

National Data Center Power Reduction Incentive Program

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Program**

Proposal to the United States Secretary of Energy, Dr. Steven Chu



A Proposal from the Board of Directors of Data Center Pulse

<http://www.datacenterpulse.org/>

May 6, 2009

National Data Center Power Reduction Incentive Program

Executive Overview

Problem Statement:

Upwards of 2%¹ of our nation's power is consumed by our nation's data centers, computer rooms, and engineering spaces. The EPA estimates that annual growth in data center energy consumption is roughly 16%. Proven energy efficiency solutions exist for data centers that dramatically improve efficiency of power usage. However, adoption rate is abysmal. Solutions have existed for over 5 years, but are not adopted due to risk aversion, misunderstanding or lack of corporate prioritization. Decisions are based on a limited knowledge of the long term ROI potential. A small percentage of utility districts offer energy reduction rebate programs. These programs are unable to make significant headway in getting businesses to change their energy use habits due to the lack of a common national framework.

*"According to the government's best estimates, energy usage in data centers has doubled between 2000 and 2006, and it's poised to double again by 2011. The government has plenty of reasons to care about this, but one of the most obvious is financial. If growth continues at current levels, the federal government alone will be shelling out \$740 million for data center electrical bills in 2011."*¹

Opportunity Statement:

The potential for data center energy efficiency improvement is as much as 80%¹. This target is too significant to ignore. With appropriate funding and focus we can reduce our nation's power consumption over the next three years by upwards of 1% and in so doing also limit or even halt our long-term energy consumption growth. As corporations engage this program they will purchase capital assets, make capital improvements to their facilities, and push vendor companies to develop new more efficient solutions. Through this program we can improve the economy, strengthen our "green tech" industries and reduce our dependence on foreign energy.

Proposal:

Data Center Pulse², an organization of independent, vendor neutral, national and global data center owners is proposing the creation of a partnership with the federal government. Through this partnership a national standardized power efficiency rebate program related to data centers and other compute related facilities would be created. The program development and leadership would come from Data Center Pulse, with rebate funding support from a combination of the federal government and utilities.

There is no better time than the present for the U.S. Government to take a leadership role in combination with Data Center Pulse to support a nationwide compute infrastructure power efficiency improvement program in cooperation with utilities, utility districts, and business. With Data Center Pulse providing program leadership and management you have the strength of nearly 1,000 data center owners and operators with years of experience and expertise in this space providing a sounding board and "feet on the street" for the entire community of users and partners to leverage. By leveraging the Data Center Pulse end-user community, program development and execution can be accelerated and end-user adoption dramatically increased.

¹Taken from "Report to Congress on Server and Data Center Energy Efficiency Public Law 109-431"

²Data Center Pulse is a vendor neutral global organization of data center owners and operators (www.datacenterpulse.org)

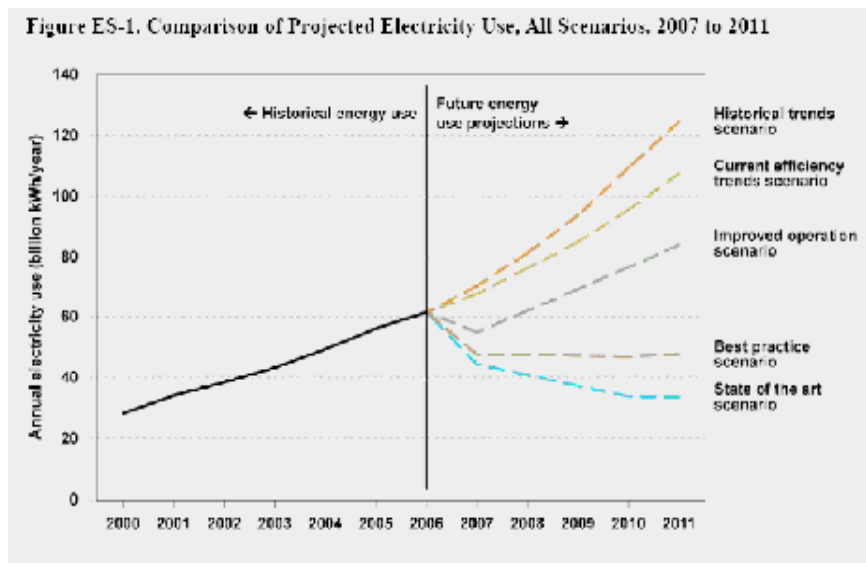
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Problem Background:

Data centers in the U.S. have an estimated power efficiency improvement opportunity of anywhere from 10% to as much as 80%¹.

Data Center Pulse estimates over 3 years, our nation's compute infrastructure can minimally achieve a 25% reduction in power use. Based on the EPA estimates stating that Data Centers consume roughly 2% of the nation's power, a 25% improvement would equate to a overall savings of .5%. We believe the actual computer room and lab space power consumption to be much higher and that the opportunity for national power use savings is closer to 2%. This is based on the fact that many smaller computer rooms and engineering spaces were not considered in the original LBNL/EPA report.

The EPA estimates that data center power consumption is growing at an average annual rate of 16%. This means that Data Centers will more than double their power requirement in 5 years, going from approximately 1.5% in 2006 to 3%+ in 2011. Graphic #1 is a representation from the EPA report to congress that illustrates the problem and the potential opportunity to reduce power use down to roughly year 2000 levels.



Graphic #1

Many executives and data center employees don't understand their current situation relative to power use and or the opportunities for making improvements. They also don't have appropriate incentives for making the change. In some cases the payback is relatively low value and multi-year, this makes it hard to justify against projects that are focused on business process improvement or have a more immediate return on investment.

¹Taken from "Report to Congress on Server and Data Center Energy Efficiency Public Law 109-431"

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A large number of solutions, best practices and new technologies are available today, but are either misunderstood or are considered a low priority for implementation. The following are just two of the many examples of technologies that have been proven in production environments for several years now, and yet are still not being fully and effectively deployed. Examples of available, but under utilized power efficiency solutions:

Example 1: Airside Economizers

- Air-handling equipment comprises 25% or more of the total energy consumed within a data center.
- Airside/Waterside Economizers have the potential to reduce power requirements of HVAC systems by up to 80% for most locations.
- Current estimated use of airside/waterside economizer systems nationally is $\leq 5\%$ of businesses (based on discussions with data center staff and anecdotal evidence).

Example 2: Server Virtualization

- IT equipment represents 50% of total energy consumed within a data center.
- Virtualization can reduce IT equipment power requirements by up to 80%.
- Virtualization has been available for 10 years and production ready for 3-5 years.
- Few organizations have more than 20% of their servers virtualized.

In summary, overall power consumption in a data center can be reduced by as much as 60% just using the two examples above. On a larger scale, this represents a reduction an overall energy consumption of 1.2% (60% of 2%).

Virtualization Example (Actual Customer Case)

<u>Before Virtualization</u>	<u>After Virtualization</u>
60 x 2-CPU servers 4 racks 16 rack mount UPSs Backup AC running in parallel 550W per server = 290 kWh / yr Cooling = 290 x 1.25 = 363 MWh TOTAL = 653 MWh	70 VMs on 5 x 2-CPU servers (14:1) ½ rack 2 rack mount UPS Backup AC on standby only 700W per server = 30 MWh / yr Cooling = 30 x 1.25 = 38 MWh TOTAL = 68 MWh Annual Savings: 585 MWh (90%)
Annual cost: \$78K (12 cents / kWh)	Annual cost: \$8K Annual savings: \$70K => 20% of total site power bill <=

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Graphic #2 represents a Data Center statistic model developed by IDC.

Datacenters are huge CO2 factories

1 full rack of blade servers = 20-25 kW
= peak demand of 30 homes

Every server removed saves ~4 tons of CO2 emissions per year

Equivalent to taking ~1.5 cars off the road (15,000 miles @ 20 mpg)

Un-utilized server capacity in the industry equates to:

\$140 billion, 3 year supply, more than 20 million servers (IDC)

80 million tons of CO2 per year, more than half of ALL countries in South America produce



Sources: IDC, Virtualization 2.0, John Humphreys; <http://cam.a.org/dig/show/world+country>

Graphic #2

Existing Rebate/ Incentive Programs:

Currently, only a small number of utilities offer programs to customers who implement new technology to reduce power consumption. Existing programs are complex and difficult for the consumer to leverage. As a result, much of the money set aside by utilities for incentive programs is unused (Pacific Gas & Electric – Mark Bramfitt - Rebate Program Manager). In other cases, many companies interested in programs find them not available in their area.

Program Details:

Create a national program with Federal incentives. The creation of a national program establishes a standardized and simple approach to obtaining power rebates. Improving the dollar value of the rebates would dramatically increase program interest and acceptance by reluctant companies. The press associated with this type of large national program would put additional pressure on companies to participate, further driving up program adoption.

The program provides significant incentives for increasing infrastructure improvement efforts. Many companies would perform building improvement projects to replace aging mechanical and electrical systems. This further drives acquisition of newer high-tech solutions.

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A well-executed program would accomplish the following high priority national objectives:

- Take the U.S. a big step in the right direction towards our goals for energy self-reliance, while also improving the environment and making our companies more competitive.
- Drive up investment in building improvements and capital equipment. Helping to improve durable goods orders and increase payrolls.
- Increase investment in new Technology and drive up adoption of solutions currently available. Also having the effect of keeping the U.S. in the lead on Green tech.

Program Leadership & Execution:

Data Center Pulse is an organization of global data center owner/ operators. Currently, Data Center Pulse has over 870 members, whom have responsibility for their company's data center. Data Center Pulse is volunteering as a non-profit entity to lead the organization and development of this program in conjunction with the support of the Federal Government and the various utility districts across the U.S. In order to ensure enforcement across the various utility districts agreements between the Fed and the utility districts would need to be established. This authority and basic participation agreement allows Data Center Pulse to more effectively execute against program goals.

The power reduction program would be defined in phases:

- Phase 1: Develop the program guidelines and rebate options
- Phase 2: National Communication of the program
- Phase 3: Begin the power reduction effort
 - Phase 3a: Initial reduction would last one (1) year with a goal of reducing power utilization by two (2) billion kWh per year.

Initial cost projections for the program:

- Rebate program cost to the federal government 200 million dollars based on an assumed average of .10 cents per kWh (2B kWh * .10/kWh = \$200M).
- Cost to implement and manage the plan = 1.5% of rebate total
- Energy provider rebates = 200 million dollars

Additional definition of the program development, leadership and execution would be provided should a decision to move forward be made. Data Center Pulse is willing to lead this effort or to provide support to another organization that the U.S. Government deems more appropriate.

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Conclusion:

There are proven solutions available today that could dramatically improve the efficiency of our nation's data centers. However, without providing incentives to make the appropriate changes, much of this opportunity will be left unrealized for years to come. The average payback for a power reduction program is measured in years. In today's business climate most business leaders are looking for substantial payback in a matter of months. If the U.S. Government backed a simplified national program in combination with local and regional power utility districts, there's a very strong possibility that the United States could realize up to 50% of the potential power savings in the course of 12-24 months post program rollout. In addition to improving our nation's energy self-reliance goals, we would be boosting the economy in several very important segments of technology and manufacturing.

We would be very interested in helping to define and potentially lead the program should a decision to move forward be made.

Please consider this proposal.

Sincerely,

/s/ Data Center Pulse Board of Directors

Board of Directors

Data Center Pulse

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