EPAct Tax Aspects of Data Centers

By Charles R. Goulding, Seann Convey and Kenneth Wood

Charles R. Goulding, Seann Convey and Kenneth Wood discuss the EPAct tax savings that data center operators involved in greenfield and brownfield facility construction and energy management can qualify for as they look for new facility sites.

As humans and businesses increasingly rely on data, data centers housing rows upon rows of servers have expanded in size. Data centers are typically large square footage facilities that consume enormous amounts of electricity. For developers and operators of data centers, the strategies for locating facility sites have continued to evolve. EPAct tax savings can assist data center operators involved in both greenfield and brownfield facility construction and energy management.

EPAct Tax Savings

Pursuant to Code Sec. 179D, as enacted by the Energy Policy Act of 2005 (EPAct),[1] properties that make qualifying energy-reducing investments in new or existing locations can obtain immediate tax deductions of up to $1.80 per square foot. If the building project does not qualify for the maximum EPAct $1.80-per-square-foot immediate tax deduction, there are tax deductions of up to $0.60 per square foot for each of the three major building subsystems—lighting; heating, ventilating and air conditioning (HVAC); and the building envelope. The building envelope comprises of every item on the building's exterior perimeter that touches the outside world including roof, walls, insulation, doors, windows and foundation.

Greenfield vs. Brownfield

Greenfield

Greenfield projects are projects that are either on previously unused land or within old facilities that impose no constraints on the new project. With a greenfield development, data center owners have an opportunity to select locations with low energy costs and construct facilities tailored to data center operators. An optimal operating environment includes maximization of white space (server location areas) and spaces to place enormous amounts of servers, server cooling equipment, network wiring, power supply infrastructure, back-up batteries and

Charles R. Goulding, Attorney/CPA, is the President of Energy Tax Savers, Inc., an interdisciplinary tax and engineering firm that specializes in the energy-efficient aspects of buildings.

Seann Convey is an Analyst with Energy Tax Savers, Inc.

Kenneth Wood is a Senior Analyst with Energy Tax Savers, Inc.

Exhibit 1.

Data Center Energy Tax Planning		
Tax Eligible Equipment	**Greenfield**	**Brownfield**
Lighting	Install low-wattage, long-life LED lighting with occupancy controls.	Convert to LED lighting or energy-efficient fluorescents with occupancy controls.
HVAC	Strive to purchase the most energy-efficient cooling equipment possible including heat exchangers, magnetic bearing chillers, and possibly geothermal.	Often nonconditioned warehouses are purchased for data center conversion. The key is to install the most energy-efficient building cooling equipment possible. With existing VFDs should be installed on major HVAC motors and replaced cooling equipment should be at the most energy-efficient level.
Building Envelope	Minimize windows in server area and install highly insulated cool roofs.	Utilize energy-efficient building replacements including cool roofs.

building mechanical equipment particularly cooling systems that support the data center operation.

Brownfield

Brownfield sites are abandoned facilities that can be re-used but first require a certain amount of cleanup or enhancement. Some brownfields have important characteristics that are valuable to data centers, including a low purchase price (particularly for large, vacant industrial buildings), large square footage and sufficient ceiling heights to install the lattice work of below-floor network and power lines necessary to operate a data center. Exhibit 1 illustrates the type of energy-efficient lighting, HVAC and building envelope equipment applicable to data centers.

Data Center Locations

Data center operators must give careful consideration to the geographical locations of data centers. After 9/11, New York City data center operators moved portions or all of their data centers to offsite locations in New Jersey. After extensive regional building damage impacting both New York City and New Jersey related to Hurricane Sandy, many of these same companies are further diversifying their data centers to other regions throughout the country.

Google's Best Practices

The industry standard energy performance parameter for data centers is the Power Usage

Exhibit 2.
Google's Power Usage Effectiveness (PUE) Measurements and Optimization

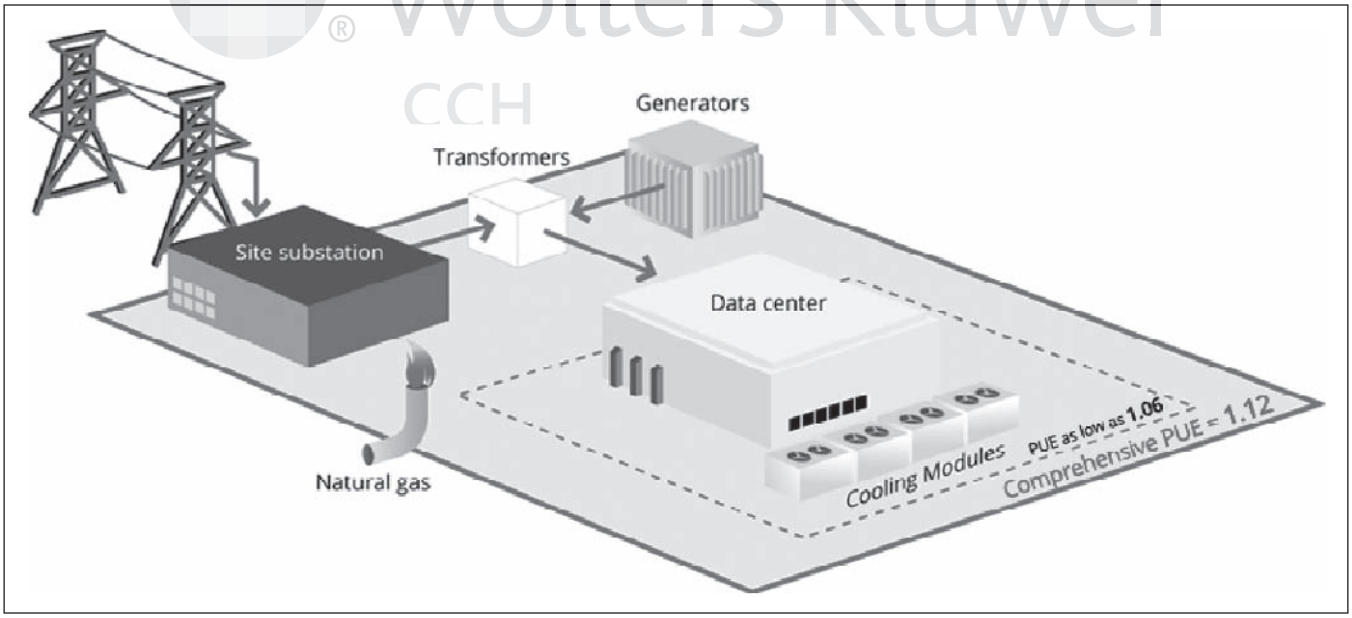
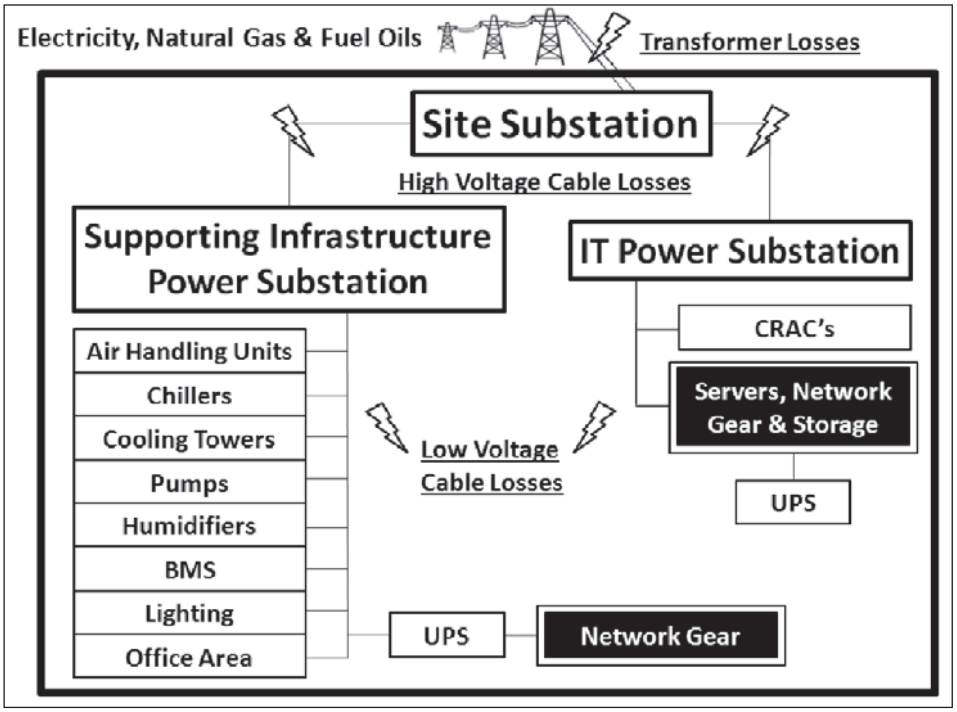


Exhibit 3.
Major Data Center Energy Components and Losses



Effectiveness (PUE). This measurement is the ratio of total facility energy usage, including climate control and all other overhead, to the energy consumption by IT computing equipment. According to the Uptime Institute's 2012 Data Center Survey,[2] the average PUE for large data centers was approximately 1.8, compared to Google's average of 1.12. This significant difference is primarily due to Google's innovative energy engineering practices.[3]

For example, Google recently began to utilize thermal modeling of their server racks to optimize airflow. Also, they have incorporated many unique HVAC processes including evaporative cooling of server exhaust and the use of free cooling methods involving ambient air and even seawater. These improvements not only save millions of dollars in energy cost consumption yearly, but also increase the opportunity for larger EPAct tax deductions when compared to an ASHRAE 90.1 2001 reference building.[4]

Exhibit 3 presents the lighting and HVAC components of a data center.

Exhibit 4 illustrates the potential EPAct tax deductions related to select data centers.

The Need for More Corporate and University Data Storage

There is an increased recognition in the corporate and university research and science community that

Exhibit 4.
Potential EPAct Tax Deductions Available for Data Centers

Building	Total Square Footage	Lighting		HVAC Maximum Deduction	Building Envelope Maximum Deduction	Total
		Minimum Deduction	Maximum Deduction			
Data Center Alley Loudoun County, VA	7,500,000	$ 2,250,000	$ 4,500,000	$ 4,500,000	$ 4,500,000	$13,500,000
IBM Many locations/LEED Silver	8,000,000	$ 2,400,000	$ 4,800,000	$ 4,800,000	$ 4,800,000	$14,400,000
Microsoft Boydton, VA, IT-PAC	1,000,000	$ 300,000	$ 600,000	$ 600,000	$ 600,000	$ 1,800,000
Microsoft Lithia Springs, GA	2,000,000	$ 600,000	$ 200,000	$ 1,200,000	$ 1,200,000	$ 3,600,000
Google Lithia Springs, GA	500,000	$ 150,000	$ 300,000	$ 300,000	$ 300,000	$ 900,000

there is not enough data storage available for the increasingly large amounts of scientific data. Google initially promised free hosting of large data sets for scientists and then terminated the program after one year without comment. Speculation is that Google was shocked by the amount of storage required. For example, the Obama administration's proposal to capture the activity of just one million neurons in the human brain[5] would require three petabytes of information. However, when one realizes that the human brain has about 85 to 100 billion neurons the scope of the challenge becomes much more evident.[6]

Conclusion

With the massive need for increases in servers, the data center facility industry is expected to experience high growth rates. Greenfield and brownfield data center operations should be able to increasingly use EPAct tax incentives as they reduce building energy use.

Endnotes

1 Energy Policy Act of 2005 (P.L. 109-58).

2 Interested parties may sign up to receive a copy of the 2012 survey results at *http://uptimeinstitute.com/2012-survey-results*.

3 Available online at *www.google.com/about/datacenters/efficiency/internal/*.

4 Steven Levy, *Google Throws Open Doors to Its Top-Secret Data Center,* accessed at *www.wired.com/wiredenterprise/2012/10/ff-inside-google-data-center/all/. See also,* Charles Goulding, Jennifer Pariante and Spencer Marr, *The EPAct Tax Aspects of Lady MAGA,* Corp. Bus. Tax'n Monthly, Apr. 2012, at 13.

5 Charles R. Goulding, Andressa Bonafe and Charles G. Goulding, *The R & D Tax Credit Aspects of Cognitive Computing,* to be published in Corp. Bus. Tax'n Monthly.

6 John Markoff, *Connecting the Neural Dots,* The NY Times, Feb. 25, 2013. Available online at *www.nytimes.com/2013/02/26/science/proposed-brain-mapping-project-faces-significant-hurdles.html?pagewanted=all & _r=0.*