

# The Tax Aspects of Cloud Computing and Data Centers

*By Charles Goulding, Jacob Goldman and Cassandra Gengler*

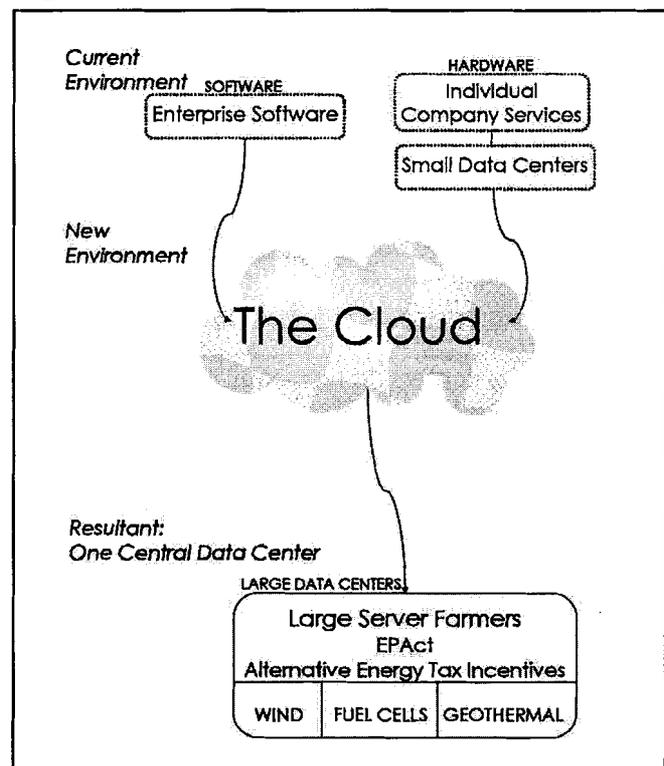
Charles Goulding, Jacob Goldman and Cassandra Gengler explain how cloud computing is taking the place of small data centers for information management and discuss the energy cost savings attendant to this method of data storage.

**H**ewlett-Packard (HP) recently announced that it was consolidating its numerous data centers and terminating 9,000 employees. This signals the beginning of an anticipated shift from the use of small data centers to utility-scale data centers. Data-center facilities house thousands of servers that make up an operating system. Through the use of cloud computing, a method using Internet-based IT architecture, HP has greatly reduced the amount of servers needed to operate its data centers. Thus, the company plans to reduce its present number of data centers by 50 percent to cut operating costs and increase efficiency. This shift in technology is recognized by Nicolas Carr in his bestseller, *THE BIG SWITCH*.<sup>1</sup> He makes the analogy that utility-scale computing will be a significant change for society just like the shift from steam power to utility-scale electricity.

Cloud computing is a highly modernized, automated and economical approach that is becoming increasingly popular among leading companies like Apple and Microsoft. Once the project is complete, HP's experience can serve as a competitive advantage by integrating the lessons learned into its large consulting practice and marketing this to other data-center users. Almost all organizations today rely upon data centers

to store, manage and protect all information, but this requires a great deal of power and can be very expensive. With fewer locations, HP can focus on energy efficiency within these data centers. Fortunately, there are also a variety of incentives available to organizations that will reduce both energy consumption and operating costs of data management. The impact of the cloud and the consolidation into tax advantage utility-scale data centers is presented in Figure 1.

**Figure 1.**



**Charles 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.

**Jacob Goldman**, LEED AP, is an Engineer and Tax Consultant with Energy Tax Savers, Inc.

**Cassandra Gengler** is an Analyst with Energy Tax Savers, Inc.

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## EPAct Tax Opportunity

The Energy Policy Act of 2005 (EPAct)<sup>2</sup> provides an immediate tax deduction of up to \$1.80 per square foot for building investments that achieve specified energy cost reductions beyond the American Society of Heating and Air-Conditioning Engineers (ASHRAE) 90.1-2001 building energy code standards. A one-time \$1.80-per-square-foot deduction is the maximum tax deduction available, but deductions of up to 60 cents per square foot are also available for the three types of building systems: lighting, including lighting controls; HVAC; and the building envelope, which includes roof, walls, windows, doors and floor/foundation (everything that “touches” the outside world). To obtain a tax deduction of 30 cents per square foot for lighting, the wattage must be reduced by 25 percent from ASHRAE 90.1-2001 levels. The maximum allowable tax deduction of 60 cents per square foot requires a 40-percent reduction in wattage for lighting.

Figure 2.

Potential EPAct Tax Deductions for Data Centers

Building	Total Square Footage	Lighting		HVAC Maximum Deduction	Building Envelope Maximum Deduction	Total
		Minimum Deduction	Maximum Deduction			
<b>IBM</b> many locations LEED Silver	8,000,000	\$2,400,000	\$4,800,000	\$4,800,000	\$4,800,000	\$14,400,000
<b>Microsoft</b> Quincy, WA; Northlake, IL	2,050,000	\$615,000	\$1,230,000	\$1,230,000	\$1,230,000	\$3,690,000
<b>Google</b> Dalles, OR; Council Bluffs, IA; Lenoir, NC (3 of the 19 in the US)	836,845	\$251,054	\$502,107	\$502,107	\$502,107	\$1,506,321
<b>Apple</b> Maiden, NC; Newark, CA	609,000	\$182,700	\$365,400	\$365,400	\$365,400	\$1,096,200
<b>eBay</b> (1 of 6) Utah LEED Gold	240,000	\$72,000	\$144,000	\$144,000	\$144,000	\$432,000
<b>Facebook</b> Prineville, OR LEED Gold	147,000	\$44,000	\$88,200	\$88,200	\$88,200	\$264,600

## Energy-Efficient Lighting

Although data centers do not require extensive lighting, many data centers are over-illuminated. A few minor changes in the lighting design of a data center can greatly reduce costs. At minimum, all existing data centers with now federally banned metal halide and T-12 lighting should upgrade to more efficient lighting. An emerging new technology, known as LED (light-emitting diodes) lighting has proved to be more energy efficient than metal halide lighting. LEDs use semiconductors, called diodes, to provide a lower-energy-consumption powerful light source. They also are resistant to environmental impacts and have very

long product lives. While LEDs are expensive in terms of initial cost, the maintenance-cost savings for fully automated data centers located in remote areas more than makes up for the initial expense. In addition, energy-efficient LEDs typically qualify for EPAct tax deductions resulting in even greater savings.<sup>3</sup>

## LEED Data Centers

The U.S. Green Building Council (USGBC) recognizes buildings to be energy efficient, or “green” in terms of design, construction, operation and maintenance, by awarding Leadership in Energy and Environmental Design (LEED) certification. Many state and local governments have adopted plans that award expedited permits, fee reductions/waivers and grants for LEED-certified buildings. A LEED-certification program specific to data centers is currently in process, but in the meantime, data centers can be certified through the “LEED for New Construction” and “LEED for Existing Buildings: Operations and Maintenance”

programs. Since LEED certification was initially intended for commercial office buildings, data centers may find it difficult to achieve LEED certification. It is not impossible, however. The American College Testing (ACT) data center was the first in the United States to earn the highest rating, LEED Platinum. This

was achieved through its use of a geothermal energy cooling system.

The tax advantage of a LEED data center is that it already has a building energy simulation model that can be converted into an EPAct tax model. Facebook is in the process of developing a 147,000-square-foot Gold LEED data center in Prineville, Oregon. This is an ideal size for maximizing the effect of EPAct tax deductions since it falls just below the threshold of the EPAct’s more favorable category for ASHRAE HVAC reference buildings measuring less than 150,000 square feet. With the \$1.80-per-square-foot deduction, the Facebook data center could potentially qualify for a \$264,600 EPAct tax deduction (see Figure 2).

LEED certification also places a company in a positive public light. In 2008, Honda's data center earned Silver certification, along with good publicity and lower operating costs, both of which were extremely beneficial during a struggling sales year.

## **Building Envelope**

It takes nearly as much power to run the servers in a data center as it does to cool them. There are a number of steps in which cooling energy can be reduced. The first step to an efficient cooling system is to ensure that the data center is properly sealed. This can be done by sealing all doors and windows, which is commonly done through the use of a vapor seal (created using a plastic film, vapor retardant paint, vinyl wall coverings and vinyl floor systems).

## **Server Cooling**

While fans may be the most obvious way to maintain air flow, it is not the most efficient use of energy cooling. Liebert and Emerson Network Power's publication titled *Five Strategies for Cutting Data Center Energy Costs Through Enhanced Cooling Efficiency* has a number of recommendations to increase the cooling efficiency of data centers.<sup>4</sup> For instance, equipment racks should be positioned so that each row faces each other. This will create hot aisles as the racks exhaust hot air and cold aisles as the racks draw in air. Computer room precision air conditioners (CRACs), which control the humidity level in a data center, should be placed perpendicular to the hot aisle to stop hot air from entering the cold aisle. Server cables and piping in a data center should also be managed so that it does not obstruct air flow.

By using outside air and providing free cooling during the cold months of the year, economizers have the ability to cool data centers at a low cost. There are two types: air-side economizers, which use sensors, ducts and dampers to maintain appropriate air flow from the outdoors, and fluid-side economizers, which use a heat rejection system with a glycol solution and an outdoor cooling tower.

CRAC units will operate more efficiently with the use of varying capacity based on operating conditions. This is done through four-step compressor unloading, which shuts off refrigerant to some cylinders rather than cycling the compressors on and off to control capacity and operate more efficiently. Advanced control systems should also be used to

ensure that CRAC units in the room communicate and coordinate operation to avoid having some units add humidity and some units remove moisture.

In 2002, Emerson Network Power's Liebert XD System introduced supplemental cooling. This is a system that pumps refrigerant cooling from above or next to high-density racks to supplement cool air pumped from the floors. The refrigerant, R134, converts to gas when it hits the air. This is 700-percent more effective in moving heat than water and ensures no damage to servers in case of a leak. The combination of the refrigerant and ideal location of the cooling system can reduce energy costs up to 27 percent.

There are also a variety of financial incentives that are offered by local utility companies. For example, California's Pacific Gas & Electric offers a utility rebate program for efficient cooling systems in data centers larger than 5,000 square feet. Through the Data Center Cooling Controls Program (DCCCP), data centers may be eligible for \$.09-\$.15/kWh plus \$100/peak kW for verified savings by QuEST engineering services.

## **Alternative-Energy Tax Credits**

Recently, Google recognized the need for "greener" data centers and invested over \$10 million in Enhanced Geothermal Systems (EGS). This is similar to the traditional geothermal approach in that it finds pockets of steam or hot water; however, this system fractures hot rock, circulates water through the system and uses the steam created to produce energy. This approach is extremely cost-effective if it is scaled to data-center power usage. There is also a federal tax credit of 10 percent available for businesses with geothermal systems.<sup>5</sup>

The location of a data center is the key in determining the efficiency level of hydropower usage. Hydropower is a cost-effective and reliable electricity source used in data centers. If the facility has easy access to a body of water, the cost of energy transmission is eliminated. Hydropower capital costs and maintenance fees are also relatively low. Another benefit to this alternative-energy source is that local utility companies may offer to buyback electricity overflow.

The utility company serving Google's data center, MidAmerican Energy, generates more wind energy than any other utility in the United States. Wind is another great renewable source of energy, but like hydropower, wind energy is dependent on the location of the data center.

## **Fuel Cells—30-Percent Tax Credit**

An innovative alternative-energy source recently featured on CBS's "60 Minutes" is the fuel cell. Bloom Energy is just one of the providers of fuel-cell energy and calls its product the Bloom Box.<sup>6</sup> This is a unit made up of fuel cell stacks; oxygen and fuel are drawn from opposite sides of the unit and together, through a clean electrochemical process, they create power. Water is the only waste generated. An attractive aspect of the Bloom Box is that energy is produced without connection to an electric grid and, therefore, is more reliable. Google, eBay, Staples and Wal-Mart are just some of the large corporations generating power using the Bloom Box. Not only is the Bloom Box energy efficient, but also it is eligible for a 30-percent federal tax credit,<sup>7</sup> plus in California, there is a 20-percent tax credit. The Fujitsu data center located in Sunnyvale, California, reaped \$500,000 in utility rebates from fuel cell use and will recover its costs in just 3.5 years.

## **Utility Rebates**

Many state government programs have recognized the critical need for energy reduction in data centers and, in turn, are offering large utility rebates for such projects. For example, New York State Energy Research & Development Authority (NYSERDA) has awarded funding for technologies that have energy, environmental and economic benefits. Data centers that reduce energy usage by at least 20 kilowatts can receive \$600 per kilowatt from NYSERDA. The maximum rebate is 65 percent of costs or \$1.25 million per data center. To obtain one of these awards, a proposal must be submitted to NYSERDA based on a project in one of the following categories:

- demonstration projects—projects for an energy-efficient data center, server technology, component or system presented at a New York state site;
- product development—projects for an energy-efficient data center or server technology that provides economic benefit besides its end use;
- technology feasibility—projects that focus on studies of conceptual design, technology and market assessment or other preliminary product-development research;
- market development—projects that are performed through services to the New York state marketplace (educational workshops, seminars, training, *etc.*, on energy efficiency); or

- Advanced Concept Data Center Project—a project that uses a combination and integration of energy-efficient technologies and practices.

Additional rebates can be obtained through negotiation with local utility companies for custom rebates based on the intent of the design. The company must show that the data center's design promises long-term energy savings to acquire a custom rebate for complex energy-savings measures, as opposed to prescriptive rebates that are based off predetermined energy-efficiency measures. For example, Long Island Power Authority, a utility company also in New York, offers up to \$200,000 in custom rebates per building annually.

## **Economic Development Initiatives**

While the size of a data center is similar to that of an office building or factory, it is not similar in employment level. The average data center employs between 50 and 100 IT workers for day-to-day operations, depending on the size of the facility. More employees are needed for the construction of the data center than for the operation of the data center. IT workers may be less in number, but their position demands a higher level of IT and management skills. Iowa Governor Chet Culver spoke of Google's data-center jobs and stated that it "will attract some of the smartest and most capable people from around the world to our state, and keep our smartest workers here in Iowa." Managers and employees must understand data-center operations and IT architecture (networks, software, data and applications) and have the ability to adapt quickly to modern processes and technologies.

## **21st Century Virtualization and Cloud Computing**

In the current economic environment, companies are looking for ways to reduce costs through automation and, as a result, turning to virtualization and cloud computing. Virtualization is an alternative to data-center storage; through this method, companies can now store information on the Internet, as opposed to physically storing data amongst the servers in a data center. The data can be accessed from any computer through an application provider, which stores data for a fee based on usage. This is often referred to as "cloud computing." This was introduced by leading provider Salesforce.com in 1999 in an effort to make

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New York franchise tax applies to nonresident members of a limited liability company (LLC) that holds a general partnership interest in an enterprise doing business in New York.<sup>5</sup> In *Shell Gas Gathering Corp. #2*, Shell Gas Gathering Corp. and Shell Gas Pipeline Corp. were corporate members of SUSGP, LLC. SUSGP indirectly held general partnership interests in entities that did business in New York. SUSGP, LLC and the entities it held an interest in were disregarded entities, *i.e.* partnerships, for federal and state tax purposes.

New York law, and related regulations, provide that if a partnership is doing business in New York state, then all general corporate partners are subject to New York franchise tax. The taxpayers argued that they did not possess the requisite minimum contacts with New York because there was no direct nexus between the taxpayers and New York. The Tribunal, relying on *Allied-Signal*,<sup>6</sup> held that the state's power to tax need not be based on the taxpayer's own activities in the state. Rather, the appropriate inquiry to justify imposition of tax is whether New York has given something for which it may impose tax in return. In this case, New York satisfied the standard because it accorded privileges and immunities that led to income that inured to the benefit of the taxpayers. In so holding, the Tribunal pointed out that the activities being taxed were the activities of entities owned by SUSGP, LLC and those entities met the four-prong test established in *Complete Auto Transit*.<sup>7</sup>

The taxpayers also argued that ownership of a membership interest in a limited liability company did not provide a basis to assert

personal jurisdiction over a nonresident member. The Tribunal dismissed this argument stating that cases involving personal jurisdiction were not precedent in tax matters.

## Oklahoma

Amended Regulation 710:50-17-71 requires taxpayers to include receipts from the performance of services in the sales-factor numerator if the receipts are derived from customers within Oklahoma or if the receipts are otherwise attributable to Oklahoma's marketplace. The phrase "customer within Oklahoma" refers to a customer that is engaged in a trade or business and maintains a regular place of business in Oklahoma, or a customer that is not engaged in a trade or business whose billing address is in Oklahoma.

## Washington

The Washington Department of Revenue issued a special notice, dated September 10, 2010, which contains guidance on "trailing nexus." Trailing nexus is that amount of time a taxpayer continues to have nexus with the state after the taxpayer ceases in-state business activity. The Washington business and occupation tax uses two nexus standards. An economic-nexus standard applies to companies engaged in apportionable business activities. Taxpayers engaged in other business activities, such as retailing and wholesaling, must be physically present in the state to have nexus.

For business and occupation tax purposes, a taxpayer continues to have nexus for the remainder of the calendar year in which the nexus creating activity

ends, plus one additional year. For example, a calendar year taxpayer that was physically present in Washington until July 20, 2008 continues to have business and occupation tax nexus until December 31, 2010.

## ENDNOTES

- <sup>1</sup> Conn. Dept. of Rev. Serv., IP 2010(29) (Sept. 23, 2010).
- <sup>2</sup> *Bridges v. Hertz Equip. Rental Corp.*, La. App Ct, No. 45,647-CA, [La.] St. Tax Rep. (CCH) ¶ 202-339 (Aug. 11, 2010).
- <sup>3</sup> *Bridges v. X Communications, Inc.*, La. CtApp, 861 So2d 592, [La.] St. Tax Rep. (CCH) ¶ 201-677 (2003), writ denied, 866 So2d 830 (2004).
- <sup>4</sup> New Jersey Div. of Tax., *How to Obtain a Letter Ruling from the Division of Taxation* (Sept. 9, 2010).
- <sup>5</sup> *Shell Gas Gathering Corp. #2*, N.Y. Div. Tax Appeals, Tax Appeals Trib., DTA Nos. 821569 and 821570, [N.Y.] St. Tax Rep. (CCH) ¶ 406-993 (Sept. 23, 2010).
- <sup>6</sup> *In Matter of Allied-Signal, Inc. v. Commissioner of Fin.*, 79 NY2d 73 (1991).
- <sup>7</sup> *Complete Auto Transit v. Brady*, 430 US 274 (1977). The four-prong test of *Complete Auto* provides that for a tax to be constitutional under the dormant Commerce Clause the tax must: (1) be applied to an activity with a substantial nexus with the taxing state; (2) be fairly apportioned; (3) not discriminate against interstate commerce; and (4) be fairly related to the service provided by the state.

## Cloud Computing

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enterprise software easier to use and to reduce costs.

This service presents a major business advantage in that the cloud can store and secure a large amount of data over the internet, allowing companies to scale back and operate out of a central data center and access the information from any location. As mentioned earlier, HP will cut half of its data centers as a result of virtualization. Cisco also recently announced its plans to consolidate its 56 data centers into 20 data centers over the next six years with cloud computing. The cloud is

also a more affordable method of storage, which has enabled many companies, particularly start-ups, to avoid the purchase and maintenance of expensive servers. Leading tech companies provide cloud computing services to businesses. Among these are Amazon's EC2 (Elastic Cloud Compute), Google's App Engine, and HP's Cloud Assure. Amazon uses an Amazon Machine Image (AMI) which is the Web service interface that contains the applications, libraries, data and settings custom to the company. Benefits to these services include lower operating costs, increased scalability, accessibility and reliability.

## Conclusion

Developing a central data center is a highly beneficial decision for many companies operating in the fast-paced technological business environment of today. It ensures a reduction of costs and allows for greater focus on energy efficiency. This can lead to even more savings by qualifying for the wide range of tax incentives available for environmentally friendly data centers.<sup>8</sup>

## ENDNOTES

- <sup>1</sup> NICHOLAS CARR, *THE BIG SWITCH: REWIRING THE WORLD, FROM EDISON TO GOOGLE* (2008). Carr was formerly the executive editor of the *HARVARD BUSINESS REVIEW*.
- <sup>2</sup> Energy Policy Act of 2005 (P.L. 109-58).
- <sup>3</sup> Charles Goulding, Taylor Goulding and Raymond Kumar, *LED Parking Garage Lighting Installations Accelerate With EAct Tax Savings*, *CORP. BUS. TAX'N MONTHLY*, Sept. 2009, at 15-16, 46
- <sup>4</sup> Available at [www.liebert.com/common/ViewDocument.aspx?id=13](http://www.liebert.com/common/ViewDocument.aspx?id=13).
- <sup>5</sup> Code Sec. 48.
- <sup>6</sup> *The Bloom Box*. Retrieved from [www.cb-snews.com/video/watch/?id=6228828n&tag=mncol;lst;1](http://www.cb-snews.com/video/watch/?id=6228828n&tag=mncol;lst;1).
- <sup>7</sup> *Id.*
- <sup>8</sup> Additional information on cloud computing is available at [www.informationweek.com](http://www.informationweek.com) and [www.datacenterknowledge.com](http://www.datacenterknowledge.com)

## Geothermal Heat Pumps

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### Geothermal Heat Pumps & HVAC EAct

An HVAC retrofit that reduces total building energy use by 16.67 percent allows the building to qualify for the 60-cent-per-square-foot EAct HVAC deduction.<sup>4</sup> Given the extraordinary efficiency of geothermal heat pumps, a retrofit by means of geothermal will most likely qualify for the immediate 60-cent-per-square-foot HVAC deduction and can potentially reduce energy use enough to trigger \$1.20- to \$1.80-per-square-foot EAct tax deductions on its own. Table 1 illustrates the potential tax savings, including EAct, the geothermal tax credit and MACRS building depreciation, for installation of a geothermal heat pump HVAC system.

To obtain the \$0.60- to \$1.80-per-square-foot EAct deduction, the required energy-cost reduction must be documented by an IRS-approved energy simulation model. The popular U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) certification program also requires building energy modeling. Moreover, recognizing the increasing importance of building energy-efficiency measures, recent changes to the factors considered for LEED certification place much more emphasis on granting LEED-qualifying points for energy-efficiency measures. The only way to accurately right-size HVAC to the building envelope and other building systems is to model the building. As a result of improvements in CAD systems

and modeling interfaces, along with the huge increase in professionally trained energy modelers, soon every new building will be modeled as matter of course.<sup>5</sup>

### Free-Riding Existing Geothermal HVAC System EAct Tax Deductions

If a building has already achieved the required energy-cost reduction from installation of an HVAC system, such as a geothermal heat pump, but has not yet taken its EAct tax deduction, any further energy-reducing HVAC equipment installation will bolster EAct HVAC tax deductions. Accordingly, any building that already has very efficient HVAC, such as a geothermal heat pump, and has not already taken the EAct tax deduction, should give strong consideration to further HVAC upgrades on or before December 31, 2013. One common EAct tax deduction free-riding project is to upgrade building controls. For instance, if the owner of a 500,000-square-foot building installed a geothermal heat pump prior to 2006 that resulted in a large energy-cost reduction, but could not take an EAct deduction because the law had not yet been signed into effect, they could then realize up to the full \$900,000 EAct tax deduction upon upgrading HVAC building controls before December 31, 2013.

### Combining Geothermal with Lighting Retrofits

Since geothermal heat pump installation can generate large