A photograph of two workers installing solar panels on a brick building. One worker in a red shirt and white hard hat is on a ladder, and another in a dark shirt and yellow hard hat is on a higher ladder. Two large solar panels are visible on the roof. The background shows a blue sky with clouds.

BUILDING EFFECTIVE GREEN ENERGY PROGRAMS IN COMMUNITY COLLEGES

MAY 2010

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INTRODUCTION

¹ *Federal Register*, Volume 74, Number 120, June 24, 2009. <http://www.doleta.gov/grants/pdf/SGA-DFA-PY-08-19.pdf>, accessed on May 11, 2010.

Community colleges across the country are engaged in large-scale federal and state initiatives to train low-income individuals for the nascent field that's become known as "green jobs." Many green economy advocates believe that green jobs training can be part of career pathways that help move unemployed and disconnected individuals—who are often low-skilled—from entry-level positions into higher-skilled, higher-paying jobs.

But amidst all the excitement and funding, even those colleges at the forefront of green energy education have been struggling to build green workforce development programs as a result of three factors: 1) the state of the U.S. economy, 2) the emerging nature of the green sector economy, and 3) the focus placed by the federal government on educating low-income and low-skilled individuals for this emerging sector in its training grants.¹

Identifying green energy jobs for individuals with entry-level skills has been a significant problem. In fact, the projections for green growth have not yet translated into a sizeable number of jobs. As of now, there also appears to be only marginal demand within green energy sectors for lower-skilled workers. Moreover, green energy sector credentials and competencies are inconsistent and still evolving across the industry and among employers. And though welcome, the large influx of training funding provided by the American Recovery and Reinvestment Act (ARRA) has also contributed to substantial confusion among training providers struggling to determine who should provide what training.

In this paper, Workforce Strategy Center (WSC) examines how community colleges leading the field in green energy education are grappling with these issues. It also makes the case that community colleges should be substantially involved in training low-income individuals, especially the low-skilled, if in fact the goal is to help them lead self-sustaining lives. Our aim is to help community colleges across the country navigate a path forward through evolving terrain as they develop green energy education and training programs for low-income populations. Their success will enable national and state policies incentivizing growth in the green economy to propel disadvantaged people towards family-supporting employment.

Workforce Strategy Center undertook this study in the fall of 2009 and is presenting it in collaboration with Green For All, a nonprofit organization working to build an inclusive green economy. It was commissioned by Living Cities, an innovative philanthropic collaborative of 22 of the world's largest foundations and financial institutions, to inform its Green Sector Jobs initiative.

TRAINING FOR A NEW ENERGY FUTURE

²<http://www.boozallen.com/news/42747101>, accessed on March 26, 2010.

³<http://www.pikeresearch.com/newsroom/u-s-energy-service-company-market-to-increase-250-by-2020>

⁴Center on Wisconsin Strategy, *Greener Pathways: Jobs and Workforce Development in the Clean Energy Economy*, 2008, and Washington Employment Security Department, *2008 Washington State Green Economy Jobs*, 2008.

⁵Bill & Melinda Gates Foundation, www.gatesfoundation.org, accessed May 6, 2010.

In February 2009, the U.S. Congress enacted ARRA to stimulate the national economy with \$787 billion. Catalyzing green energy is a central component of ARRA with more than \$45 billion in new investments, including \$5 billion to retrofit low-income families' homes to make them more energy efficient—up to \$1 billion of which may be spent on training and technical assistance. The ARRA is also funding \$500 million in green energy training partnerships across the country to help build the nation's green workforce and strengthen states' green jobs training capacity.

ARRA funding for training anticipates widely forecasted growth in green jobs. According to Booz Allen Hamilton, green building will support as many as 7.9 million U.S. jobs between 2009 and 2013.² The market research and consulting firm Pike Research issued a report in January 2010 projecting green revenue growth from \$5.6 billion in 2009 to \$19.9 billion by 2020, primarily due to untapped demand for energy efficiency in private commercial buildings.³

Research suggests many green jobs will be family-sustaining “middle-skill” jobs that require more than a high school diploma but less than a four-year degree.⁴ With existing connections to employers and regional credibility, community colleges are well positioned to play key roles in establishing career pathways in green energy sectors to help low-income students advance to even higher-paying jobs.

At a time when the importance of training and education for disadvantaged citizens is more clear than ever, the role the nation's

1,200 community colleges play could not be more critical. They are accessible in almost every community, and many have open enrollment policies. They offer low tuition, a wide range of education and training, and a continuing funding base.

Labor market research has demonstrated that continuing skill development is a key factor in moving families out of poverty. However, a large gap remains between the requirements of increasingly complex well-paying jobs and the skills of unemployed, undereducated workers. With more than half of all new jobs requiring some form of postsecondary credential—and millions of low-income young adults struggling to earn a living or family-sustaining wage—greater efforts need to be made to offer these individuals opportunities for career advancement.⁵

Current industry growth projections in green energy bear this out. To prepare disadvantaged individuals to succeed in the evol-

ing new energy labor market, this country's workforce and education systems need to be organized around long-term, comprehensive career pathways that integrate education, training, and work.

Career pathways offer students a seamless transition from one level of education or employment to the next. A systemic approach to workforce development, they can also offer disadvantaged individuals the necessary support services to obtain the skills, credentials, and certifications they need to be hired by green energy companies and attain self-sufficiency. These typically include career advising, transportation, and child care, as well as reduced tuition and book fees.

With the promise the green energy economy holds for low-income individuals, it is all the more important to tackle the hurdles that colleges developing green programs face today, particularly given the high expectations—and uncertainties—surrounding this emerging field. To explore the issues raised in this paper, we researched community colleges at the forefront of green energy workforce education and training in both renewable energy and energy efficiency.

We chose to investigate colleges that have some of the longest standing green energy programs in the country. The fact that energy programs in these colleges are generally less than five years old—and some much newer—is testament to how new this training arena is for colleges. We also chose colleges that demonstrate some of the following elements of effective practice:

- Extensive reliance on data for industry selection, analysis of education and training gaps, and evaluation of outcomes
- Responsiveness to demand for skilled workers in the renewable energy and energy effi-

ciency sectors

- Industry involvement in helping shape or carry out the program
- A systemic approach to establishing regional partnerships and/or relationships among education, workforce development, industry, employer, union, and community-based providers and organizations
- Education and training services and programs mapped for clear career advancement
- Support services to meet the needs and challenges of low-income individuals
- Track record of training low-income individuals for career advancement in jobs

To identify the colleges, we conducted a literature review and environmental scan and then carried out site visits and interviews with 11 community colleges. We then narrowed that field and chose to highlight eight leading colleges and one consortium of colleges focused on educating individuals for careers in renewable energy and energy efficiency.

The following colleges are featured in our paper:

- City College of San Francisco (CA)
- The City University of New York (NY)
- Columbia Gorge Community College (OR)
- Lane Community College (OR)
- Laney College (CA)
- Los Angeles Trade-Technical College (CA)
- Skyline College (CA)
- South Seattle Community College (WA)
- New Energy Workforce, a consortium of 26 Bay Area community colleges in California working together to address industry needs in the new energy economy



Photo © Lisa F. Young / iStockPhoto

KEY ISSUES

⁶ National Council for Workforce Education and the Academy for Educational Development, *Going Green: The Vital Role of Community Colleges in Building a Sustainable Future and Green Workforce*, 2009.

⁷ The National Center for O*NET Development, *Greening of the World of Work*, 2009.

Forecasts such as those noted above have led to the widespread expectation that the demand for green jobs workers will increase as the economy recovers and consumer incentives and government mandates supporting energy efficiency and renewable energy take effect. However, we found the economic recession is continuing to take a heavy toll on both the green sector and on the colleges.

Hiring by green energy companies has significantly declined since the recession hit, according to the director of the San Francisco Bay Region Center of Excellence. Others echo this observation. New and existing companies have struggled to get financing to open or expand. And even though federal stimulus funds designed to help fill funding gaps are starting to take effect, it has not yet translated into significant jobs growth. In addition, state budget cuts have hit community colleges hard, limiting their ability to increase green training capacity. As a result, our colleges' green energy programs are responding to a less certain operating environment than they faced when they started, even if that was just a few years ago.

Below are several key challenges the colleges are facing as they build their green energy programs to serve a low-income population. Our findings are consistent with issues raised in a 2009 report from the National Council for Workforce Education and the Academy for Educational Development on community colleges and the green economy, and in research on green energy from the Center on Wisconsin Strategy.⁶

1

Employment demand for green jobs is difficult to forecast.

The demand for training in the green energy sector in its current state differs significantly from other sectors that community colleges serve. Effective community college workforce development programs are designed to respond to industry market demand, both current and projected. The demand in today's green sector is mostly not real, but projected. It is being driven primarily by government incentives and funding designed to create a market, and by venture capital investments.

In 2009, the National Center for O*NET Development, a federal occupational information resource, developed a system for characterizing green jobs with its *Greening of the World of Work* report.⁷ Some regional labor market sources have since used this system to begin labor market analysis, linking to staffing industries, and establishing trends over time. According to the O*NET center, renewable energy is seeing greater development and growth than any other sector. However, because energy efficiency is so

⁸ Center on Wisconsin Strategy, *Greener Pathways: Jobs and Workforce Development in the Clean Energy Economy*, 2008, and Washington Employment Security Department, *2008 Washington State Green Economy Jobs*, 2008.

closely related to other industries, such as construction, the center noted that analysis is difficult because the sector's occupations are less clearly delineated.

Also, green energy is still emerging and is largely comprised of many small firms, especially the energy efficiency companies that retrofit homes and buildings. This makes a challenge out of engaging with and understanding firms' workforce needs. The industry is so new that it's also not yet clear which green technologies (and accompanying jobs) will really take hold and which won't, making demand and employment growth uncertain.

Moreover, in many cases green jobs will create opportunities for carpenters, electricians, plumbers, sheet metal fabricators, and other workers with existing experience and training in construction, building management, and manufacturing. It is hard to determine how many "new jobs" there will be, and how many positions will require additional skill attainment versus full-scale training.

Two facts appear certain: One is that the current industry market demands higher-skilled workers; the other is that the emerging nature of the green sector provides an opportunity for those willing and able to start their own companies, implying that business management skills should be offered as part of green energy training programs. What hangs in the balance for colleges is the lack of jobs now.

2

As currently understood, most green jobs in renewable energy and energy efficiency require high skill levels. Community colleges are challenged to prepare low-income individuals who have limited basic and/or technical skill levels for these higher-skilled positions.

Projected demand in the green energy economy suggests that the majority of jobs will require mid- to high-level skills.⁸ This has led college officials we interviewed to wonder how to approach short-term training for low-skilled individuals and to what end, since the demand for low-skilled jobs is currently projected to be fairly minimal. The federal government's stimulus funding for home weatherization, a subsector that will comprise low-skill jobs, has not yet translated into demand for jobs.

Some jobs are more difficult to prepare low-skilled workers for than others. The leap from entry-level green jobs, such as manual labor on a solar installation work site or blowing insulation into an attic, to more highly skilled technician jobs such as installing lighting systems is wide. Energy efficiency technicians, for example, need to have strong conceptual and analytical thinking skills that allow them to understand how complex energy and air systems work in homes and buildings, as well as significant knowledge about environmental micro-climates, electricity basics, regulations, codes, etc.

3

To meet ARRA funding requirements, most colleges need to develop new green energy curricula and programs for the low-income, low-skilled population.

Green energy programs at community colleges have tended to have higher entrance requirements than other college programs and have attracted more students with higher educational backgrounds and/or work experience compared to other college programs. In fact, most of the colleges' green programs traditionally serve incumbent workers. ARRA green energy training funds target disadvantaged popula-

⁹Green for All, *Green Job Certifications*, 2009.

¹⁰Middle Class Task Force, Council on Environmental Quality, *Recovery Through Retrofit*, 2009.

¹¹Center on Wisconsin Strategy, *Greener Skills*, 2010.

tions. To receive ARRA funding, colleges are having to shift course to more directly target low-income individuals, many of whom have specific challenges and needs.

According to our interviews, poor math skills are a stumbling block for many low-skilled students. Moreover, in the current economy, low-income, low-skilled individuals are often competing with higher-skilled dislocated workers in the labor market.

Community colleges are grappling with how training programs for green jobs can create upward mobility for low-skilled individuals. Some are attempting to create green energy career pathways but are having difficulty identifying the target occupations, skill needs, and training when so little is known about the green energy demand for entry-level workers. Others are struggling with how to provide real-life learning experiences for students, such as internships, to provide them with job experience. Still others are finding it difficult to retain disadvantaged students who must overcome financial and social barriers to stay in school.

4

Green energy industry standards and certifications are in the process of being established.

Because green energy is an emerging industry that is still defining itself, industry standards and workforce certifications are also evolving, according to college officials we interviewed. This makes it difficult for colleges to design programs or curricula. Three national organizations offer widely recognized industry certifications in the renewable energy and energy efficiency sectors: the Building Performance Institute (BPI), Leadership in Energy and Environmental Design (LEED), and the North

American Board of Certified Energy Providers (NABCEP). However, these certifications do not cover all emerging industry sectors. Green For All maintains a “living document” that seeks to track the many industry certifications that are in the marketplace.⁹ But in some fields there are no standards.

In October 2009, Vice President Joe Biden released the *Recovery Through Retrofit* report calling for the establishment of national certification and training standards.¹⁰ The Center on Wisconsin Strategy has just issued a report describing the current certifications and skill standards for workers in clean energy sectors, and outlining key steps and policy recommendations for a national credentialing system.¹¹

The college officials we interviewed said that the unsettled nature of the field has made their work difficult. Industry equipment standards are changing quickly. Still-evolving government incentive programs may end up promoting one set of standards or licenses over others—or create new ones altogether. Meanwhile, in order to develop their programs, some colleges are working with local industry partners to develop standardized occupational skill requirements. These are vulnerable to being eclipsed by new national standards, which could compromise the certifications already earned by their students. This is further complicated in states implementing licensing requirements for workers in this field.

5

The influx of ARRA stimulus funding into communities suffering severe recessionary budget cuts, and its focus on low-income individuals, have—at least initially—created confusion among training and education providers.

Several of the colleges noted that budget cuts were causing destabilizing competition among education institutions participating in regional partnerships. Some colleges have joined together and reached agreements about who will provide which training services. But budget cutbacks coupled with the influx of federal and philanthropic funding are encouraging competition rather than collaboration within regions.

Community colleges are also navigating the landscape of what their roles in green energy will be compared to that of other key partners, including community-based organizations, workforce boards, training providers, and unions. These roles can differ by grant provisions, location, and based on the structure, culture, and prior roles undertaken by all of these stakeholders. They are also subject to change depending on the occupational requirements.

Some unions are adjusting their training to meet changing occupational requirements by creating new curricula for newly classified occupations. For example, the Laborers' International Union of North America (LIUNA) has created a new job category and curriculum for residential weatherization technicians. Community-based organizations are also playing significant roles in offering low-income students and workers green energy training. Regional workforce development leaders and community colleges are attempting to determine how best to consolidate these efforts so that students can easily opt in and out of employment and education to advance their opportunities.

Due to widespread interest from policy-makers and others to quickly ramp up green education and training capacity, it makes sense now more than ever to take regional approaches to developing green programs based on colleges' and other training providers' existing strengths and niches. For example, colleges with strong existing HVAC programs can more easily segue into energy efficiency technicians programs than those without such programs. Colleges with strong construction and electrician programs are well positioned to develop solar energy programs. Colleges cite the expense of setting up programs with the requisite equipment and facilities, and keeping them up to date, as additional reasons regional collaboration makes sense.

COMMUNITY COLLEGES PAVING THE WAY

The speed and scale of the green energy initiatives, along with the newness and uncertainties of the industry itself, are placing community colleges in the position of serving as change agents—together with government and industry. Their flexibility and responsiveness—the hallmarks of community colleges' workforce development activities—are helping to define the industry. Just this year, Michigan's Lansing Community College retrained up to 100 former General Motors employees, mostly factory workers, in alternative energy.

Other colleges across the country are taking similar steps to train workers for jobs in the new energy economy. In this section, we show how using good workforce development practices can address each of the key issues raised above. We also offer brief descriptions of how our featured colleges are applying these practices in their green energy training programs in ways that can benefit and increase the employment opportunities of low-skilled individuals. More detailed case studies of the colleges' practices and programs, including outcome data, are presented in Appendix A.

Challenged to respond to market demand in our current economic climate, as a whole the community colleges featured in this study have proceeded cautiously. They are collaborating with industry and other workforce development stakeholders, first to assess employers' needs and then to create industry-driven training courses. They have designed curricula using methodology proven to be the most successful in teaching students who need real-world work experience skills and knowledge. Where

skill standards are absent, they have sought to create them in partnership with industry.

ISSUE: RESPONDING TO INDUSTRY DEMAND

Community college approaches:

- Form a regional collaborative or partnership among education, industry, community-based organizations, unions, workforce development groups, and others as appropriate.
- Research state laws and policies, the industry, demographics, institutional capacity, available regional resources and services, and local employers. Prioritize course offerings according to which occupations demonstrate the most potential for growth.
- Create courses using labor market information and employer guidance. Revisit on a continuous basis.

At the **City College of San Francisco**, labor market analyses drive the region's green energy programs. In 2009, the Center did an initial analysis of the Bay Area's green economy

**South Seattle
Community College:
Weatherization
Training with
Unions and
Community-Based
Organizations**

South Seattle Community College (SSCC) hosts the largest array of construction apprenticeships in Washington state. Having building trades within easy access of its energy efficiency program means the college is strategically located to assist the City of Seattle with training low-income students as part of the federal \$5 billion ARRA initiative to weatherize one million homes a year. It also means students can continue at the college to gain additional energy efficiency skills or opt to enter weatherization apprenticeship programs for further skill enhancement.

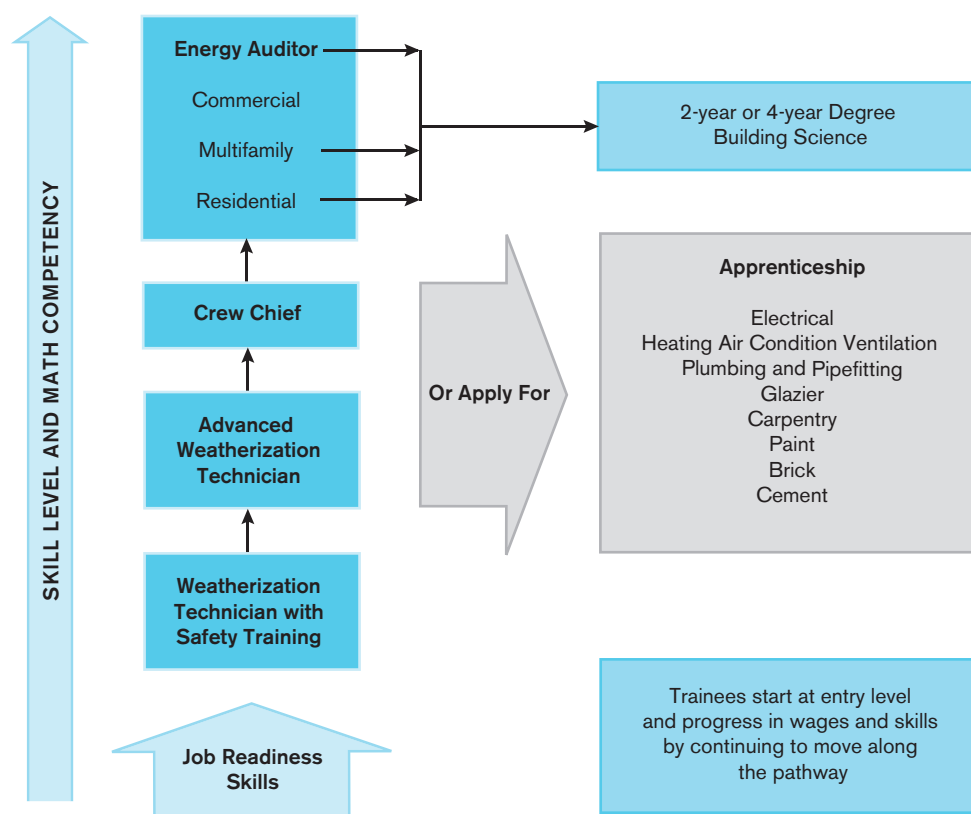
According to the Green Construction Skills Panel, a private/ public partnership working to improve the skills of Washington state's workforce, weatherization demands understanding buildings as a system. To become a weatherization technician entails learning 14 different types of skills, from drywall and insulation to basic plumbing and glazing, competencies identified by the National Weatherization Consortium. Through this program, the weatherization technician samples a bit of each construction trade, and thereby becomes a more qualified applicant for these apprenticeships in the future.

Funded by the City of Seattle to organize its weatherization effort for low-income individuals, the Seattle Jobs Initiative (SJI) has created a weatherization training "pipeline" wherein community-based organizations recruit participants and assess their job readiness while SSCC and others provide weatherization training to employers' specifications. Applicants need to be able to meet specific physical demands, such as working in confined spaces, or they can't get a job—so it's important to assess for this so a student is not trained for job they won't get. In some cases union tradesmen are the instructors for the college's program.

The SJI-SSCC training program ensures that students have received comprehensive training from a qualified training provider, have completed job-readiness training, and meet all industry-specific hiring standards. SJI is not only a point of contact for employers—it also provides students with wraparound support services both while they are in training and for one year following job placement. With funding from the Seattle King County Workforce Development Council, and SkillUp Washington (a regional workforce funding collaborative), SSCC is currently building an energy efficiency career pathway at the college (see diagram on page 11.)

As part of its energy efficiency initiatives, the State of Washington awarded a \$4 million grant to SustainableWorks to generate new green jobs. Founded by Sound Alliance, SustainableWorks facilitates energy efficiency retrofits for homes and small commercial buildings. The organization leverages the grant with utility incentives and homeowner investments, assesses the energy efficiency needs in moderate-income neighborhoods, and then works with unions to weatherize the homes. SustainableWorks has direct placement agreements with five unions, so qualified trainees who have graduated from Laborers' International Union of North America or from SSCC's Weatherization Technician's program can have access to these slots. The homeowners' costs are matched through low-interest loans based on their energy savings.

SOUTH SEATTLE COMMUNITY COLLEGE ENERGY EFFICIENCY CAREER LADDER



and identified six component subsectors. Now the Center is conducting labor market analyses on each of the subsectors roughly twice a year. Because of limitations of standard data, the Center surveys local employers to collect primary data about anticipated employment needs. These reports attempt to identify three types of labor needs: replacement jobs to fill the positions of those retiring, existing jobs that need to add a new “layer” of green skills (such as building maintenance technicians

who need to learn to operate and maintain new energy efficiency technologies) and actual “new” jobs, such as retrofit installers, that rarely existed before.

Initiated in 2006, the Renewable Energy Technology Program at **Columbia Gorge Community College** (CGCC) in north-central Oregon is the direct result of conversations between the college and industry after entrepreneurs began opening wind farms in the region. Following a needs assessment, the

college offered a pilot curriculum as a six-month non-credit program in January 2007. By September 2007, the college had created a one-year certificate (51 credit hours) and a two-year Associate of Applied Science (AAS) degree (100 credit hours). The college meets twice a year with industry representatives to assess course offerings against industry needs as they transpire. It is also in the process of completing a second needs assessment to determine if the skill needs have changed.

The New Energy Workforce (NEW) initiative is a regional industry-driven collaborative among 26 community colleges, industry, and workforce development organizations supported by the California Community College System to share expertise and plan for green energy training in the Bay Area. NEW members organize industry summits to learn about their workforce needs and the latest technologies. They hold train-the-trainer faculty forums, and work with planning staff to assess where and what type of green energy programs makes sense. Collaboration has led to development and sharing of new curricula with industry-recognized certifications, student internships provided by industry partners, and an increased number of faculty qualified to teach the new curricula.

ISSUE: DEVELOPING CAREER PATHWAYS TO FACILITATE CAREER ADVANCEMENT

Community college approaches:

- Determine local occupational demand and develop courses to fill current and forecasted needs.
- Map training and education services within the college and across the region.
- Link courses to employment opportunities.

Green building operations is one area where

the **City University of New York (CUNY)** sees entry-level positions with a good career path. As a result, the university is developing a Green Maintenance for Buildings Program pathway centered at the New York City College of Technology. To accommodate basic skill needs, the program will offer students career counseling, the development of an academic plan, and GED and math courses taught in the context of green maintenance careers. These “contextualized” courses lead into an intensive training program in building science and systems, energy efficiency, sustainable practices, and green terminology. At higher levels, the program offers industry-related certification courses, such as OSHA (Occupational Safety and Health Administration), refrigeration and heating and cooling licenses, as well as further specialization in renewable energy systems design and installation.

Columbia Gorge’s Renewable Energy Technology Program is part of a clearly delineated career pathway that maps courses from high school straight through to a four-year Bachelor of Science degree at the Oregon Institute of Technology. As part of this program, CGCC offers a certificate that can lead to employment as an entry-level technician earning \$13 to \$15 an hour. The AAS degree can lead to mid-level technician employment at \$26 to \$36 an hour. The program prepares students for employment in hydro-generation, wind-generation, automated manufacturing, and engineering technology.

ISSUE: DEVELOPING CURRICULA FOR LOW-SKILLED INDIVIDUALS

Community college approaches:

- Respond to industry demand for low-skilled occupations.

- Contextualize or integrate courses to offer core academic and workforce readiness skills.
- Create learning communities by forming cohorts of students.
- Create opportunities for hands-on learning.
- Create programs as part of a career pathway.

Long a leader in training individuals for work in energy efficiency occupations, **Lane Community College** in Eugene, Oregon, offers a two-year degree in energy management for energy efficiency, an option in resource conservation management, and a renewable energy technician degree—all through its Northwest Energy Education Institute. Lane has a model approach to hands-on learning for energy management programs. With buildings ranging from more than 50 years old to near new, the college uses its entire campus as a laboratory for students enrolled in the college's energy management program. Facilities management staff allow students into mechanical rooms to log energy use data from various heating and cooling systems. Students also analyze campus building blueprints, calculate wall-to-window ratios, assess insulation levels, and measure lighting balances.

In 2009, **Laney College** in Oakland, California, received a grant to start a new one-year certificate program in Building Performance and Energy Efficiency that focuses on residential energy auditing, whole building performance, and weatherization. Many students in Laney College's new energy efficiency certificate programs face serious life difficulties that hamper their ability to succeed in the classroom. As a result, the college offers a set of foundation courses to help students build academic skills, learn college strategies, and become better prepared for college success.

To address entry-level occupations and the needs of lower-skilled students, **Los Angeles Trade-Technical College** (LATTC) has several prep-academy programs that last from one to 12 weeks. The programs employ a cohort-based community model. The prep-academy programs are designed to offer students foundational skills within a career pathway to prepare them for a certificate, college degree and self-sustaining careers.

LATTC's prep-academy courses are contextualized to deliver core academic and workplace readiness skills, and focus on raising students' skill levels to a point where they can demonstrate sufficient proficiency for entry-level employment. Based on lessons learned from previous experience, LATTC's prep-academies now begin with a "transitions to college" orientation session and conclude with a session devoted to supporting the students as they move to the next stage of education and/or employment.

ISSUE: ESTABLISHING ROLES FOR TRAINING AND SERVICE PROVIDERS ACCORDING TO THEIR STRENGTHS AND EXPERIENCE

Community college approaches:

- Work with workforce development boards and community-based organizations to promote programs and provide support services such as transportation, skills assessments, career counseling, and financial aid.
- Determine what training local unions can provide and tailor community college courses accordingly. Create pre-apprenticeship courses if applicable.
- Connect courses offered by training organizations to community college courses that offer certificates and degrees so that students can continue their education and advance their careers.

Located outside of San Francisco, **Skyline College** has a Community-Based Job Training grant from the U.S. Department of Labor to train dislocated workers for green jobs. The college has a distinct role as the training provider, while area workforce development boards offer support services to students. The grant is paying employment specialists at two different workforce boards to provide services such as recruiting and assessing potential students, allowing the college to focus on education and training. A staff person at another workforce board is responsible for job placement services for completers, working with them individually and arranging biweekly employer seminars open to all graduates.

South Seattle Community College hosts the largest array of construction apprenticeships in Washington state. Having the building trades within easy access of its energy efficiency program means the college is strategically located to assist the City of Seattle with weatherization training for low-income individuals.

As part of this effort, the Seattle Jobs Initiative (SJI) has created a weatherization training “pipeline.” Community-based organizations recruit, screen, and provide basic skills training while South Seattle and others provide weatherization training to employers’ specifications. In some cases union tradesmen are the instructors for the college’s program. SJI’s program guarantees that students have received comprehensive training from a qualified provider and meet all industry-specific hiring standards.

ISSUE: OFFERING COURSES AND PROGRAMS THAT MEET INDUSTRY STANDARDS

Community college approaches:

- Teach to available standards such as BPI,

LEED, and NABCEP. Be prepared to make changes as occupations, new requirements, and new standards emerge.

- Where occupational standards are lacking, work with industry and other colleges in the region to create regional standards.
- Share curriculum across the region to encourage standardization.

Columbia Gorge Community College and the American Wind Energy Association have collaborated to identify the skill sets that meet the industry’s needs. The college expects to develop certification standards within the year. As noted above, the **NEW** initiative has led to the development of curricula with industry-recognized certifications (NABCEP) that is shared across California.

Los Angeles Trade-Technical College is working with the utility industry to map out green career pathways. Different sectors within the industry use different job titles, which complicates the process of developing credentials. LATTC has surveyed the field, selected the most prevalent credential, and designed its programs accordingly.

ISSUE: PROVIDING SUPPORT SERVICES

Community college approaches:

- Assess students to determine barriers to success in education and employment.
- Prepare to offer skill and career assessments, career coaching and advising, financial aid, and transportation.
- Work with workforce boards and community-based organizations to determine what services each can provide. Consider the need for a case manager.

In order to reduce program attrition and

improve students' outcomes, **Laney College** has established systems, such as full-time case management, to link students to resources to help them stay enrolled and on the path to completion. Faculty members also attend team meetings to become aware of students' situations and to strategize on how to support them.

As part of the City of Seattle's effort to include low-income individuals in its weatherization initiative, it has contracted with the Seattle Jobs Initiative to provide students with wraparound support services while they are in training at **South Seattle Community College** and for six months following job placement.

At **Skyline College**, partner employment specialists recruit and assess potential students through a multi-step process: 1) organizing large group discussions among college faculty, green employers, and potential students (all of whom are eligible for Workforce Investment Act funding), 2) administering a standardized assessment to gauge students' basic skills level and determine if they meet enrollment requirements, and 3) arranging a second smaller discussion group meeting that often involves going to a work site with just a few potential students. The project director attributes the low attrition rates among the first program cohorts to this extensive assessment process.



Photo © Darren Kemper / Corbis

CONCLUSION

¹²The Pew Charitable Trusts,
*The Clean Energy
Economy*, 2009

Will economic forecasts and federal investments in the green energy economy grow the market? Will they translate into sustainable jobs for disadvantaged people? Maybe.

Considering that the majority of the nation's venture capital investments in 2008 were in the clean energy and energy efficiency sectors, it appears the green economy has the potential for great growth.¹² But for low-skilled individuals to reap the benefits of this growth—which is currently dominated by mid- and high-skill jobs—a concerted effort will have to be made to target their education for career advancement.

This means that training in these sectors and for these individuals must take place within the long-view context of career advancement over time, and not simply with short-term training and immediate job placement in mind. For this to happen, green energy training must be connected to community colleges, where students can earn recognized credentials and opt in and out of education as their circumstances, and the colleges' education programs, allow.

The colleges profiled in this report suggest it is possible to build green energy programs to help low-income people earn a family-sustaining wage—even in a shifting environment. The key lies in: a) labor market demand, and b) being able to respond to the demand using the combined resources of a region's interlocking systems of education, workforce development, and economic development.

Yet even as we applaud their pioneering

efforts, community colleges are finding limited demand for green jobs. Prognosticators continue to believe that energy efficiency, renewable energies and alternative fuels will soon become fast-growing, job-producing sectors. But for now, in a recession with credit tight and investors wary, those sectors are growing much more slowly than predicted.

Moreover, not everyone believes that as it grows the field will require significant quantities of new workers, or that it will be a boom industry for the under- and unemployed. Some of those working in the field note that the work, at least at first, is defaulting to the current labor force. Electricians are installing solar panels. Plumbers will put in low-flush toilets. Carpenters and laborers who were building new houses a few years ago will be the ones who install efficient windows and blow insulation into drafty government buildings.

For inexperienced low-income workers to

enter and succeed in the green economy, community colleges will have to play a central role in training. Family-sustaining green jobs require some postsecondary credentials, and moving out of poverty necessitates continued skill development. With their connections to industry and other workforce development service providers, community colleges are the principal institutions in the country capable of offering the skills and postsecondary education necessary to low-income students and workers with barriers to success.

But this in turn means that community colleges have to have an immediate and complete as possible understanding of what the industry requirements are. And, because so much of the demand in these sectors is technology driven, they will also need to have access to up-to-date equipment and facilities. In fact, if the potential of the green economy is to be fully realized, community colleges will be integral to scaling the effort.

Each of these requirements can be met through a strong coordinated approach to education and training aimed at offering students clear career advancement in response to regional market demand. This paper and the profiles that follow demonstrate that even in an uncertain environment community colleges are showing their ability to train low-income workers for the emerging green sector.

CASE STUDIES FROM THE FIELD

CITY COLLEGE OF SAN FRANCISCO: LABOR MARKET ANALYSES DRIVE REGIONAL GREEN ENERGY PROGRAMS

The City College of San Francisco (CCSF) has a long history of building partnerships. The college has worked closely with area business, unions, the Workforce Investment Board, the mayor's office, and community-based organizations to assess and address community needs.

The college's Center of Excellence is one of a network of ten centers throughout California funded by the state community college system to provide data about high-growth, emerging and critical industry sectors in the state. In 2009, the center analyzed the Bay Area's green economy and identified six component subsectors. Now the center is conducting two labor market analyses on each subsector at the rate of about two per year. Because of limitations of federal Standard Occupational Code-based data, the center surveys local employers to collect primary data about anticipated employment needs. These reports attempt to identify three types of labor needs: replacement jobs to fill the positions of those retiring; existing jobs that need to add a new "layer" of green skills (such as building maintenance technicians who need to operate and maintain new energy efficiency technologies); and actual "new" jobs, such as retrofit installers, that rarely existed before.

The center is seeking new partnerships with federally supported workforce boards and economic development agencies that share an interest in good data to support planning for emerging industries such as green energy. Colleges in the region are also increasingly writing labor market analyses, to be carried

out by the center, into their foundation and federal grant applications so that good data become the basis for new green education and training projects.

OUTCOMES

- CCSF is positioned to be the primary provider of green energy education and training in the City of San Francisco.
- The local Workforce Investment Board allocates funding based on this understanding.
- In 2009, the California Community Colleges Centers of Excellence were selected as a finalist by the Community College Futures Assembly for the National Bellwether Award in Workforce Development.

THE CITY UNIVERSITY OF NEW YORK: GED AND MATH COURSES IN BUILDINGS OPERATIONS PROGRAM

The largest urban public university in the nation, the City University of New York (CUNY), has made a strategic decision to systematically increase its renewable energy and energy efficiency efforts. CUNY is made up of 23 colleges and institutions, including six community colleges. In addition to offering several relevant degree programs, it also provides training and education to incumbent workers and union members who desire skills enhancement in energy efficiency and green building practices.

In December 2009, New York City passed legislation to reduce greenhouse gas emissions from existing government, commercial, and residential buildings, including requiring that every large building in the city have an energy audit by the end of 2013. As part of its Greener, Greater Buildings Plan, the city plans

to identify skills and provide training for an estimated 17,880 jobs it projects the legislation will create. The great majority of those jobs are expected to require at least an associate's degree.

One area where CUNY sees entry-level positions with a good career path is green building operations. So in addition to expanding its building operations programs for incumbent workers, the university is developing a career pathway program in green building operations centered at New York City College of Technology, a technical college offering noncredit, associate's and bachelor's degree programs. CityTech has a number of degree programs related to building energy as well as a history of successfully training and placing disadvantaged adults through its continuing education division.

As part of this pathway, and to accommodate the basic skill needs of low-income individuals, CityTech is developing a Green Maintenance for Buildings Program pathway that offers students career counseling, the development of an academic plan, and contextualized GED and math courses, leading into an intensive training program in building science and systems, energy efficiency, sustainable practices, and green terminology. Experienced maintenance workers will continue to have access to a number of industry-related certification courses, such as OSHA (Occupational Safety and Health Administration), refrigeration and heating and cooling licenses, and renewable energy systems design and installation. At the higher skill level, the pathway includes five certificate programs, and four AAS degree areas of specialization at CityTech, as well as undergraduate and advanced degrees at other CUNY colleges.

In addition to the building operations

pathway, CUNY is also planning to establish a new community college, with academic programs that will include energy services management, environmental science, supply chain management, and medical informatics.

Designed to improve retention and graduation rates and meet projected enrollment growth, the college will offer integrated remedial and core course work. It is slated to open in 2012.

OUTCOMES

- Established in 2003, CUNY's Center for Sustainable Energy (CSE) promotes sustainable and efficient energy technologies in urban communities through education, training, workforce development, and research.
- Opened in 2007, CUNY's Building Performance Lab has recorded nearly a 500 percent increase in enrollment in its Building Operations Certification program.
- The Center for Urban Research's New York City Labor Market Information Service at CUNY's Graduate Center was awarded a U.S. Department of Labor (DOL) grant (as part of a statewide proposal) to conduct a survey of green jobs and related training in 2010. Results of the survey will inform future green energy offerings.

COLUMBIA GORGE COMMUNITY COLLEGE: RENEWABLE ENERGY TECHNOLOGY PROGRAM OFFERS STUDENTS CAREER PATHWAYS

Columbia Gorge Community College (CGCC), in The Dalles, Oregon, serves students across the Mid-Columbia region in both Oregon and Washington. Its Renewable Energy Technology Program, which began in 2006, is the direct result of conversations between the college and industry after wind

farms began to materialize in the region. The college's chief academic officer created a committee of college, industry, and workforce development partners to determine how best to address the need for workers in this new market sector. The college then designed a pilot curriculum first offered as a six-month noncredit program in January 2007. By September 2007, the college had created a one-year certificate (51 credit hours) and a two-year Associate of Applied Science (AAS) degree (100 credit hours).

CGCC's Renewable Energy Technology Program prepares students for employment in hydro-generation, wind-generation, automated manufacturing, and engineering technology. The program is competitive and limits the number of new students: It is intense and requires high-level skills, particularly in math, which is integrated into all of the courses. Students enter the program in cohorts. There is also a lab component and an emphasis on teamwork. Through a U.S. Department of Labor grant, the college has hired a full-time advisor who is responsible for recruiting students. While the college has found that some low-income students do possess the requisite math skills, many do not. This makes it challenging to prepare them to enter the program, which is very popular and fills up quickly. The college can handle 104 students at a time in the program: 75 percent to 80 percent graduate.

The program is part of a clearly delineated career pathway that maps courses from high school straight through to a four-year Bachelor of Science degree at the Oregon Institute of Technology. The CGCC certificate can lead to employment as an entry-level technician earning \$13 to \$15 an hour. The AAS degree can lead to mid-level technician employment at \$26 to \$36 an hour.

The college meets twice a year with industry representatives to assess course offerings against industry needs. It is also in the process of completing a second needs assessment to determine if the skill needs have changed. Indications are that the demand for renewable energy will grow in the next five years, though not significantly for low-skilled occupations. The college's partnership with industry has remained strong over the years, with employers providing continuous guidance, support, and equipment. While there are no standards as yet, the American Wind Energy Association is taking the lead in developing skill sets.

OUTCOMES

- Graduates 75 percent to 80 percent of students; the college estimates that more than 90 percent are employed.
- Its Renewable Energy Technology Program has grown 32 percent since 2007. A number of colleges across the state want to connect their electrical, mechanical, and other offerings to CGCC's program.
- CGCC has expanded the program with a grant from U.S. DOL.

LANE COMMUNITY COLLEGE: A MODEL APPROACH TO HANDS-ON LEARNING FOR ENERGY MANAGEMENT PROGRAMS

Long a leader in training individuals for energy efficiency occupations, Lane Community College in Eugene, Oregon, offered one of the first associate's degrees in energy efficiency in 1980. Today the college offers a two-year degree in energy management for energy efficiency, an option in resource conservation management, and a renewable energy techni-

cian degree through its Northwest Energy Education Institute. Seventy percent of the students who enroll in the energy management program already possess a four-year degree. With a national reputation, Lane's energy management program is currently exceeding capacity.

Lane uses its entire campus as a laboratory for students enrolled in the college's energy management program. The college's buildings range from those built in the late 1960s to nearly new ones. This span gives students access to and understanding of the same wide array of building technologies they will encounter when they go to work. Facilities management staff allow students into mechanical rooms to log energy use data from various heating and cooling systems. Students also analyze campus building blueprints, calculate wall-to-window ratios, assess insulation levels, and measure lighting balances.

This example is in the field of commercial energy utilization, but the approach transfers to other energy efficiency and renewable energy programs. Given the complexity of environments that students will encounter when they practice their trade, creating curricula that encompasses building-scale laboratory exercises greatly enhances students' skills beyond what they could learn in classrooms or simulated models.

OUTCOMES

- Lane's energy management program has tripled over the years—from 30 to 90 students. The waiting list for 2010 classes has been expanded to accept additional applicants.
- Lane expanded its program into a two-year associate's degree program to include commercial energy efficiency, resource conser-

vation management, and renewable energy system installation technologies.

- The National Science Foundation awarded Lane a grant to offer its program to other energy management cohorts through distance learning. All of its core courses will be online starting in fall 2010 so that students across the country can earn Lane's degree.

LANEY COLLEGE: GREEN ENERGY BUILDING PERFORMANCE PROGRAM WITH SUPPORT SERVICES FOR LOW-SKILLED STUDENTS

A member of the New Energy Workforce initiative, Laney College in Oakland, California, is located in an urban area with persistent poverty. The college has a long-standing and well-regarded HVAC technician program that has increasingly evolved over the years to emphasize energy efficiency.

In 2009, the college received a grant from a local foundation to start a new one-year certificate program in Building Performance and Energy Efficiency focusing on residential energy auditing, whole building performance and weatherization. Because of its special funding, Laney recruited students with widely varying abilities.

Many students in Laney College's new energy efficiency certificate programs face serious life difficulties that hamper their ability to succeed in the classroom. College faculty describe a range of obstacles encountered by students including losing living spaces, family deaths, murder of friends or family, jail time and more. In order to reduce program attrition and improve students' outcomes, the college has full-time case management to help students facing life challenges.

Faculty members also attend team meet-

ings to become aware of students' situations and to strategize on how to support them. Without such support, the lead faculty person reports that some students would simply drop out and never come back. Now there are systems in place to offer students resources to help them stay enrolled. Laney also instituted a set of foundation courses to help students build academic skills, learn college strategies, and become better prepared for college success.

OUTCOMES

- Laney has launched two new grant-funded interdisciplinary programs in the past year: the Building Performance and Energy Program and the Oakland Green Jobs Corps Clean Energy Program. Both were designed with extensive industry input.
- Laney also has a National Science Foundation grant to expand its commercial HVAC program and deepen its curriculum to focus on best energy management practices in system design, installation, repair, operations, and maintenance.
- Laney recently won a federal designation as a Center of Excellence in High Performance Operations & Maintenance Education and Training. The center will serve as a national resource for building technician education and training in high-tech facility operations and maintenance.

LOS ANGELES TRADE-TECHNICAL COLLEGE: A COMPREHENSIVE APPROACH TO WORK- FORCE DEVELOPMENT

The oldest of the nine public two-year colleges in the Los Angeles Community College District, the Los Angeles Trade-Technical

College (LATTC) launched what is now called the Division of Green Workforce Education in 2006. The college offers more than 50 green-integrated courses in 12 programs. As part of the Los Angeles LA Infrastructure and Sustainable Jobs Collaborative, LATTC began its entry into the green economy with an industry sector-based plan to create a seamless education, training, and workforce infrastructure. The collaborative has representatives from the major industries, the primary labor organizations, community-based organizations, the K-16 system, government, and policy and advocacy groups such as the Apollo Alliance.

After extensive research, college officials determined that most green jobs largely comprised a set of new skills and comprehensions for existing occupations within existing industry sectors. The most promising demand existed in traditional occupations—such as finance and accounting, information technology, and administrative support—as well as in the more explicitly “green” occupations of construction workers, solar installers, and technician and operations management technicians in HVAC and energy management.

LATTC set about preparing for green demand by “greening” its existing courses and programs, developing entry-level training and education, and developing incumbent worker training and education—all with new technologies and career ladders. Much of the greening of LATTC’s curricula has consisted of addressing a portion of the curriculum, such as materials and techniques, and adding a few additional courses.

To address entry-level occupations and the needs of lower-skilled students, the college has several prep-academy programs that last from one to 12 weeks. The programs employ a cohort-based community model and

¹³CASAS website, <https://www.casas.org/home/index.cfm>, accessed on April 16, 2010.

are designed to address students' foundational skills to prepare them for self-sustaining careers or a college degree or certificate.

The courses are contextualized to deliver workplace readiness skills within the context of core academic courses. They focus on raising students' skill levels to a point where they can demonstrate sufficient proficiency for entry-level employment.¹³ Based on lessons learned from previous years, LATTC's prep-academies now begin with an orientation "transitions to college" session and conclude with a session devoted to supporting the students to the next stage of education and/or employment.

Trade-Tech is partnering with other institutions to standardize curricula and programs. It has developed a sustainable lighting curriculum with four community colleges in California. California's Sustainable Green Construction Education Task Force is working to develop and implement standards for green construction curricula in the state's high schools and community colleges.

And Trade-Tech was selected by the California Public Utilities Commission (CPUC) to test a program to recruit and train disadvantaged, low-income community individuals to install energy efficiency measures as part of the state's Low Income Energy Efficiency program. The program is being developed and piloted in partnership with a local utility and their energy efficiency contractors. The intent is for this piloted program to serve as a model throughout the state.

OUTCOMES

- The college has been selected by the Los Angeles Workforce Collaborative as the intermediary for green sector-based workforce development initiatives placing emphasis

on those occupations necessary for "greening" the sector.

- Students in the prep-academy are demonstrating significant gains in math and English, according to pre- and post-tests.
- As part of the CPUC, the college has developed an industry-recognized assessment for the entry-level weatherization installer occupation.
- The college has secured numerous grants and contracts to support green workforce education and training activities in partnership with multiple organizations. The college is currently engaged in over 20 federal, state, and foundation grant-funded programs.

THE NEW ENERGY WORKFORCE (NEW) INITIATIVE: A SYSTEMIC REGIONAL INDUSTRY-DRIVEN COLLABORATIVE

The New Energy Workforce (NEW) Initiative is a regional industry-driven collaborative of 26 community colleges, industry, and workforce development organizations supported by the California Community College System to share expertise and cooperatively plan for green energy training in the Bay Area. NEW members include Workforce Investment Boards; SolarTech, a regional solar energy industry organization; and the Silicon Valley Industry-Driven Regional Collaborative (SV-IDRC), which was created to meet the need for skilled workers in photovoltaic solar system design and installation.

NEW members organize industry summits to learn about workforce needs and the latest technologies. They hold train-the-trainer faculty forums, and work with planning staff to assess where and what green energy programs make sense. Collaboration has led to development

and sharing of new curricula with industry-recognized certifications, student internships provided by industry partners, and an increased number of faculty qualified to teach the new curriculum.

Along these lines, a faculty member at one NEW member college has developed a framework for how to assess community colleges' core strengths and how they are positioned for particular green energy training programs—across a region. He examined the presence of four existing programs: electrical, construction, HVAC, and architecture. This framework (which has not been formally implemented) asserts, for example, that if a college has electrical and construction, it is poised for photovoltaic solar training. If it has construction and architecture, it is suited for LEED certification building. And if it has HVAC and construction, it could be well positioned for energy efficiency.

Other factors to take into consideration, according to this approach, are: 1) the capacity and strength of identified core programs, 2) whether there are faculty champions to support a particular new green program at the college, 3) the support of college administration, including department deans, and 4) whether resources for new equipment are available. This is, of course, a “supply side” analysis for assessing how colleges can specialize within a region to train for green jobs without overlapping or competing—examining industry and employer demand would be a critical first step.

OUTCOMES

- NEW's faculty forums have trained more than 60 faculty to date and created a faculty learning community throughout the state.
- As part of the NEW initiative, the SV-IDRC

has created a flexible, modularized, and project-based solar curriculum with industry-recognized certifications in credit and noncredit formats. It has also documented solar career pathways and created solar career ladders—all shared among NEW members and community colleges throughout the state.

- 225 students have completed solar photovoltaic installation courses as a result of the NEW initiative. Of these, 25 had been hired in full-time installer positions or are serving internships as of August 2009.

SKYLINE COLLEGE: NEW SHORT COURSE PROGRAMS FOR DISLOCATED WORKERS

Skyline College, outside of San Francisco, has a Community-Based Job Training (CBJT) grant from the U.S. Department of Labor to train dislocated workers for green jobs. Started in 2009, the college and its partners have developed short-course career certificates (six to 16 weeks full time) in solar installation, solar design and sales, energy efficiency/ weatherization, and green HVAC. The college acts as the training provider while area workforce development boards serve as supporting service providers. The grant is paying employment specialists at two different workforce boards to play dedicated and specific roles not typically found in community colleges.

One of the employment specialists recruits and assesses potential students through a multi-step process: 1) organizing large group discussions among college faculty, green employers, and potential students (all of whom are eligible for Workforce Investment Act funding), 2) administering a standardized assessment to gauge students' basic skills

level and determine if they meet enrollment requirements, and 3) arranging a second smaller discussion group meeting that often involves going to a work site with just a few potential students. The project director attributes the low attrition rates among the programs' first students to this extensive assessment process.

A staff person at another workforce board is responsible for job placement services for graduates, working with them individually and arranging biweekly employer seminars open to all graduates.

Similar to other colleges we interviewed, Skyline College finds that math is the most common stumbling block for potential students. The college's new green energy programs require 10th- through 12th-grade proficiency, depending on the specific program. To address the gaps, beginning in summer 2010 the college will offer green "bridge" courses in both math and English for those individuals who do not meet the basic skills entrance requirements. The bridge courses will teach subject areas contextually. For example, students in the math bridge will calculate energy savings gained from implementing energy efficiency savings by analyzing electric or gas utility bills. The courses will be precursors to enrolling in the short course green training programs the college offers through its U.S. DOL grant.

Skyline also plans to provide career ladders for students by linking career certificates with degrees that are now under development. It expects that the solar certificates and energy efficiency certificate will link to environmental science programs at the college and at the four-year level. The details of both, however, are still being worked out.

OUTCOMES

- Skyline's photovoltaic program has grown more than 20 percent since 2007.
- Job placement: Photovoltaic Installer, 35 positions (\$22/hour); Senior Photovoltaic Installer (\$27/hour), 3 positions; Solar Customer Care Specialist, 1 position; Solar Inside/Outside Sales Consultant, 4 positions.
- Awarded a \$1.9 million grant U.S. DOL CBJT grant to expand the program.

TABLE 1: CHALLENGES AND SOLUTIONS

ISSUE	COMMUNITY COLLEGES APPROACHES
Responding to industry demand	<ul style="list-style-type: none"> • Form a regional collaborative or partnership between education, industry, community-based organizations, unions, workforce development, and others as appropriate. • Research state laws and policies, the industry, demographics, institution capacity, available regional resources and services, and local employers. Stick with demand and prioritize the selection of course offerings according to which occupations demonstrate the most potential for growth. • Create courses using labor market information and employer guidance. Revisit on a continuous basis.
Developing curricula for low-skilled individuals	<ul style="list-style-type: none"> • Respond to industry demand for low-skilled occupations. • Contextualize or integrate courses to offer core academic and workforce readiness skills. • Create learning communities by forming cohorts of students. • Create programs as part of a career pathway.
Developing career pathways to facilitate career advancement	<ul style="list-style-type: none"> • Determine local occupational demand and develop courses to fill current and forecasted needs. • Map training and education services within the college and across the region. • Link courses to employment opportunities.
Establishing roles for different training and service providers according to their strengths	<ul style="list-style-type: none"> • Work with workforce development boards and community-based organizations to advertise programs and provide tools and support services such as transportation, skills assessments, career counseling, and financial aid. • Determine what training local unions can provide and map community college courses accordingly. • Create pre-apprenticeship courses if applicable. • Map training provider courses to courses that offer certificates and degrees to advance career opportunities.
Offering courses and programs that meet industry standards	<ul style="list-style-type: none"> • Teach to available standards such as BPI, LEED, and NABCEP. Be prepared to make changes as occupations, new requirements, and new standards emerge. • Where occupational standards are lacking, work with industry, and where possible, other colleges in the region, to create regional standard. • Share curriculum across the region to encourage standardization.
Providing support services	<ul style="list-style-type: none"> • Assess students to determine barriers to success in education and employment. • Prepare for the need to offer skill and career assessments, career coaching and advising, financial aid, transportation, and tools. • Work with workforce investment boards and community-based organizations to determine what services they can provide. Consider the need for a case manager.

APPENDIX B

COLLEGES FEATURED IN THE REPORT

City College of San Francisco

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Phyllis McGuire
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Lane Community College

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Laney College

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Skyline College

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New Energy Workforce

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WORKFORCE STRATEGY CENTER

Workforce Strategy Center advises leaders who seek to make education and workforce development more responsive to the economy. Founded in 1998, WSC has worked with education, workforce development, and economic development stakeholders in more than 20 states to develop strategies to help students and workers succeed and regional economies grow. A pioneer in career pathways development and implementation, WSC's research and work in the field of regional sectoral workforce development seeks to promote effective and innovative policy and practice. To learn more about WSC, please visit our website at www.workforcestrategy.org.