



Educating Tomorrow's Green IT Workforce

As the nation moves toward a more environmentally sustainable economy, many of the new green jobs will be information technology (IT) and networking jobs. Large-scale energy efficiency, carbon emissions reduction, resource management, and other sustainability initiatives largely depend on the monitoring, control, and analytical capabilities that only digital technology can deliver.

A [study](#) conducted by The Boston Consulting Group on behalf of the Global e-Sustainability Initiative, an international alliance of IT companies, stated the following: "Information and communications technology has the potential to cut total carbon-dioxide emissions in the United States by 13% to 22% from business-as-usual projections by 2020. This translates to a gross energy and fuel savings of \$140 billion to \$240 billion — equivalent to a 20% to 36% reduction in imported oil consumption."

Take the smart grid, for example. *Smart grid* is the name for a future electrical system that could potentially reduce energy use in the U.S. by 10% to 15%. The system will merge IT and energy technology to create an intelligent infrastructure enabling two-way communication among generation plants, power transmission facilities, utilities, building sensors and meters, and even individual electrical devices and home appliances. The American Recovery and Reinvestment Act (ARRA) has allotted \$11 billion to a nationwide smart grid implementation. "Every device in every home and business could participate," says Marie Hattar, vice president of Cisco Network Systems and Security. "You can think of it as the next evolution of the Internet."

"Green jobs play an important role in our economic recovery. The promise of green jobs is not only to help re-start the economy and put Americans back to work, it is also to help make America more energy-independent."

—Hilda Solis, U.S. Secretary of Labor

A skilled IT workforce is a necessary prerequisite to building the smart grid and undertaking other 21st century green initiatives. A [report](#) sponsored by Green For All and PolicyLink that examines the green provisions in ARRA points out that "it will be particularly important to put in place mechanisms that ensure the linkage between programs that create jobs and those that train people for those jobs." ARRA provides \$500 million in grant funding specifically for research, labor exchange, and job training projects aimed at preparing workers for careers in energy efficiency and renewable industries. According to an Association for Career and Technical Education [issue brief](#), "Community and technical colleges are in a unique position to evolve and adapt quickly to changing technologies in the energy industry, and to create new training programs to meet the growing demands for a skilled and environmentally conscious workforce." High schools and four-year institutions will also play a vital role.

Although potential funding is in place and job opportunities will soon emerge, schools and colleges are finding that establishing a green education program presents the same challenges as building any other technical certificate or degree program—it can be a laborious undertaking that takes up considerable staff time and resources. One way to ease the process is to integrate classroom-ready courses that have already been developed and refined, but can be adapted easily to the institution's specific program and student profile.

Cultivating Green IT Skills: A Case Study

Consider one community college that has created an educational partnership focusing on network convergence with an emphasis on green applications. The National Science Foundation (NSF) awarded a grant to Collin County Community College to establish the Convergence Technology Center, a regional partnership in the North-Central

Texas area that now also includes El Centro College and the University of North Texas. *Convergence* is defined as the integration of voice, data, video, and imaging communications on a single network infrastructure based on IP. Converged networks form the backbone of enterprise IT, and sustain collaboration technologies such as videoconferencing and real-time document sharing that promote environmental sustainability by reducing business travel.

A recent [article](#) in *Community College Times* identifies convergence as an occupational “hot area” where workers can earn \$45,000 to \$55,000 or more a year. The Convergence Technology Center is dedicated to producing a pool of highly qualified convergence technicians, and is also committed to providing professional development for faculty, recruiting underserved students, and acting in a mentoring capacity for several other colleges across the U.S. that are building similar programs.

The colleges have integrated Cisco® Networking Academy® courses into their convergence curricula to make sure students master fundamental network administration and IT skills. Collin County Community College offers an Associate in Applied Science (AAS) in Convergence Technology, while El Centro College offers an AAS in IT with a convergence track. Both colleges also give students the option of obtaining certificates in convergence. The students can get transfer credit if they choose to apply to the four-year Engineering in IT degree program at the University of North Texas.

The Convergence Technology Center has given green IT a prominent place in the curricula. “We focus attention on sensors for green buildings and smart grid implementation, and we also cover subjects such as teleconferencing, digital signage (used to create environmental awareness and replace paper), radio-frequency identification, and other technologies involved in sustainability and recyclability,” says Dr. Ann Beheler, who helped found the center and is principal investigator for the NSF grant. “In keeping with the convergence concept, we’ve used the technology to blend online and face-to-face instruction, and we even manage the grant through periodic teleconferences.”

The program’s mentoring efforts have been especially successful. “Ten colleges to date have been able to take the core curriculum and customize it to fit their own circumstances,” Dr. Beheler says. “We work with business advisory councils in the various localities, and conduct skills analyses to determine exactly what skills employers need and what certificates and degree programs would be appropriate for the region. Employers such as utility companies tell us that convergence skills, with a concentration on green technologies like smart grid, are exactly what they are looking for.”

Brett McCormick has been a student in the program at Collin College for two years and is currently the CTC lab assistant. He plans to enter the University of North Texas

“Green IT is central to the tenets of reduced cost, increased value to our clients, and the preservation of our planet. Green initiatives can be as narrowly focused as purchasing more energy-efficient networking equipment, or as broad in scope as virtualization, cloud computing, or Software as a Service. Graduates who truly understand the interplay of the ‘green’ in IT will have a true advantage in the job market and will be recognized for their broader contribution in the workplace.”

—Glenn Wintrich, Jr., Director, Service Line Management, Perot Systems Corp.
 (Perot Systems is a member of the Convergence Technology Center’s Business Advisory Council.)

in August 2009, majoring in Information Technology. One of the classes he took at Collin, Convergence Case Study, is a problem-based course that involved designing a small office/home office network while taking green infrastructures and principles into account. “The class simulated what working in a team environment in the real world would be like,” McCormick says. “One thing that is very relevant out there is green IT. The CTC itself is starting to monitor its own electricity usage, as well as to teach students about energy consumption — everything from covering the roof of the data center with solar panels to ‘virtual presence’ over the network. The CTC also offers classes that allow students to listen in and participate remotely, and being able to telecommute is another key aspect of green IT.”

IT and Networking Are Key to Going Green

There are a number of green initiatives where networking skills are having a major impact:

Green Workplaces

Commercial buildings account for 70% of total U.S. energy consumption and 39% of total greenhouse gas emissions, according to the U.S. Green Building Council. Today’s smarter buildings help mitigate this eco-impact with digital networks that gather and relay information for effective energy monitoring and centralized facilities control. IT professionals will also be busy transforming commercial buildings into more versatile workplaces with technologies such as wireless networks and power over Ethernet.

The State of Missouri, for example, has taken the concept to an unprecedented scale with a networked real estate system that manages approximately 1000 buildings representing 32 million square feet of office space, saving the state \$35 million a year and avoiding emissions of an estimated 205 million pounds of carbon dioxide.

Broadband Deployment

ARRA sets aside \$7.2 billion for improvements to the nation’s broadband (high-speed Internet) infrastructure, of which \$2.5 billion is earmarked for distance learning, telemedicine, and extending broadband to underserved and rural areas. The providers who implement these services will need employees with expertise in technologies ranging from wireless transmission and data “packet shaping” to video streaming and network security.

The Information Technology and Information Foundation (ITIF) [projects](#) that high-speed connections to the home would increase the number of telecommuters to 19 million by 2012. That would save 1.5 billion hours of commute time—and reduce gasoline consumption by 5%. And deploying next-generation broadband to 80% of U.S. homes would also create some 2 million new jobs, according to the ITIF study.

Virtual Collaboration

Organizations are reducing carbon emissions by using network-enabled collaboration and conferencing technologies running on convergent networks to encourage telecommuting and limit business travel. The latest high-definition video and sound technologies give attendees at virtual meetings and training sessions the sense of actually being in the same room. Remote interaction based on web 2.0 technologies is also playing an increasing role in both business and private life. All of this requires not only advanced multimedia applications, but also unifying network “plumbing,” such as specialized routers and Internet-enabled cloud computing infrastructures, to support the applications.

Cisco Networking Academy courses cover the basics of collaborative technology, giving students the fundamentals necessary to pursue additional training and specialist certifications. Cisco certifications are recognized by IT professionals and organizations throughout the industry. They enhance job applicants' resumes and assure employers that prospective new hires have the right skills for the position.

Greener IT Operations

Enterprises are looking to implement environmentally friendly IT facilities, such as energy-efficient data centers, to meet their green goals and to reduce the considerable costs associated with IT energy use. (IT operations use so much electricity that many IT departments pay the energy bills directly from their budgets.) A recent [survey](#) of 1000 enterprises worldwide conducted by Symantec Corp. found that 89% of respondents believe that IT should play a very or extremely significant green role. Even as organizations cut overall IT budgets, 73% of respondents said they plan to increase green IT spending. A [McKinsey report](#) found that greening the IT function can help eliminate a massive 7.8 metric gigatons of greenhouse gases by 2020, amounting to 15% of all global emissions.

In addition to replacing older, less-efficient equipment and monitoring usage, IT departments are reducing power requirements in data centers by deploying a technology called *virtualization* that increases server and storage utilization by allowing multiple functions to run on one physical device. In the education sphere, the [University of Hawaii](#) system, which includes seven community college campuses and supports distance learning courses for students on the Hawaiian Islands, American Samoa, and Guam, has implemented VMware virtualization solutions in its network operations center, which will support the campus network as well as virtualization-oriented courses offered through the VMware IT Academy program. (VMware's virtualization platform, combined with the Cisco Unified Computing System, provides a virtualized and physical computing system over an intelligent, unified network fabric.)

Wayne Lewis, Cisco Networking Academy manager at the Pacific Center for Advanced Technology Training, a consortium of the University of Hawaii community colleges, says that “the foundational networking skills provided by Networking Academy CCNA courses give our students an entryway to the world of virtualization.”

The green activities just described can only suggest the variety of work that awaits students who have the requisite technical skills. Employment possibilities will certainly expand as nascent environmental efforts in the U.S. and around the world accelerate and organizations take advantage of the power of networking to achieve their objectives.

What's Next?

Find out more about how Cisco Networking Academy can put your students on the fast track to green jobs and other emerging employment opportunities: www.cisco.com/go/netacad/us

For information on Cisco Networking Academy and economic stimulus, visit: www.cisco.com/go/netacad/us/econ

Links

- Boston Consulting Group, 'Technology Could Cut Annual CO2 Emissions in U.S. by 22 Percent and Save Up to \$240 Billion by 2020', www.bcg.com/about_bcg/media_center/press_releases.jsp?id=2792
- Green for All and PolicyLink, 'Bringing Home the Green Recovery: A User's Guide', www.greenforall.org/resources/recoveryusersguide

- ACTE, 'CTE's Role in Energy and Environmental Sustainability', www.acteonline.org/uploadedFiles/Publications_and_Online_Media/files/Sustainability.pdf
- Community College Times, 'A good time to upgrade for IT', www.communitycollegetimes.com/article.cfm?Articleid=1639
- ITIF, 'Executive Summary: Improving Quality of Life Through Telecommuting', www.itif.org/files/Telecommuting.pdf
- Greener Computing, 'Symantec's State of Green IT 2009', www.greenercomputing.com/resources/resource/symantec-state-green-it-2009
- McKinsey Quarterly, 'How IT can cut carbon emissions', www.mckinseyquarterly.com/ghost.aspx?ID=/information_Technology/Management/How_IT_can_cut_carbon_emissions_2221
- University of Hawaii System, www.hawaii.edu/

About Cisco Networking Academy

Cisco Networking Academy is a global public-private education partnership that prepares students for jobs in the green economy, as well as a host of other employment opportunities that require IT and networking skills. In the U.S., more than 128,000 students attend classes in 2200 academies each year. There are academies in over 50% of community colleges nationwide. Networking Academy courses meet the "shovel-ready" test: they can be established quickly and economically in any school, college, or nontraditional setting.




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