



Best Practices in Green IT

With advanced technologies and sustainable practices, you no longer need to choose between profit and the planet

By Christopher Rence, CIO, FICO

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The move toward corporate sustainability has gained tremendous momentum. Businesses now realize that green initiatives can be good for both the environment and the bottom line. And who doesn't like a win-win?

But true sustainability in business still has a long way to go. Many "green" businesses rely heavily on buying offsets to reduce their carbon footprints. These days, we can do more.

From PCs to data storage, today's IT is propelling a rapid rise in carbon emissions—but it also holds the key to a potential sea change. Recent McKinsey research suggests that IT will generate 3% of the world's greenhouse gases by 2020. But IT can also abate five-times more emissions than it produces annually by 2020¹—if we invest in the right technologies.

At FICO, we've leveraged leading-edge technologies and sustainable practices to achieve real "green"—both bottom-line and environmental—without cutting back on capabilities, either to clients or staff. Rather than choosing between IT performance and environmental responsibility, we're finding ways to achieve both. To date, we have:

- Reduced IT energy consumption by 33%, eliminating 29 cubic tons of carbon emissions. We're on track to reach a 50% reduction by 2010.
- Reduced paper consumption by 50%, saving 8 million sheets of paper. We plan to reach 80% by 2010.
- Realized \$740,000 in operational savings.
- Boosted network security while lowering costs, with an expected 24-month ROI of \$400,000.
- Improved overall data center performance. Even though the IT demands of the business have grown, we can support it using far less physical servers than before.

In this white paper, I'll provide insight into best practices, and highlight the technologies and measures that helped us achieve these results. The paper is written for all audiences, technical and non-technical alike, since sustainability benefits go beyond IT, and should be understood and championed across the business.

¹ The McKinsey Quarterly, April 2009, "IT's carbon footprint"

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» **Getting started:
best practices**

While green initiatives can certainly be implemented at a smaller scale or local level, you'll achieve greater success with an enterprise-wide program. Global adoption of new technologies and policies is essential to creating economies of scale.

As with any IT initiative, a sustainability program requires planning and benchmarking. You'll need to secure management support, put together a business plan, work in cross-departmental teams, set goals and measure progress.

Having gone through this process, we've learned a few lessons on how to get started and build a plan for success:

Develop a comprehensive plan. We built a three-year roadmap that included initiatives already underway, tactical needs and even nice-to-have items. By starting with a solid baseline, you can set the right priorities and assess the full impact across the business.

Have long-term vision. From a business perspective, it's important to build a plan that delivers short-term gains. But to be truly sustainable, you also want to build infrastructure that works over the long term. To do so, you'll likely need to invest in foundational changes that might not provide immediate benefit. These will need to be explained and accounted for in your plan.

Build in flexibility. Ask what-if questions such as, "What if our product roadmap changes, requiring different platforms or configurations?" You don't want to be in the position of needing to rebuild infrastructure if business priorities change in the future. Choose technologies that give you flexibility.

Remember it's a business shift. Changes to the organization will be broader than just technology. Your plan needs to identify and work through all core business requirements.

Plan for a staged implementation. This program will be competing for resources with "keep the lights on and systems running" activities that will always take priority. A slow and steady pace will be more successful than an all-at-once big bang. By taking a staged approach, we were able to hold our IT budget flat for three years, even while supporting an increase in IT needs.

Leverage best-in-class partners. We've worked with vendors such as VMware, Cisco, HP, EMC and Microsoft. Since we use many emerging technologies, we've built mutually beneficial relationships—for example, participating in pilot programs at low or no cost, while helping them build their technology roadmaps.

Get involved with industry organizations. We're members of *The Green Grid*, which provides excellent resources on data center efficiency and helps you connect with technically forward-thinking organizations. We've also joined *The Climate Registry*, which provides a standard, independently verified method to document your company's current emissions and track subsequent reductions.

After our own planning, research and prioritization, it became clear that we should initially focus on three areas that would drive the greatest gains—IT efficiency, telecommuting and reducing paper consumption.

» INSIGHTS**» IT plugs into green**

Certainly, IT efficiency was one of our top sustainability challenges. After years of organic growth and acquisitions, we were running 24 data centers, based on different technologies and various degrees of sophistication.

We essentially overhauled our data centers, using leading-edge technology to consolidate our footprint into four state-of-the-art facilities. This consolidation was enabled by some very exciting emerging technologies that increased our overall computing effectiveness and efficiency. And many offer enormous potential to expand IT capabilities moving forward.

Virtualization and cloud computing

In a typical data center, a physical server is deployed to support a single operating system and application. As a result, resources such as CPU and system memory can be considerably underutilized. Multiply this across your company's operating environment, and it's a significant cost to execute individual applications.

Virtualization technology increases server efficiency by adding a software management layer that enables one machine to act as many—up to several dozen machines, each supporting a different application. This technology is complemented by an architecture of shared network and storage devices. Ironically, we're going back to the same operating paradigm as a mainframe, with one big machine—these days, a set of high-powered individual servers—running many different tasks.

We are also deploying the latest blade servers, which are designed to optimize virtualization processing. Think of blade servers like a CD jukebox, with multiple disks sharing an enclosure, electronics and power supply. This design is very space- and energy-efficient since it shares components and increases the number of servers per data center rack. It's also easy to scale out; essentially you just slide another blade server into the enclosure.

Using the latest virtualization software and blade servers, we've deployed a private cloud computing environment. This is game-changing technology that has captured a lot of buzz from both IT communities and business users. Cloud computing involves providing hosted services over the internet. In the case of a private cloud, those services are provided internally within our corporate network.

The value of cloud computing is that it offers easy, scalable access to computing resources and IT services. For example, we can go outside FICO to leverage services that do not reside on our own servers, and we pay only what we consume. Most recently, we've moved over to hosting our email exchange server "on the cloud."

Virtualization and cloud computing offer huge future potential. IT could build "virtual instances," essentially server "templates" that are preconfigured with amount of memory, operating system and other features. Teams within FICO could then select the type of server they need and press a button, and the server would be dynamically created. FICO Product Development could have a fixed set of templates, such as for QA or development, to use as needed and shut them down when they're done. Similarly, our Professional Services could create environments to test client code.

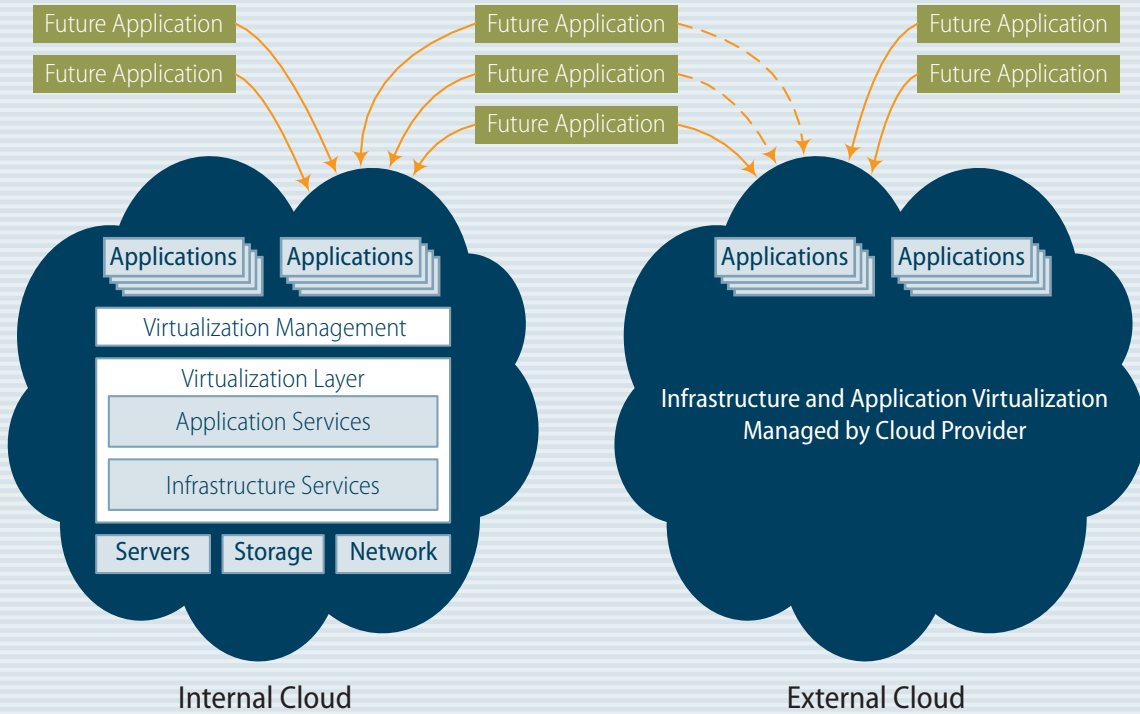
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Long-term, cloud computing will likely be the preferred product delivery mechanism for small, mid-sized and possibly even larger companies. It's been important to stay ahead of the IT curve, and build the infrastructure for our Product Development to eventually design and create products that fit that model.

In addition, cloud computing can play a critical role in business continuity planning. An external cloud could be leveraged immediately in the event that operations are disrupted or additional capacity is needed.

Figure 1: Evolution of Cloud Computing

Applications can be deployed internally, externally or to both.
External clouds can be leveraged for business continuity planning.



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Innovation on demand

Another area we're exploring for the data center is Software as a Service (SaaS). In some cases, a SaaS provider can deliver better capabilities with higher computing efficiency, at lower cost. And since you lease appliances, the maintenance is hassle-free. There are never any hardware or software upgrades or technical incompatibility issues.

We currently leverage a SaaS solution with a network appliance for security capabilities known as event correlation. The appliance resides on our customer-facing network, collecting and forwarding log and threat (IDS) data to the SaaS provider. The data is securely archived, analyzed and aggregated with customers worldwide.

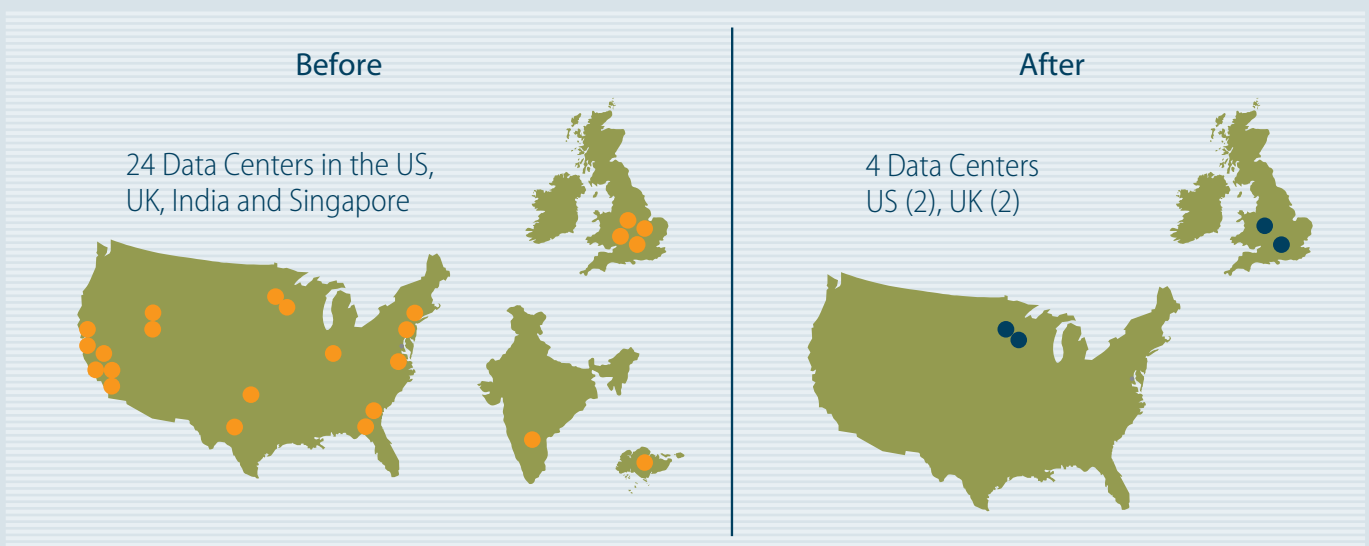
This global view provides better threat alerts than when we only saw suspicious activity on our network. Plus, we've been able to replace the 70 servers once performing this function with a small number of appliances. We expect a 24-month return of about \$400,000.

Smarter data center design

Consolidating our technical infrastructure onto a smaller footprint introduced a new challenge: How could we meet the same power and cooling demands within a much smaller square footage? This made the data center design itself extremely critical.

With the help of partners, we engineered a high-density cooling and powering environment. We can now support 60 amps and 12 KW per server rack, almost three times the typical 4.2 KW per rack. For areas of the data center where equipment generates extra heat, we've deployed zone cooling devices—a technique called "hot spot cooling." This has reduced our cooling needs by 40 tons and eliminated related operating costs. By 2010, we expect to achieve a 60 ton reduction.

Figure 2: From 24 data centers to 4 state-of-the-art facilities



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Consolidating our technology footprint

Using newer technologies to shrink our IT infrastructure, we've reduced data center floor space from approximately 46,000 to 16,000 square feet. This has lowered our IT energy consumption by 33%, and with continued improvements, we're on target to reach a 50% reduction by 2010.

Overall, we've removed from service:

- 2,400 server devices
- 300 network devices
- 150 network routers
- 50 CSU/DSU (Channel Service Unit / Data Service Unit)
- 27 PBX (Private Branch Exchange) devices
- 77 standalone storage devices
- 6 diesel generators
- 24 Freon-based HVAC systems
- 230 UPS systems

Of course, we also had to consider the environmental impact of retiring this hardware. We put in place a centralized global contract that ensures that all legacy technology is recycled according to individual country-specific regulations.

And we continue to look for ways to offset the impact of our technology. For instance, we participate in the *Dell Plant a Tree program*. For each laptop we purchase, a tree is planted—a small act with significant long-term impact. Over its 70-year lifespan, the tree will trap 1.3 tons of CO₂, more than offsetting the carbon emitted from powering the PC.

Figure 3: Boosting data center efficiency

	FY07	FY08	FY09
Tech Floor Space (SQFT)	46,000	31,000	16,000
Total Watts	8,050,000	5,425,000	4,000,000
Total BTUs	27,450,500	18,499,250	13,640,000
Total Sensible Tons of Air	2,287.54	1,541.60	1,136.67
Total BTU per SQFT	596.75	596.75	852.5
Total SQFT per Ton of Air	20.11	20.11	14.08

Metrics calculated via http://www.abrconsulting.com/Custom_Code_Pages/calc4.php#calc

» INSIGHTS**» Driving eco-gains with telecommuting**

As we moved toward more sustainable practices, telecommuting provided clear benefits. Not only could we get more cars off the road, but it enabled us to close some of our smaller offices, saving energy and other costs.

Videoconferencing and other collaboration tools have matured, enabling remote staff to remain productive and engaged. We've invested in and standardized collaboration and communications tools across the company so that it's easy for everyone to connect. And we've boosted the speed and security of remote network access from every employee laptop, using VPN technology and RSA security tokens.

These technologies don't only support telecommuters. They also reduce our overall need for travel between offices, which in turn lowers costs, employee down time and the environmental impact of airline travel. Due to telecommuting and less travel, we've offset emissions equivalent to 13,000 midsize cars.

» Reducing paper waste

Document printing may be a small per-unit cost, but it's a significant overall expense due to the volume generated over a year. Once we looked at our global print output, as well as what was disposed through recycling and shredder, we saw an opportunity for greater efficiency.

The biggest waste of paper is the document submitted for printing but never retrieved. It's also a potential security risk if it contains confidential data. Our approach to this issue was two-fold—first, education encouraging employee behavior change and second, reinforcing this with new printer policies.

Our printers are now PIN controlled, requiring employees to provide a code at the desktop and again at the printer to initiate printing. Printer defaults are set to four-up, double-sided, black and white printing. And only a limited number of printers have color capabilities. After all, a color copy is more costly to print—often ten times or more.

We also supplied projectors in many conference rooms and encourage employees to bring laptops to meetings where group document review is needed. When documents are printed solely for review during a meeting and then discarded, it's wasteful and a potential security risk.

With these changes, we now print 50% less than before, saving 8 million sheets of paper. As a result, we've been able to reduce our total number of printers by 50% and still meet staff demand. We hope to further reduce paper consumption, reaching an 80% reduction by 2010. We've also switched to post-consumer paper whenever possible.

The bottom-line results of these changes have been significant. In a single year, we saved \$300,000 in paper, printer maintenance and related print costs. Overall, we've realized an operational savings of \$740,000.

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» Managing a cultural shift

While getting the technology right is important, employee buy-in is also critical to success. After all, you're asking everyone to adhere to new policies and make day-to-day changes on how they get work done. It's important to facilitate a dialogue and provide support to ease the transition.

In our case, telecommuting probably required the biggest internal cultural shift. But investing in videoconferencing and other collaboration tools certainly helped our remote employees still feel connected to colleagues, and vice versa, despite the distance.

Employee support is also important because you'll need teams outside IT to help carry out various initiatives. We've been very successful working with groups throughout FICO, who realize that our sustainability goals provide benefit across the company.

For example, it was our Facilities group that installed the new data center server racks that I discussed earlier. The payoff—increased energy efficiency—directly impacted their budget, not to mention the company as a whole.

Many employees are passionate about going green, and can offer fresh ideas or additional support to further goals. At FICO, it was the employees themselves who provided the initial momentum to get our sustainability initiative started. It's been important that we continue this dialogue.

FICO provides regular updates on the sustainability initiative via our intranet, including through video interviews with executives. (Some are available externally—*watch one*.) We also have a message board on the homepage of our intranet, where employees can exchange ideas and get direct feedback from senior leaders.

» The payoff: financial, environmental and social ROI

Overall, I'm proud of what we've accomplished here at FICO. We've realized financial and environmental gains, as well social benefits by fostering positive momentum within our own staff—what I call the “triple bottom line.”

We've achieved these gains without sacrificing performance for sustainability. In fact, with capabilities like virtualization and cloud computing in our toolbox, we're improving performance for both client and staff, and building a stronger IT infrastructure for the future.

Of course, our work is ongoing and we've set some pretty aggressive milestones for 2010. But I'm confident that with our technologies, vision and employee support, we can meet, and even exceed, our green goals.

Christopher Rence is the CIO at FICO and heads up the company's Sustainable Enterprise Initiative. Watch his Tech Talk video interview “Green IT: Corporate Social Responsibility,” and share your own success stories or comments about going green.

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