

By James R. Stone III

It Isn't Easy Being Green, or Is It?

BUT HOW REAL IS THE IMPACT OF THE GREEN REVOLUTION ON JOB CREATION, AND WHAT IS THE IMPACT OF GREEN ON CAREER AND TECHNICAL EDUCATION?

PHOTO BY STOCKXPERIENCE.COM



James R. Stone III Ph.D.,

is professor and director of the National Research Center for Career and Technical Education, University of Louisville. He can be contacted at james.stone@nrccte.org.

IN THE MIDST OF AN ECONOMIC RECESSION, double digit unemployment rates, and financial bailouts lies a promise of economic recovery through investments and training for a green economy and green collar occupations. Demand is growing at the local, national and international levels for products and services that conserve energy and natural resources, decrease greenhouse gas emissions, and reduce our dependence on foreign oil. Driving the green movement are America's dependence on imported oil and the associated volatile fuel costs, and the growing concern for the well-being of our planet.

There are numerous advocates who are thinking green: policymakers, research scientists, environmentalists, entrepreneurs, financiers, educators, industry leaders and consumers. Every state is experiencing growth in at least one green industry sector, according to a series of state reports released by the National Governors Association Center for Best Practices. But how real is the impact of the green revolution on job creation, and what is the impact of green on career and technical education (CTE)?

Let's begin with understanding what we mean by green jobs. There are those who caution "the rush to jump on the 'green' bandwagon has outpaced the development of a concept of what it actually means to be green"—(Dierdorff et al., 2009). Most definitions of "green" jobs involve protecting the environment and fostering energy independence. For example, the United Nations Environmental Programme (UNEP, 2008)

states that green jobs should "contribute substantially to preserving or restoring environmental quality." Other definitions root the notion of a green economy in products or services that promote renewable resources, reduce pollution, and exist in skilled trades and professional occupations (NASDCTEc, 2009). Green activities can range from recycling/reducing waste to increasing energy efficiency. The emerging green economy encompasses a number of sectors in the workforce, including renewable energy generation, transportation, energy efficiency, construction, environmental protection, manufacturing and recycling and waste

Green Sectors

Dierdorff and colleagues (2009) performed an extensive review of the literature and identified 12 sectors that were consistently mentioned. The following sectors are not independent nor are they meant to be exhaustive:

1. Renewable Energy Generation
2. Transportation
3. Energy Efficiency
4. Green Construction
5. Energy Trading
6. Energy and Carbon Capture and Storage
7. Research, Design and Consulting Services
8. Environment Protection
9. Agriculture and Forestry
10. Manufacturing
11. Recycling and Waste Reduction
12. Governmental and Regulatory Administration

reduction (see Green Sectors).

Green jobs are said to be growing at a faster rate than the whole economy (Melville, 2009) with green innovation occurring in most states. However, the impact of green employment on the total number of jobs available is relatively small. There were an estimated 750,000 “green jobs” in 2006 (Global Insight, 2008). The Obama administration wants to create 5,000,000 new green jobs over the next 10 years. *The New York Times* (11/14/2009) estimates that if this ambitious goal is met, green jobs will comprise about 3 percent of current workforce levels. By contrast, health care workers of all kinds will comprise more than one-third of all workers. While keeping the green potential in perspective, what are the potential green labor market impacts?

Many green jobs are occurring in traditional occupations where the context has changed but not the skills. For example, a traditional job of welding a boiler for a coal-fired energy facility could transform into a green-collar job involving welding the components for a wind energy machine, or a traditional blue-collar job of assembling an SUV in an auto plant may be “greened” by assembling a hybrid in the same auto plant. In both examples, the skill sets for the blue- and green-collar jobs are the same as is the training for these jobs. Other possible greened jobs could include:

- All construction workers
- Some manufacturing workers
(e.g., tools setters, operators)
- Energy consultants
- Organic farmers
- Extraction workers
(e.g., drilling, boring, mining)

Other green jobs will require significant changes to the work and worker requirements of existing occupations. These changes may or may not result in an increase in employment demand for



PHOTO BY STOCKXPRT.COM

the occupation. The essential purposes of the occupation remain the same; but tasks, skills, knowledge and external elements, such as credentials, may change. An example is the occupation of architect, where greening has increased knowledge requirements pertaining to energy efficient materials and construction, as well as skills associated with integrating green technology into the aesthetic design of buildings. Other green enhanced jobs may include:

- Power plant operators
- Mechanical engineers
- Auto specialty technicians
- HAVC engineers and mechanics
- Precision farming techniques for framers and ranchers
- Occupational health and safety technicians

But the green influence will also

require unique skills and worker requirements resulting in the generation of a new occupation or one born from an existing occupation. An example would be of solar system technicians who must be able not

New Green Occupations

- Solar power operations
- Carbon capture and sequestration
(engineers and technicians, maintenance)
- Solar lab technician
- Photovoltaic fabrication testing technician
- Energy retrofitting specialist
- Waste composting
- Green landscaping
- Whole home performance analysts
- Hybrid car maintenance
- Industrial ecologist
- Recycling, reclamation technicians

Federal Requirements of Programs of Study

Programs of Study (POS) must include coherent and rigorous content aligned with challenging academic standards and relevant career and technical content. This content must be delivered in a coordinated, non-duplicative progression of courses that align secondary and postsecondary education, and lead to an industry-recognized credential or certificate at the postsecondary level, or an associate or baccalaureate degree. In addition, the programs may include the opportunity for secondary education students to participate in dual or concurrent enrollment programs, or provide other ways to acquire postsecondary education credits.

only to install new technology, but also to determine how this technology can best be used on a specific site (see New Green Occupations). The majority of green jobs are expected to emerge from the transformation of existing jobs as skill sets, methods and occupational profiles are redefined. Similarly, the majority of job trajectories in green industries will likely be built into traditional career pathways. Green jobs span a variety of skills, educational backgrounds and occupations. The largest number of new green jobs are projected to be in occupations requiring professional certification, an apprenticeship, or one or two years of postsecondary education. Thus, many of the green jobs are “middle-skilled” jobs meaning they require some postsecondary education or training, but less than a four-year postsecondary degree.

What is good news for our economy and our workforce is that these green, middle-skill jobs are less susceptible to being outsourced. Given the expected growth of the green sector (Collaborative Economics, 2008), reports indicate a shortage of qualified individuals with the necessary green skills due to the lack of a green-trained workforce (White and Walsh, 2008). An Association for Career and Technical Education Issue Brief, “CTE’s Role in Energy and Environmental Sustainability,” stresses the pivotal role CTE programs can play in producing workers with the skills necessary for green occupations. At the cornerstone of CTE is its responsiveness to industry trends and

workforce needs. CTE can respond to emerging green economy in three ways: 1. “Green” Programs of Study, 2. “Greening” CTE curriculum, and 3. Creating New Green CTE Programs.

Green Programs of Study

Perkins IV, passed in 2006, included the requirement that to be eligible to receive funds, recipients must offer at least one Program of Study (POS) (see Federal Requirements of Programs of Study). The National Research Center for Career and Technical Education’s Technical Assistance Academy is currently working with five states in their efforts to build capacity for assisting local education agencies and postsecondary institutions in developing “green-focused” POS models for both urban and rural settings. They include:

- Ohio—energy/biotech/agriculture
- New Jersey—green technologies layered into other industries
- Oregon—wind/solar/construction
- Georgia—energy/construction/transportation
- Illinois—energy/utilities/waste management
(see Three Examples from One State)

Greening the CTE Curriculum

Green job skills and knowledge built on concepts of sustainability, green technologies, green standards, green processes, and life cycle analysis apply to every current CTE program. One example was described by Sally Arnett and co.

in a recent edition of *Techniques* (www.iluccte.org/Arnett_AFI.pdf). Further, as noted in the November/December 2009 issue of *Techniques*, “sustainability” is a new workplace readiness skill and “as such, CTE’s role will be to develop new academic approaches to sustainability and continue to explore alternative curriculum paradigms and career pathway applications”—(Konopnicki, p. 47).

Green skills and knowledge can be integrated into every existing CTE program or course and built into traditional career pathways to add skills and value for every student. Programs in construc-

WHAT IS GOOD NEWS FOR OUR ECONOMY AND OUR WORKFORCE IS THAT THESE GREEN, MIDDLE-SKILL JOBS ARE LESS SUSCEPTIBLE TO BEING OUTSOURCED. GIVEN THE EXPECTED GROWTH OF THE GREEN SECTOR, REPORTS INDICATE A SHORTAGE OF QUALIFIED INDIVIDUALS WITH THE NECESSARY GREEN SKILLS DUE TO THE LACK OF A GREEN-TRAINED WORKFORCE

tion can expose students to green building design, renovation and retrofitting of existing buildings, and energy management. Plumbing could also integrate retrofitting to increase water efficiency and conservation. Students in automotive programs can learn green automotive skills as they work on or build hybrid cars. Electrical engineering programs can incorporate units on wind turbines and solar energy. Culinary arts can incorporate food production using organic and/or sustainable grown agricultural products. Carpentry

Three Examples from One State

#1 Energy and Alternative Fuels

- Solar, geothermal, wind, biofuel, hydro, fossil
- Research and development
- Site selection, acquisition and preparation
- Business management and operation

Industry Partners Include:

- American Electric Power
- Solid Waste Authority
- Department of Agriculture
- POET Biorefining

#2 Bio-Products

- Products based on agricultural feedstocks
- Paints, adhesives, plastics, packaging

Industry Partners Include:

- Univenture
- University Bioproducts Innovation Center
- Channel Bio Corporation

#3 Precision Agriculture for Sustainability

- Sustainable production practices
- Production efficiency
- Energy Reduction
- Reduce dependence with demand growing

Industry Partners Include:

- Agricultural Research and Development Center
- Farm Bureau
- Agriculture Technical Institute

can be taught using environmentally certified and recycled wood.

In fact, all programs could incorporate the reuse and production of products made from recycled, nontoxic materials as well as techniques to conserve energy. A simple example is switching off several devices that are often used together, such as a PC, a monitor and a printer, with a switchable power bar or surge protector with multiple sockets. This reduces the usage of standby power (also known as vampire power or phantom load) con-

sumed by electronic appliances while they are switched off or in a standby mode.

The curriculum challenge to CTE is not in finding opportunities to integrate green into programs, but rather, how to systematically ensure that every CTE pedagogic opportunity incorporates green. This includes:

- Classroom-based experiences that directly address green.
- CTSO civic or social projects or competitive events that address concepts within their particular industries.
- Work-based learning (*e.g.*, job shadowing, cooperative experience, supervised occupational experience, internships, apprenticeships, school-based enterprises) that incorporates green themes as part of the students' work experience, through careful coordination with the sponsoring business or organization.

The Green Opportunity for CTE

In addition to integrating green elements into existing programs, CTE can respond to the new and emerging green occupations by creating new green CTE programs where there is sufficient labor market demand and business interest. The "green" opportunity today is to create a new or modify an existing program that starts in high school and leads to industry recognized credentials (certificates, diplomas, associate or bachelor's degrees) and workforce opportunity. Crafting such a program with a curriculum that is horizontally integrated (math and literacy with CTE) and vertically integrated (secondary and postsecondary) and that incorporates educational experiences that are sequential, progressive and non-duplicative meets all the demands of the current Perkins legislation, and more importantly, meets the needs of today's students and tomorrow's workplace. **I**

References

- White, S. & Walsh, J. (2008). "Greener Pathways: Jobs and Workforce Development in the Clean Energy Economy." Center on Wisconsin Strategy, The Workforce Alliance, The Apollo Alliance.
- ACTE. (2008). "CTE's Role in Energy and Environmental Sustainability." ACTE Issue Brief. Washington, D.C.
- Dierdorff, E., Norton, J., Drewes, D., Kroustalis, C., Rivken, D., & Lewis, P. (2009). "Greening of the World of Work: Implications for O*NET@SOC and New and Emerging Occupations."
- National Center for O*NET Development: www.onetcenter.org/reports/Green.html.
- Cleary, J. & Kopicki, A. (2009). "Preparing the Workforce for a 'Green Jobs' Economy." Rutgers, N.J.: John J. Heldrich Center for Workforce Development.
- The PEW Charitable Trusts. (2009) "The Clean Energy Economy: Repowering Jobs, Businesses and Investments Across America." Washington, D.C.
- Arnett, S. "CTE: Preparing the New Green Collar Workforce." *Techniques* (2009, September), 37-38.
- Konopnicki, P. "Sustainability: The Next 21st Century Workplace Skill." *Techniques* (2009, November/December), 44-47.
- UNEP. (2008). "Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World."
- NASDCTEc, (2009). "Green Jobs and CTE."
- Global Insight. (2008). "Current and Potential Green Jobs in the U.S. Economy." Lexington, Mass. Prepared for The United States Conference of Mayors and the Mayors Climate Protection Center.
- Melville, J. (2009). "Digging Deep on Green Jobs: What the Data Tells Us." Collaborative Economics Presented at the Green Economy State Roundtable by the National Governors Association Center for Best Practices, Washington, D.C., April 30, 2009.



Interested in exploring this topic further? Discuss it with your colleagues on the ACTE forums at www.acteonline.org/forum.aspx.