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The green IT stars of 2010



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By Ted Samson – Thu Apr 22, 6:00 am ET

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San Francisco – This year's crop of Green 15 winners demonstrates how organizations of all sizes are finding innovative ways to use information technology to achieve critical and often complementary environmental and business objectives. Increasingly, companies are moving beyond out-of-the-box products and siloed approaches to making IT itself more energy efficient. Rather, they're leveraging technology as part of a broader, holistic effort to create greener operations as a whole.

Telecom equipment manufacturer Ericsson, for example, has adopted a complex asset management system that the company and its global partners use to deliver parts, products, and repair services to customers in the most efficient way possible. The project promotes environmental objectives such as reuse, fuel efficiency, and material conservation -- and it saves Ericsson cash while boosting customer satisfaction.

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Meanwhile, accounting company KPMG is finding ways to use IT to ingrain sustainable practices in day-to-day operations. For example, the company added a Green Travel Advisor to its internal portal that urges employees to use telepresence over air travel whenever practical. When it's not, the advisor directs them to environmentally responsible hotels.

Companies are also continuing to devise ways to enhance traditional green tech projects. In the past, data center greening projects tended to rely heavily on rolling out server virtualization, creating hot and cold aisles, and adjusting temperature and airflow. Green 15 winners including Dell and Intel have taken green data center initiatives a step further, employing homegrown techniques to drill down into how efficiently, or inefficiently, resources are being used and whether they're required at all.

Out of necessity or optimism, more organizations are thinking different in the name of thinking green. Syracuse University, for example, has done what few traditional data centers are willing to try: employing DC power in its new data center. The government of Andhra Pradesh in India embraced virtual desktops at 5,000 schools because it lacked the infrastructure for PCs. And a consortium of universities in Canada transformed a circular cement silo that formerly housed a particle accelerator into an innovatively designed cooling enclosure for a new supercomputer.

Since InfoWorld launched the Green 15 in 2008, project leaders have reiterated a shared sentiment time and again: Technology goes only so far in helping an organization achieve environmental objectives. Organizations in which executives work to promote green practices, engage employees, and drive collaboration and knowledge sharing among departments and business units will enjoy the greatest return on their green IT investments.

InfoWorld's 2010 Green 15 Award winners, in alphabetical order:

- [Aflac](#) pushes for paperless practices, yields productivity gains
- [Andhra Pradesh](#) overcomes resource limitations with virtual desktops
- [CLUMEQ](#) transforms rundown particle accelerator into high-efficiency cooling enclosure

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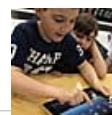
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Aflac pushes for paperless practices, yields productivity gains

Embracing electronic documents and print-management technology, the insurer sees faster policy processing and lower bills

Stacks of unclaimed printouts are a common site at organizations across the globe. At best, those pages get tossed into the nearest recycling bin, but even so, they represent a significant waste of natural resources and hard-earned company cash. As part of a companywide greening effort, insurance company Aflac instituted various technologies and policies to put the kibosh on print waste, resulting in a smaller environmental footprint, commendable cost reductions, and a surge in efficiency.

Starting last year, Aflac opted to invest only in energy-efficient network printers and has reduced printer count by 34 percent. Further, the IT department has set machines to default to two-sided printing, and the company embraced print management technology from Secureprint that requires users to confirm a print job at the printer before it will execute. Print jobs not retrieved within 24 hours are purged from the queue.

Aflac's paper-reduction efforts didn't end at the printer, either. The company's IT department has developed an online system called Smart App Next Generation (SNG) for enrolling and accessing policies electronically. "From a business perspective, this has helped Aflac reduce the need to handle the large amounts of paperwork usually associated with writing insurance policies. We are able to process the applications faster because there is no shuffling of paper between the agents and Aflac," said Pat Rayl, 2nd vice president of technology services at Aflac.

Agents have an added incentive to employ the environmentally friendlier approach to handling policies, Rayl noted: "Applications are approved faster through SNG. Therefore, the agents' commissions are paid faster."

The electronic delivery of policies, coupled with the electronic delivery of agents' statements, billing invoices, and corporate reports, has enabled Aflac to achieve an average of only 1.84 printed sheets of paper per active policy. There's also the ripple effect of fewer stacks of papers being sent to and fro via time consuming, eco-taxing snail mail.

Aflac's paper-reduction initiatives are a fraction of the company's overall sustainability initiatives. Other endeavors have included a data center makeover, such as server reduction through virtualization and improving cooling efficiency and air flow with techniques such as blanking panels, hot and cold aisles, and Koldlok around open floor areas. Additionally, the IT department has developed and promoted Aflac's Meeting Place, which features a suite of collaboration tools, including discussion groups, blogs, wikis, shared-document management, videoconferencing, and instant messaging. By promoting this approach to collaboration among offices spread out among its various offices and corporate campuses, the company saw a 43 percent increase in online meetings in 2009.

Rayl attributed the success of Aflac's multiple green endeavors to two key factors: sponsorship, promotion, and communication from upper management, as well as making the processes easy for employees to embrace. In terms of communication, Aflac's IT department maintains a Green IT page on Aflac Workplace that keeps company employees up to date on key metrics such as paper usage and server efficiency. "Probably the biggest lesson we have learned is that simply implementing green initiatives is not enough. Employees must be continually educated on the benefits of these programs and how they can contribute to making an environmental impact at work and at home," Rayl said.

Andhra Pradesh overcomes resource limitations with virtual desktops

Watt-sipping virtual PCs give students in India 5,000 school computer labs and a new start



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For some organizations, embracing sustainability is something of a luxury. They have an ample supply of electricity, for example, and plenty of cash on hand, so they can gradually deploy waste-reducing projects that pay for themselves over time. For other organizations, however, sustainable efforts are driven by real, immediate needs.

Such was the case for the government of Andhra Pradesh in India, which needed to supply 1.8 million students across 5,000 public schools with access to state-of-the-art computing facilities. Standard desktop PCs wouldn't cut it, due to limited funding and limited electricity resources -- but virtual PCs proved a perfect alternative.

The school district chose a virtual desktop solution from NComputing. Students are equipped with their own monitor, keyboard, mouse, and NComputing X-series devices. (The devices come in kits that also include vSpace virtualization software and a PCI card.) The devices are connected to individual desktop computers, at a ratio of around 4 to 1, which perform the bulk of the processing work for the connected systems. In all, 40,000 NComputing devices were deployed, along with 10,000 full PCs provided by various OEMs, including HP and Acer.

The eco-magic of the NComputing access devices is that they require just a single watt of power to run, compared to a typical desktop that draws between 65 and 250 watts. Thus, the Andhra Pradesh government uses 90 percent less electricity than it would to power labs running traditional PCs. The virtual machines' watt-sipping nature was particularly significant given the limited infrastructure in the region.

"Certain locations where the installations occurred had very weak or no electricity infrastructure. For example, certain areas only received a few hours of electricity in the day. With a project of this scale, big generators would have been needed to support the setup of each lab in all of the 5,000 schools," said Stephen Dukker, CEO at NComputing. "However, because of the low electricity consumption, the Andhra Pradesh government purchased smaller generators that are generally used in homes."

In terms of cost, the government estimates that taking the virtual desktop route conserved a whopping \$20 million when factoring in savings on larger generators, fuel, electricity, and the like. From a green perspective, the virtual devices are also eco-friendlier than traditional PCs in that they last longer and contain fewer materials.

Thanks to the power of green technology, the students of Andhra Pradesh will be far better prepared for the future. "Earlier students did not even have an idea of how to switch on and off the computer," said Bhavani, a teacher at Zila Parishad School at Medak, India. "After four months, they are operating [the machines] themselves."

CLUMEQ transforms rundown particle accelerator into high-efficiency cooling enclosure

HPC consortium discovers circular shape of concrete structure yields significant cooling efficiencies

The Université Laval in Quebec, Canada, had two problems. First, its campus was home to a run-down particle accelerator, constructed in the 1960s, that needed to be decommissioned. Second, the university and 11 of its fellow institutions, members of an HPC consortium, needed a place to construct a state-of-the-art supercomputer. With a little ingenuity -- and a devotion to embracing sustainable practices -- the group was able to transform the 36-foot-wide, 65-foot-high circular concrete silo into an effective cooling enclosure for its supercomputer.

Transforming the silo into a home for a new data center presented some unusual challenges for CLUMEQ (Consortium Laval, Université du Québec, McGill and Eastern Quebec). The final design concept comprised a topology where three levels of server racks are arranged along a circle, creating an inner hot-air cylindrical core and an outer ring-shaped cold-air plenum. The large floor cross-section of the cold-side plenum results in very low air velocity, almost no turbulence (thanks to the absence of corners), and thus uniform temperature and pressure, according to Marc Parizeau, professor at Université Laval and deputy director of CLUMEQ.

"Having a single annular-shaped cold aisle with a large cross-section and thus very low air velocity is probably close to ideal if one wants to air cool today's high-power density racks without using rear-door heat exchangers or other technologies that require bringing water near the servers," Parizeau said.

The main cooling system, located in the basement, pulls the hot air down from the center using energy-efficient variable drive fans. The hot air is cooled by forcing it through highly efficient, custom-designed walls of coils connected to the campus chilled water loop. Designers considered employing liquid cooling, but "simulations demonstrated that [benefits would be] marginal compared with our 120,000 CFM blowing capacity, and not worth the risk -- and costs -- of putting water above the servers."

Heat waste generated by the supercomputer is put to good reuse. During eight months of the year, it's transferred from the chilled water return to the campus hot-water loop to provide heating for the school, thus reducing energy bills.

The supercomputer itself was built by Sun using the company's Constellation blade system. It's composed of 7,680 Intel Nehalem cores with 24TB of RAM and 1 petabyte of high-performance, high-availability parallel storage. The server hardware itself is "quite energy efficient, but not significantly more than the competition," Parizeau said.

Beyond enjoying the benefits of using an existing structure to house its supercomputer, the Université Laval and CLUMEQ estimate the silo design results in annual savings of more than 1.5 million kWh, compared with a traditional data center. Transforming the silo into a data center likely costs more than going the conventional square-build, raised-floor route, Parizeau said, "but this does not take into account the higher efficiency of the silo design, nor the fact that we recycled a building that was almost impossible to reuse for anything else. It may have cost a little more, but we got more for the money -- and there were no budget overruns."

Dell spurs efficiency by pulling the plug on unnecessary apps

Retiring 7,000 useless or redundant apps contributes to huge efficiency gains in Dell's data centers

Dell has taken its efficiency initiative a step beyond those of most other data center operators: Beyond consolidating hundreds of physical servers, it's pulled the plug on hundreds of others.

One of the key strategies in Dell's efforts to slash energy waste in its data center was to identify precisely which of the 10,000 support applications were necessary. "Our first real 'aha' moment was to challenge the assumption of the phrase 'keeping the lights on' itself, which by definition implies an untouchable set of applications that you must keep running at all costs," said Robin Johnson, CIO at Dell. "We decided instead to look at that part of the business as an opportunity to turn the lights off. Rather than viewing it as the 'must run' portion of IT, we instead became maniacally focused on what could be eliminated from the fixed-cost side of IT."

The first step was to change the way IT billed departments for computer resources. Previously, departments paid a proportionate share of the total IT budget based on their percentage of overall company revenue. Under the model, there was no incentive for departments to give much thought to whether they were running more applications than they needed. Under the new model, departments were charged for their actual usage "but with a twist," said Johnson. "Rather than charging for actual usage using some complex formula of compute capacity consumed, we simply took the entire cost of the data centers and application infrastructure and divided by the total number of applications."

This step helped prepare company leaders for the next stage of the project. Dell's IT department conducted a thorough analysis of the various apps it was supporting and discovered thousands that had no identified owner or appeared to have little or no utilization. Those servers were simply unplugged from the network in controlled batches. Then IT waited for trouble tickets to arrive. "Not surprisingly, for each group of 500 servers that was taken off the network, at most two or three trouble tickets were raised," Johnson said.

This entire process helped Dell eliminate around 60 percent of the 7,000 total apps it ended up removing. The remainder came from identifying niche apps that could be replaced by an enterprise-level solution, as well as weeding out and eliminating duplicate apps.

When these efforts were all done, Dell managed to reduce its number of supported apps from 10,000 to 3,000, which freed up a significant amount of data center resources. These efforts coupled with virtualization have allowed the company to remove 4,000 servers over the past year. Meanwhile, server utilization levels have doubled to 40 percent -- a number Dell is continuing to improve.

Moreover, the company has reaped even more energy savings by upgrading to high-efficiency servers and reorganizing the way it does power and cooling -- including using outside air 150 days of the year in sweltering Austin, Texas. All in all, Dell reports that through its array of data center efficiency efforts, it has increased overall computing capacity by 270 percent, reduced energy consumption by 30 percent, and saved over \$50 million in assorted costs. Retiring and consolidating thousands of servers and apps has also simplified IT administration tasks, including management, accounting, and licensing.

EPA's Energy Star for servers and data centers illuminates sustainable paths

New specifications set a much-needed bar for energy efficiency in the products or operations

Over the past couple of years, an increasing number of data center operators and hardware manufacturers have proudly proclaimed that the respective facilities they run or the hardware they produce are oh so greener than the competition's. But such proclamations can leave observers wondering what that really means, given that standards for weighing such claims have been lacking.

That's changed in the past year as the Environmental Protection Agency rolled out not one but two brand-new Energy Star specifications, one for [servers](#) and one for [data centers](#), that set a bar for assessing and comparing the energy efficiency of individual machines or entire facilities. While not perfect, these two specs reflect some heavy-duty data gathering and feedback solicitation from stakeholders. More important, these specs mark a couple of critical steps forward for IT sustainability in the United States and beyond.

Energy Star for Servers took well over a year to develop, with the EPA collecting comments from vendors, environmental groups, and other concerned parties. The end result was a standard applicable to machines with between one and four sockets and at least one hard drive. Servers that manage to burn the fewest watts while idling are eligible for the Energy Star designation. Power wasted in idle mode is indeed significant, particularly given that servers are notoriously underutilized. Additionally, compliant servers must be capable of measuring their own real-time power use, processor utilization, and air temperature -- all critical data for helping operators assess the overall efficiency of their facilities.

Devising the first edition of the Energy Star for Data Centers spec entailed gathering and analyzing a wealth of data center measurements, amassed over extended periods of time from an array of facilities. Through careful statistical analysis, and again drawing on feedback from stakeholders, the EPA determined what criteria do and do not account for differences in energy efficiency among data centers. The end result was an Energy Star standard based on PUE (Power Usage Effectiveness), which is the ratio of overall data center power consumption to the power consumption of IT equipment.

Energy Star for Data Centers compares a facility's actual PUE against their predicted PUE, which is effectively what the average PUE would be among similar facilities. Data centers that achieve a PUE well below the predicted level (once verified by the third party) can claim Energy Star status. A finalized version of the spec will be released in Portfolio Manager, the EPA's online benchmarking tool, later this year.

Both sets of specs need fine-tuning. Energy Star for Servers, for example, doesn't consider a server's efficiency when it's doing actual work, nor does it take into account cores per processor. Energy Star for Data Centers is based heavily on PUE, which, though useful, hardly paints a complete picture of power usage. Further, the standard doesn't consider differences that can affect overall PUE, such as tier level or what sort of work a data center is doing. The EPA, however, readily recognizes that these standards (like other Energy Star standards) are a work in progress. The organization is already in the process of developing [Version 2.0 of Energy Star for Servers](#) and is seeking feedback from stakeholders.

In the meantime, server vendors and data center operators now have useful maps to guide them down the uncertain path toward sustainability.

Ericsson drives a greener supply chain

Web-based asset management system promotes increases in efficiency and reuse

Telecom equipment company Ericsson faced a problem not uncommon among manufacturing companies: Its services supply chain was fraught with inefficiencies. The company had limited visibility into its own far-reaching inventory of parts, and for competitive reasons, repair providers were reluctant to share their inventory data. Thus, in order to ensure it could keep up with customer demands, the company had to maintain excess stock, which can prove both costly and wasteful. Moreover, the company determined that it was spending more time and resources than necessary to get inventory to customers -- not to mention the waste that came from disposing of excess wares that had become obsolete.

In an effort to make its services supply chain more efficient and environmentally sound, Ericsson last year deployed a network asset management system from Trade Wings called Re:source Visibility. Among its feats, the system provides Ericsson and 2,000 global users with a consolidated, up-to-date view of the inventories at repair centers and service channel operation centers, as well as from new material order teams.

The greater visibility into inventory lets Ericsson and partners determine whether the parts a customer needs are available at a nearby repair shop, thus saving the time and expense of ordering and shipping the goods from afar. The system also offers the ability to look beyond the normal boundaries of internal stock levels so as to whether parts are available for reuse.

Additionally, Ericsson can better foresee potential shortages of in-demand wares, thus helping to reduce costlier small-production runs to fulfill customer requirements.

From a logistics perspective, Ericsson can use the system to devise efficient transportation routes, taking into account distance, fuel, and emissions when, for example, moving inventory from one location to another. The system provides data on both availability of equipment and the distances from point of need, which has enabled users to factor fuel consumption into their decisions.

The program also supports the company's material take-back service, a legal requirement under the European Union's WEEE (Waste Electrical and Electronic Equipment) directive. Customers can request that Ericsson pick up retired goods for end-of-life management. In 2009, the company received approximately 500 requests globally for WEEE collection, which amounted to about 7,045 tons. All told, Ericsson's recovery rate for treated equipment reached more than 95 percent; the WEEE directive's requirement is 75 percent.

All of these benefits add up to faster, more efficient customer service, lower operating and energy costs,

less electronic waste, and fewer carbon emissions. All told, the company has saved a considerable some cash by reducing service-related equipment purchases by 20 percent.

Intel pinpoints thousands of unproductive servers

Using a homegrown application for measuring server utilization, chipmaker is able to reassign or retire 5,000 machines

Imagine running a company with a staff of 2,000 full-time employees who spent around 80 percent of their time doing nothing beyond waiting for some work to do. Odds are, you'd make some staffing changes pretty darn quickly to address such egregious waste. Yet in data centers around the world, servers are permitted to run 24/7, wasting power and adding to organizations' carbon footprints while operating at average utilization levels of 20 percent, 10 percent, or even less.

There are several reasons data center operators tolerate this level of waste. One is that companies lack the necessary tools to gain full visibility into the hardware they're running, such as how much work a machine is doing or whether it's powering a business-critical application. Thus, it's generally easier (and safer) to simply add new racks of servers when computing demands increase, rather than performing a time-consuming inventory of all the machines and pulling the plug on systems that appear to be performing unnecessary work.

Intel last year developed an innovative application for determining which servers were earning their keep and which ones were slacking off. Called iSHARP (Interactive System Health and Resource Productivity), the application is capable of accurately measuring and tracking utilization on the company's large distributed pools of computers. These particular machines are part of an interactive environment, used to process design and development simulations and related tasks for microprocessors.

"This was in effect an effort to drive down the cost of capital expenditures within the batch and interactive services and the evergrowing operational expenses, including data center power, cooling, and space," said Richard Meneely, Interactive Computing Product Owner for Intel's Engineering Computing group. "We would prefer to not add the expense of building and operating any additional data centers."

In developing iSHARP, Intel first had to define algorithms to correctly identify underutilized machines. Specifically, the app measures CPU and memory utilization on a frequent basis for each system within the interactive computing environment. Those measurements are written to a back-end database for reporting and analysis. The algorithms take into account the individual system's architecture, hardware configuration, and category of application when determining thresholds for identifying underutilization.

Beyond the challenge of developing this application itself, Intel's engineers also had to convince end-users that they could relinquish their computing resources without fear. "Design teams were often initially reluctant to give up resources they already had and believed doing so would impact their productivity. iSHARP allowed us to communicate the same information our IT engineers saw directly with the customer," said Meneely.

"We often offered to keep the targeted systems available offline for a period of time in case the customer determined they really did need it. After a period of time, confidence grew with our customers that we could accurately measure and remove systems without impacting their productivity," Meneely concluded.

The effort proved remarkably successful. In the span of about 12 months, Intel reduced the size of its targeted server pools from 14,000 machines to under 9,000, a reduction of 35 percent. Another 2,700 servers were reallocated to more productive purposes, and 2,300 were removed entirely. The removal of those machines helped Intel shed over 8 million kWh and save \$645,000 on energy costs. From a business perspective, the project helped Intel boost the efficiency and capacity of its IT environment -- without hurting productivity.

Meneely said he is now involved in an effort called LEAF, which will build on the lessons learned from iSHARP to provide detailed data for each application within Intel's interactive environment. That, in turn, will help Intel further optimize its resource allocation.

Iron Mountain finds limestone a natural fit for data center efficiency

Geothermal and subterranean conditions of former limestone mine yield significant savings on cooling

Twenty-two stories below ground, deep within the secure confines of a former limestone mine in Pennsylvania, resides Room 48, Iron Mountain's state-of-the-art underground data center. Designed by Iron Mountain vice president of engineering Chuck Doughty, the facility takes advantage of the natural properties of the subterranean location to help the data storage and security company put a dent in its significant energy costs.

"A major challenge was helping our engineers and equipment suppliers understand the basic physics, thermodynamics, and electrical transformation and distribution of this unique location and how they could be leveraged -- and not just apply typical data center designs that have been used for the last 25 years," said

Doughty.

The location's geothermal and subterranean conditions open up opportunities for energy reduction that you wouldn't find in a traditional data center. For starters, the natural temperature of the facility is between 55 and 65 degrees, so Room 48 benefits from free cooling. Ducting above the servers pushes air down naturally, using far less power than would be necessary to blow air upward, as a traditional data center would.

Iron Mountain also employs a cold-air containment strategy, which uses the limestone walls and ceiling vents to cool wires and cables hanging above the server racks to increase cool-air distribution by up to 20 percent. At the same time, air pressure differentials force warm air from the servers up and out through perforated ceiling tiles. Room 48 (which gets its name from its location on the underground facility map) has no need for raised floors found in traditional data centers, thanks to the natural limestone walls' ability to absorb 1.5 BTUs per square foot per hour.

Mother Nature alone isn't responsible for the efficiency gains of the facility. As part of the design, Iron Mountain located the power distribution and air conditioning equipment outside of the facility, resulting in a further reduction in heat while freeing up 30 percent more space for racks.

Room 48 uses motion-sensor, low-power, low-heat lighting to further reduce temperature and costs. Additionally, Iron Mountain opted to purchase run-of-the-mill K-rated transformers and electrical load centers in the data center, the kind you'd find in an everyday electric supply store, rather than pricey electrical equipment typically used in data centers. The company also incorporated readily available, energy-efficient T8 fluorescent bulbs into its lighting scheme.

Iron Mountain's efforts paid off in spades. The company estimates that Room 48 cost about 30 percent less to build than a traditional data center because of its energy-efficient design and use of standard equipment instead of specialty gear. The various efforts to slash cooling save the company hundreds of thousands of dollars annually. Moreover, the natural cooling allows Iron Mountain to boost power in the room to 200 watts per square foot, 50 percent above the 125 watts per square foot used in data centers located in the same underground facility.

"Room 48's design and construction provided a powerful lesson in discarding prior data center design templates and leveraging the natural advantages this unique location provided," said Doughty. "Future Iron Mountain data centers will use the lessons of Room 48 to help design, construct, and operate the most cost-effective data centers, utilizing the geothermal cooling of the underground."

KPMG scores sky-high savings with telepresence

Part of a companywide green IT makeover, KPMG sheds 100 metric tons from its carbon footprint by reducing air travel

When browsing KPMG's internal travel portal to plan a face-to-face meeting, employees will sometimes find a pleasant alternative to booking energy-sapping, time-consuming flights: booking time in one of the company's 16 HP Halo telepresence studios. Not only does that approach spare workers the stress and jet lag of air travel, it's helped the massive accounting corporation achieve its goal of employing technology to cut costs and reduce its carbon footprint.

According to Darren McGann, green IT manager at KPMG, air travel accounts for 60 percent of the company's overall carbon footprint, which is why the company has made a determined effort to promote telepresence usage among employees. "Within a month of integrating Halo into our travel portal, we saw a 30 percent increase in its usage," said McGann. "Once employees use telepresence, the technology sells itself and employees who use Halo become the biggest promoters of the technology."

KPMG staff have grown to appreciate telepresence for a variety of reasons. "Employees continue to use it not only as a cost-savings measure but because of the social benefits they discovered from their initial experience," McGann said. "Users have said that it allows them to maintain closer relationships with global teams and decrease frequency of travel, thus improving their work-life balance. And it makes them feel good about working for KPMG since the firm has these technologies available."

Beyond boosting productivity and morale, telepresence has helped KPMG achieve its financial and environmental goals. The company has shaved a cool \$1 million from its travel budget and 100 metric tons from its total carbon footprint.

If telepresence isn't an option, the Green Travel Advisor within the travel portal directs employees to hotels that comply with the key environmental guidelines of the American Hotel and Lodging Association.

In addition to telepresence and the Green Travel Advisor, KPMG monitors both its data center and its 88 remote offices' computing facilities for compliance with ASHRAE's updated temperature recommendations. Monitoring the remote locations entails using a BMC Performance Manager Patrol agent to collect router intake temperatures from the various offices via SNMP. That data is then graphed for trending purposes,

helping to identify areas to implement tighter controls to save energy and operating costs.

"Collecting and monitoring more data points allowed us to safely raise the temperature setting to 74 Fahrenheit, which in turn enabled us to reduce our CRAC energy consumption up to 15 percent," said McGann. "The monitoring provides more response time to a spike in temperature and also alerts us when there is a temperature drop and therefore waste of electricity."

KPMG has also developed an IT Sustainable Procurement Standard, a joint effort between IT and the company's procurement department, requiring that new IT hardware meet Energy Star and EPEAT standards. The procurement standard will result in a predicted energy savings of over a half million kWh for 2009 purchases alone, along with huge reductions on GHG emissions, water usage, and general materials.

McGann attributes much of KPMG's sustainability success to the support it's received from upper management. "There needs to be buy-in from an organization's leadership to successfully implement green initiatives," he said. "It often helps to secure this buy-in by presenting a business case for green IT initiatives that demonstrates not only the cost savings, but the environmental impact."

Palo Alto takes a unified approach to shattering carbon-cutting goals

Pulling data from myriad sources into a single management system equips city to intelligently monitor sustainability efforts

The city of Palo Alto, Calif., is well known in technology circles as the home base for high-tech companies such as HP, Facebook, and VMware. Thus, it's rather fitting that the city government embraced information technology to help meet the City Council's challenge of shrinking the town's carbon footprint.

Initially, the city's 13 different departments worked independently to meet their respective assigned carbon budgets, using spreadsheets, various allocation methods, and calculation tools to track environmental data such as consumption of water, electricity, and natural gas. Not surprisingly, this go-it-alone approach proved insufficient; the city determined a unified approach was necessary. To that end, the city implemented a third-party energy and environmental management SaaS offering from Hara, which has proven instrumental in monitoring the city's 160 ongoing projects pertaining to areas of sustainability management, energy consumption, and water and natural-gas use.

City staffers manually input past and present data about various sustainability-oriented projects, but much of the other data flows into Hara via outside systems. For example, hundreds of meters track consumption of electricity, natural gas, and water, which is delivered into Hara via SAP's utilities billing module. The purchasing data for paper and other tracked consumables is downloaded into Hara through the city's SAP financial system.

Fleet fuel usage data is collected each time a vehicle refills at the city's municipal service center through RFID technology in each vehicle. That data flows into the fleet management system, which in turn generates input files for the Hara system.

All of that data can then be sliced and diced in any number of ways to determine progress at a granular project-by-project basis or at a broad level, such as how many gallons of water have been saved citywide between 2008 and 2009. "We are now able to monitor the progress of each project and its costs, as well as isolate the appropriate meter readings, purchasing data, etc., to evaluate the effectiveness of each project," said Karl Van Orsdol, sustainability team and energy risk manager for Palo Alto. "Each [project] report allows all departments to see how quickly and effectively the project is implemented and what the impacts are. Departments can then use this to implement their own initiatives."

By comparing project reports, city employees were able to determine that adopting intelligent power strips was a more effective way to reduce PC power consumption than was an approach requiring active participation from employees.

The wealth of data available to city employees also helped track the long-term effectiveness of, for example, print-reduction projects. Those initiatives included setting printers to print double-sided by default and encouraging staff and city council members to access reports in digital form instead of hard copies. These efforts resulted in a 25 percent reduction in paper use in 2009 over that of 2005.

All told, the city of Palo Alto reaped tremendous gains for its various sustainability projects, and a significant portion of that success can be credited to having a tool to track all those projects from a single pane. By the end of 2009, Palo Alto found that it had shattered its goal of reducing GHG emissions by 5 percent from the 2005 baseline, instead achieving an overall reduction of 12 percent. Specifically, the city slashed electricity consumption by 8 percent, natural gas consumption by 25 percent, solid waste consumption by 22 percent, paper consumption by 25 percent, and employee commute time by 31 percent. In terms of tax dollars, the city saved \$550,000 on electricity, natural gas, and materials.

Of course, technology alone did not help reduce Palo Alto's carbon footprint. "The greatest challenge is organizational, not technical. [It] centered on working with departments to take responsibility for their energy

management and convincing senior management that this diffused responsibility was the most effective approach to attaining efficiency," said Van Orsdol. "When you are using a GHG management tool to transform the organization in its thinking about and managing energy, complete support from the executive offices is critical."

Provider Enterprises steers fleet toward fuel savings

System boosts safety, response time for bus service to special-needs students

Provider Enterprises offers a critical service for New Hampshire schools: lining up transportation for over 1,500 special-needs children to 200 different schools every day. Managing the fleet of vehicles can be complex as the company strives to ensure the safety and comfort of its passengers while adhering to strict time tables -- and, of course, a budget.

In an effort to improve service and cut expenses, Provider enlisted fleet management technology from Navman. The system gave the company a new level of visibility into the real-time whereabouts of its 178 vehicles, tools for tracking factors such as fuel consumption and vehicle maintenance records, and the means for quickly exchanging communications -- including instructions and directions via SMS -- with drivers.

The system has yielded a number of benefits. From a purely economical standpoint, it helped the company cut fuel expenses by nearly 10 percent in the first year alone, which amounts to around \$50,000. In part, those savings come from the system's ability to help dispatchers identify when drivers are violating the company's no-idling policy -- and alert drivers to the problem immediately.

Moreover, dispatchers can easily notify a driver when a child doesn't need to be picked up, thus shortening trips. Dispatchers can also easily find the closest appropriately equipped vehicle to meet a passenger's needs. "Response times have been cut by 50 percent," said Garrett Scholes, operations manager at Provider. "Before Navman Wireless, we did all of our dispatching over the radio. Some buses have wheelchair lifts and some don't. Routing the correctly equipped buses to the appropriate stops was time consuming and tedious."

Further, the system enables Provider to track safety violations, such as whether a driver is speeding (which can also waste fuel and contribute to wear and tear) or failing to stop at railroad crossings or whether passengers aren't buckled in. The system also lets the company know if drivers are using vehicles for personal use, which, again, can result in higher fuel and maintenance costs.

Raytheon's companywide green efforts reach Antarctica

Company's sustainable IT programs evolve far beyond the data center and desktop

Defense company Raytheon may well have extended the reach of sustainability efforts further than any other organization on the planet. Among its successful green IT endeavors, the company devised a way to significantly slash fuel waste in the deepest of souths: Antarctica.

This particular project, a joint effort by the company's IT and facilities departments, targeted operations at the United States' McMurdo station in Antarctica. Raytheon created a secure system by which staff could remotely monitor and tune heating systems at the station from offices in Denver. The effort freed up expensive and limited staff time in Antarctica, while reducing fuel consumption by 50,000 gallons alone in 2009, in part by reclaiming some of the waste heat to use as supplement heating in other buildings. The environmental benefits are by no means trivial -- nor are the economic benefits when you consider fuel for the chilly location runs \$8 per gallon.

The McMurdo project represents the fruits of Raytheon's ongoing, companywide sustainability efforts, which have blossomed through company leaders' efforts to cultivate a "think green" mentality within the corporate culture -- no small effort considering Raytheon is a worldwide company with 75,000-plus employees. Raytheon has achieved this feat through a number of channels, such as implementing a social networking environment for fostering collaboration on green-focused projects among various teams.

The combined effort of promoting sustainability has helped the company rapidly replicate successful green IT endeavors. "A joint IT and facilities team within our Net Centric Systems (NCS) business ... developed and deployed a desktop power management solution using products from 1E," said Brian J. Moore, Raytheon's Sustainable IT Program lead. "Our social networking structures enabled IT and facilities teams in two of our other businesses to learn about their success and get help in implementing the solution for themselves. Other businesses are now beginning the process as well."

Similarly, the facilities team at one of the business units "have been sharing a process and techniques for identifying and making improvements to data center efficiencies that are low-cost but that can generate significant savings," says Moore. "Examples include using wireless temperature sensors to adjust floor tile openings and blocking air flows between hot and cold aisles."

Raytheon's efforts have helped the organization's sustainable IT efforts evolve beyond simply making IT

operations -- such as in the data center, on the desktop, and in print -- greener. That's not to say the IT-focused efforts alone weren't fruitful; the company managed to slash IT energy costs by \$17.4 million per year. But beyond simply boosting IT operations' green credentials, the company has empowered IT to find ways to apply technology to manage other business processes and operations, such as the McMurdo Station project or the development of a database to track water usage.

Moore attributes much of Raytheon's sustainability success to the company's investment in social capital. "Our focus on social capital is also enabling IT to be deeply engaged in the company-wide Raytheon Sustainability program. Sustainability is a journey, and the investment we are making in developing social capital well-prepares us to flourish along the way," he said. "Every day we see positive contributions to the company's bottom line, to the environment, and to the work lives of our employees that surprise us. We are proving that connecting the knowledge and passion of folks in various roles across the company can make a real difference."

Standard Bank enlists thin clients to avoid costly AC upgrade

The company's VDI infrastructure leads to less heat, lower bills, and easier end-user support

Standard Bank was set to relocate to a new BREEAM Excellent-rated headquarters in London in 2009 but faced a curious dilemma: The new building's air conditioning system wasn't designed to accommodate the number of employees moving into the space. Scrapping and replacing the AC system was certainly an option, but company execs felt that would violate the spirit of selecting a green building in the first place. Enter Standard Bank IT architects Joel King and Paul Cotgrove, who came up with a clever, IT-oriented approach to beating the office heat: replacing PCs with low-power virtual clients.

The bank's VDI infrastructure combines VMware View and around 700 Wyse V10L virtual clients. Two monitors are connected to each client to provide users with the necessary work environment. On the server side, in addition to the VMware View VDI platform, Standard Bank uses VMware ThinApp software to virtualize applications, including specialized, business-critical, graphically intensive apps such as SunGard Front Arena and Bloomberg. The server virtualization infrastructure is VMware VI3 with HDS USPV storage.

The VDI solution certainly nipped the heating problem in the bud, saving the bank more than \$380,000 (250,000 British pounds) on a new AC system. As an added benefit, the company saw energy consumption drop by 312,539 kWh per year, which translated to \$50,000 in savings. Those savings stem from the fact that the bank's PCs had consumed 150 watts each while the thin clients ran at about 15 watts per unit. "The data center does experience some increase in demand, but overall, our savings are far more than we thought. It's also easier to manage and control energy consumption at the data center. Overall, I think we have experienced a 30 to 40 percent savings," said King.

Environmental benefits aside, the bank reports that the new computing infrastructure is easier to manage and maintain. "Initially, the cost of provisioning a user with a thin client is [only] a little bit better than purchasing a PC. But in the long run, the thin client support is faster, cheaper, and easier to resolve. If there is a problem with a machine, typically a user simply has to log off and then they are fine," King said.

Additionally, equipping a user with a new system is a snap. "With PCs, it would take anywhere from a half a day to a full day to download the image onto the PC, install all user-specific applications, take that to the user, and configure it specifically for them. With VDI, all of that goes away. We can pretty much just add a user to the Active Directory, and it's as simple as that," said King.

Also important: End-users, who were initially resistant to giving up their PCs for thin clients, have warmed up to them considerably, in part because they make working remotely a lot easier. "Users log in and it's the same experience and full functionality as if they were in the bank. In the past, users had legacy hardware, so the quality of remote access wasn't as good," said King. "Overall, there was some resistance to begin with, but once people understood the thin clients, they were happy. We even had people asking us to move them to thin clients before their scheduled move."

Riding the sustainability wave that came with the move into the new green building, Standard Bank has embraced other IT projects to cut waste and shrink its carbon footprint. For example, the company reduced its printer count from 130 machines to just 30, and users now have to swipe a card at a printer in order for the job to process. "We've reduced paper waste, because a lot of times people would print, then forget about it," King said. "Now we're looking at power monitoring on all servers and how we can reduce our server consumption with more efficient hardware or server consolidation. Overall, there is a big drive around here, looking at everything to see how we can reduce our carbon footprint."

State Street banks on sustainability

Engaging employees companywide enhances the payback of green IT investments

As a worldwide financial giant, State Street knows a little something about making sound investments. It turns out its expansive list of sustainability investments have indeed been money well spent, helping the company -- with 27,000 employees in 25 countries -- cut expenses and drive efficiency throughout its businesses operations.

"Green' is not merely an isolated program. To garner the greatest benefit, green thinking, measurement, and management should become a part of every solution," said Madge Meyer, executive vice president at State Street's global infrastructure services division. "We have assimilated our green initiatives into our infrastructure technology Blueprint, thereby ensuring that sustainability efforts complement and align with all of our business and technology initiatives. We also consider the environment in our standard technology planning process to help minimize our environmental impact from a worldwide perspective and support our corporate commitment to the communities in which we live and work."

State Street's green IT projects run a broad gamut. Through its Standardized Accelerated Virtualized Eco-Friendly (SAVE) storage initiative, the company has consolidated 47 Windows environments to four NAS subsystems within two datacenters for significant green savings. Virtualizing 50 percent of its servers resulted in energy savings totaling nearly \$3 million per year, not to mention a 62 million pound reduction of CO2 emissions. The company has also consolidated its VoIP architecture, eliminating 84 percent of its distributed PBXes for further reduced energy consumption.

On the desktop, the company adopted PC power management, yielding energy savings of around \$500,000 per year.

State Street's list of green-oriented initiatives continues with its Work from Home initiative, a program that "leverages our sophisticated technology platform to support remote access and telecommuting, thereby reducing greenhouse gas emissions and air pollution," said Meyer. The program saves an estimated 880 metric tons of carbon per year.

The company has succeeded in saving money and reducing air travel through the use of telepresence and videoconferencing technologies as well. Teleconferencing has increased by 40 percent since its adoption, and State Street employees now average more than 1,400 virtual meetings daily.

Employee participation is critical for State Street's green initiatives to be effective. Fortunately, the company has found that workers want to be involved in the greater good. "The challenge is really about harnessing the passion that already exists in our workforce," said Meyer. "To accomplish this, we rely heavily on our Energy Efficiency Team, which is staffed by those employees within all levels of our organization who are already personally committed to sustainability. This dedicated team expands our green culture by leveraging and promoting regional efforts on a global scale to secure the broadest collaboration in managing our environmental footprint."

Syracuse University turns to DC power in constructing its Green Data Center

Other green practices include on-site power generation and innovative liquid cooling

If the subject is politics, the word "efficiency" is rarely paired with the acronym "DC." In the world of sustainable IT, however, the other DC, direct current, is gaining recognition as a more efficient, less hardware-intensive power-delivery technology than the standard AC (active current): hence, Syracuse University's decision to build its Green Data Center atop a DC power infrastructure.

Funded with public and private contributions (including IBM's largesse), the university's \$12.4 million, 12,000-square-foot Green Data Center (GDC) is designed to use about 50 percent less energy than a typical data center. A chunk of those saved watts come via a DC power system, which requires fewer power conversions than does a traditional AC-based facility.

In the GDC, DC power is delivered directly at the appropriate voltage to IBM System z10 servers, thus eliminating waste from conversions. Big Blue's Power- and z-series servers readily accept either 380 or 575 volts of DC directly, according to Edward Seminaro, chief hardware systems engineer for IBM: "When the energy efficiency is combined with the benefits of running an end-to-end DC environment, it is difficult to deploy a system that is greener or more reliable."

By embracing DC, Syracuse University also managed to reclaim precious floor space that would otherwise be lost to additional conversion equipment. Furthermore, less hardware translates to a reduced environmental footprint for the school, as there are fewer resources expended in building and delivering products.

Also contributing to the facility's energy efficiency and reduced carbon footprint, SU's GDC is powered entirely by an on-site electrical trigeneration system that runs on natural gas, one of the cleanest sources of energy out there.

Additionally, IBM and Syracuse University devised a clever approach to making cooling in the data center more efficient. For starters, they created a liquid cooling system that uses double-effect absorption to convert exhaust heat from the generator into chilled water to cool not only servers, but also an adjacent building. Server racks incorporate "cooling doors" that use chilled water to remove heat from each rack more efficiently than conventional room-cooling methods. The data center also employs sensors to monitor server usage and temperatures to tailor the amount of cooling delivered to servers, further improving

efficiency.

This story, "The green IT stars of 2010," was originally published at [InfoWorld.com](#). Follow the latest developments in [green IT](#) at InfoWorld.com.

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