SUMMARY

U.S. Environmental Protection Agency (EPA) Region 8 implemented a best-in-class, "Green" Information Technology Data Center which has significantly reduced its impact on the environment.

INTRODUCTION

As organizations increase their information capacity by buying and using more information technology (IT) systems, they require more electricity and cooling capacity within their data centers. This capacity building with new equipment adds to an organization's equipment and energy costs, as well as increases an organization's greenhouse gas emissions from energy use. Organizations interested in increasing their information capacity, while reducing their costs and carbon footprint, are turning to a variety of solutions. Data center optimization strategies focus on the convergence of resources (data center, servers, storage, networks, business applications, infrastructure products) along with actions such as refreshing, consolidating, retiring and virtualizing servers.

THE PROBLEM

EPA Region 8, like many other organizations inside and outside the federal government, has an ever-increasing reliance on IT. Under their old data center model, 20 servers were each dedicated to their own tasks such as: email, printing, and database storage. Region 8's reliance on older technology and outdated business practices created an excessive carbon footprint, added expenditures, and resulted in inefficient systems management. Region 8 was interested in reducing its data center environmental footprint, while at the same time upgrading the technology used in the data center. They anticipated that these actions would support EPA's mission to reduce the Agency's environmental impact, while maintaining the level of IT services needed by the Region. Region 8 turned to virtualization solutions to meet their goals.

IMPLEMENTING A SOLUTION

The process of virtualizing Region 8's data center was planned in phases. Before work began, the Region prepared by scoping out best practices from other businesses/government agencies that have implemented virtualization, and coordinating with EPA Headquarters to discuss equipment standards, processes, and procedures.

In the second phase of the project, the team researched possible equipment solutions to ensure the stringent power requirements, as well as EPA's green standards for electronics procurement, were met. There were also multiple network configurations that had to be completed in order to prepare for the implementation of the virtual infrastructure, while ensuring continued system access for users.

Once all the equipment and networking changes were in place, the team received training, and with the help of a consultant, started building the virtual server environment. To ensure continuous availability of systems during the work week, migration and testing of servers was performed after hours and on the weekends. As of April 30, 2010, all of the files shares, print shares, intranet, applications, patching, and anti-virus servers were all running in the virtual environment.

THE RESULTS

Under the new, energy efficient data center model, only two high performance servers are needed to provide most services to employees, resulting in less energy use. Within these two physical servers, many "virtual guest" servers deliver services. By consolidating from 20 servers to two, the data center reinvention project reduced the number of physical servers running in the data center by 85%. This concerted work effort will not only save Region 8 money, but also increase the efficiency of the IT infrastructure management. By implementing this new business practice, over $91,000 in physical equipment replacement costs, plus over $19,500 in server maintenance costs, are projected to be saved

the next three years. The anticipated power savings from virtualizing the Region 8 infrastructure is approximately 86,000 kWh per year.[1] In addition to reducing maintenance costs, and energy and carbon emissions, server virtualization also reduced the time needed to create a new server from over 5 hours to 2 hours. Finally, the physical servers that were replaced through virtualization were recycled according to the Agency's standard for environmentally sound disposition.

Figure 1: Projected Savings from Region 8's Virtualization Project
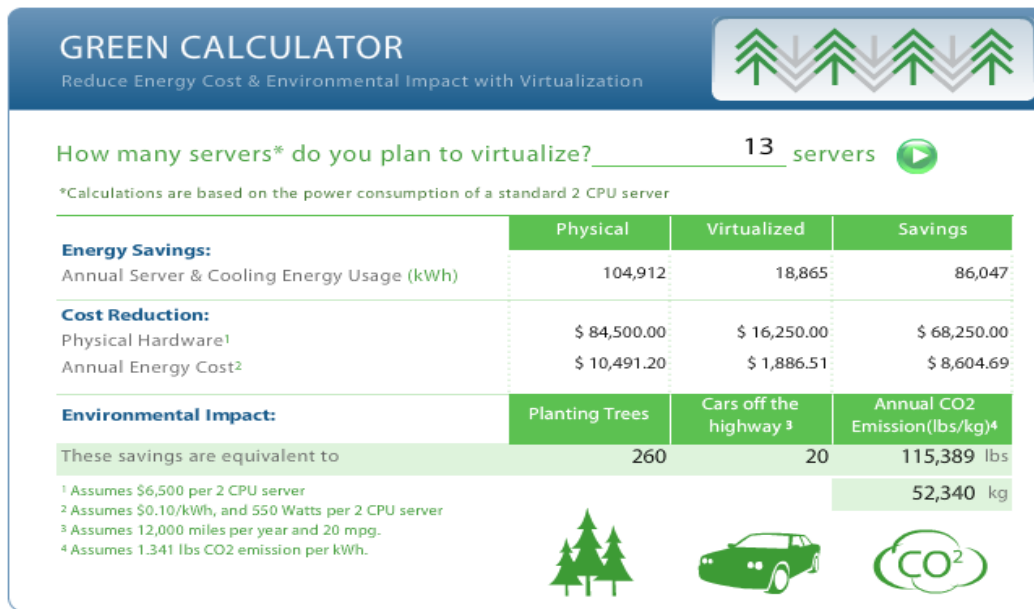
The end goal of any data center optimization project is to improve utilization, and keep IT inventory, storage space and power requirements to a minimum while maintaining appropriate Service Level Agreements and user connectivity. Region 8 discovered that migration of systems into a virtual environment provided increased performance and better recoverability; cost savings on reduced energy consumption; and reduced environmental impact.

CONTACT INFORMATION

If you have questions related to this resource or need other assistance with the Federal Electronics Challenge, please contact your Regional Champion: http://www2.epa.gov/fec/technical-assistance.

Visit the FEC online: http://www2.epa.gov/fec/

E-mail the FEC: fec@epa.gov

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[1] Projected cost and energy savings were calculated using the Green IT Calculator, available at http://www.vmware.com/solutions/green/calculator.html