15

[2] UNIX Consolidators Favor IBM pSeries, Gabriel Consulting Group, March 2005, p. 3

[3] **ibm.com**/press/greendatacenter.

[4] The Uptime Institute. "High Density Computing: The Path Forward 2006", p. 2; **ibm.com**/press/greendatacenter.

[5] The examples given in this paper above are, based on real experience in working with incentive or rebate programs and assisting customers with consolidation projects. These are just examples and there is no guarantee of comparable results. Many factors or variables determine the sizing requirements and performance of a systems architecture.

[6] www.pge.com/biz/rebates/hightech/htee_incentives.html

[7] Energy calculations based on power data provided in the product specifications.

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