



# **GREENPRINT: A PLAN TO PREPARE COMMUNITY COLLEGE STUDENTS FOR CAREERS IN THE CLEAN ECONOMY**

EQUIPPING 20 MILLION STUDENTS WITH SUSTAINABILITY KNOWLEDGE AND  
CAREER SKILLS BY 2025

DECEMBER 2015



**JOBS FOR THE FUTURE**





**The Greenforce Initiative** is a partnership between The National Wildlife Federation and Jobs for the Future to strengthen the capacity of community colleges around sustainability skills and sustainability careers leading to a competitive workforce that aids in protecting the environment and wildlife.



**The National Wildlife Federation's** mission is to protect wildlife for our children's future placing special emphasis, in the last 25 years, on working with college and university leaders, through NWF's Campus Ecology Program, to advance education and action for sustainability. Offerings for students and other young professionals have grown to include: NWF's EcoLeaders certification and career development program, project design tools, an online community and courses, and a large library of multimedia resources on greening the campus, curriculum and community.

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# FOREWORD

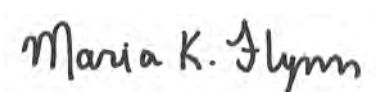
Imagine the impact of 20 million American community college graduates equipped with the skills necessary to fulfill well-paying jobs that have the added benefit of cleaning up our environment and strengthening communities. That was the goal of our collaboration—to equip millions of students to compete in the economy and contribute to society, at the same time.

Community colleges across the nation serve as a valuable gateway into these careers—especially for students with lower skills and fewer resources. By enhancing hundreds of courses across dozens of majors, creating new degree programs, and plotting new career pathways, community colleges have taken notable strides in preparing students for this significantly cleaner and more competitive U.S. economy.

These updated courses prepare students to: pursue such vibrant fields as closed-loop manufacturing, efficient transport, and high-performance buildings; contribute to new energy solutions, including ground-source heat pumps, energy storage, smart meters, and resilient power grids; and participate in the planning and implementation of coastal and other habitat restoration projects that buffer communities in a changing climate.

As community colleges ramp up to prepare the nation's workforce, they deserve a big boost in attention and resources. By implementing the recommendations presented in this report over the next 10 years, the U.S. can accomplish things that employers, customers, and shareholders increasingly demand, such as eliminating carbon pollution and waste, protecting biological diversity and resource services, and becoming healthier and more profitable for all.

We sincerely thank the Bank of America Charitable Foundation, Charles Stewart Mott Foundation, and NASA, along with all the stakeholders involved in developing this report, for their dedication to preparing the U.S. workforce to lead in the 21st century in healthy, hopeful, and resilient ways that help the entire world.



Maria Flynn  
Senior Vice President  
Jobs for the Future



Collin O'Mara  
President and CEO  
National Wildlife Federation



## LEADERSHIP PERSPECTIVES (2015–2025)

In 2015, the Greenforce team asked nine of the nation's leading workforce education experts to forecast the role of U.S. institutions of higher education over the next ten years—and especially of community colleges—in equipping students with sustainability career skills and on the policy and system changes recommended in this report. These are their responses.

### **Girard W. Weber**

PRESIDENT, COLLEGE OF LAKE COUNTY, ILLINOIS

“The workforce opportunities for the new energy economy contain jobs that our students are interested in and that will be **more than jobs**. The new sustainable economy will provide **rewarding, lifelong careers with a livable wage.**”

# DEBORAH LAMM

President, Edgecombe Community College,  
North Carolina

“Edgecombe Community College has a responsibility to prepare students with the knowledge and skills needed to reduce environmental impacts and to address critical resource shortages. By including sustainability in a broad spectrum of educational programs, **students are enabled to make better decisions** regarding fuels, energy efficiency, energy production, food production, water usage, and food choices.”

## Bryan Albrecht

PRESIDENT, GATEWAY TECHNICAL COLLEGE, WISCONSIN

“Growing local economies begins with a knowledgeable and skilled workforce. **Embedding social responsibility around sustainability issues enhances the curriculum and better equips students** for the world they will be living and working in. Leadership is critical to engaging communities in a positive dialog on how individuals, organizations and institutions can better position their interests and desired goals for a sustainable future. This greenprint serves as a framework for community colleges to engage in a dialog around effective strategies to improve their communities’ way of life.”

## WALTER BUMPHUS

President and CEO of the American  
Association of Community Colleges

“Community colleges will continue to play an important role in educating workers to support a clean energy economy. In order to maintain a viable ecosystem and environment for the current and future generations, **jobs focused on sustainability**, including the development of eco-friendly products and alternative clean energy sources, **are critically important**. This report serves as an excellent resource for college faculty and administrators interested in developing new or expanding existing programs to address the needs of the 21st-century workforce.”

## GLEN DUBOIS

Chancellor, Virginia Community  
College System

“Virginia’s community colleges were created to do what no one else would: to address Virginia’s unmet needs in higher education and workforce training. Increasingly today, that means preparing people for clean and renewable energy careers. Not even the recession could slow down Virginia’s clean energy economy, which grew more than 8 percent a year and was among the strongest in the nation. **Our colleges are uniquely positioned to help individuals earn the credentials necessary to secure these jobs** and enjoy the middle class lifestyles they afford. We’re excited to be on the cutting edge of such a promising and growing industry.”

## ROBERT GROVE

Associate Vice President for  
Creativity, Sustainability  
and College Improvement,  
Wake Technical Community  
College, North Carolina

"In today's business climate where brand, market share, and perceived value are as important as real value, companies are becoming increasingly aware of the cost and risk associated with a sustainability or environmental missteps. **This greenprint is a roadmap for workforce development** that mitigates those risks."

## SHIRLEY A. REED

President, South Texas College

"We at South Texas College are well aware that **community colleges play a vital role in connecting economic development and opportunity**, including the needs for sustainable development and related career skills. South Texas College is committed to continue to meet the educational training needs, at every level, including green skills. This was one of the reasons South Texas College partnered with The National Wildlife Federation, Jobs for the Future, and the Texas Workforce Commission, and hosted the Greenforce Initiative Conference."

## JOHN T. DEVER

President, Thomas Nelson Community College,  
Virginia

"Thomas Nelson Community College is proud of its efforts in advancing career skills in the area of solar power solutions. In 2011, the college created a solar demonstration project to show affordable and practical ways to collect, store, and use solar energy. The college has since added three more solar applications, including a solar-powered greenhouse and a community outreach mobile unit, supporting the goals of strengthening green career pathways leading to postsecondary credentials and using campus sustainability efforts as a "learning laboratory" for education and training. We look forward to pursuing further projects and programs that **provide our students with the skills needed for the emerging clean economy.**"

## Jill Wakefield

CHANCELLOR, SEATTLE  
COLLEGES

"This past year, Seattle Colleges launched a new B.A.S. program in Sustainable Building Science Technology. This program—a collaboration with more than 50 regional industry, governmental, educational, and nonprofit groups—will **help fill the gap of highly trained workers needed** for the challenges facing the 21st-century facilities maintenance leader. We engaged a broad spectrum of stakeholders in our program design and curriculum to make sure our graduates are experts in their field."



# EXECUTIVE SUMMARY

## THE CLEAN ECONOMY WILL REQUIRE WORKERS WITH SUSTAINABILITY SKILLS TO SUPPORT ECONOMIC COMPETITIVENESS AND ENVIRONMENTAL RESILIENCE

There is now broad consensus among employers, policymakers, educators, and the general public that we must collectively work to conserve resources and protect the biodiversity of our global environment. This cultural shift, which demands environmental stewardship along with economic growth, is changing how private sector employers pursue the development of products and delivery of services. The changes taking place across industries in recognition of our collective environmental challenge have created a growing clean economy—one that relies on new processes and materials and requires workers with enhanced or new sets of skills to develop environmentally beneficial goods and services. This report, a “greenprint,” illustrates effective programs being implemented in community colleges across the country to create college graduates with the sustainability skills needed for the new clean economy. It also outlines recommendations that will lead to the scaling of these programs as the clean economy continues to expand.

## THE CLEAN ECONOMY IS GROWING

- Many middle-skill jobs in the clean economy require a high school credential with additional on-the-job training, postsecondary credentials, or two-year degrees.<sup>1</sup>

- These clean economy jobs will annually pay \$53,000 on average and create economic mobility opportunities for lower-skilled adults who have the necessary sustainability skill sets.<sup>2</sup>

Community colleges are on the front lines of sustainability skills education for the clean economy workforce.

Nearly 40 percent of the nation's 1,200 community colleges have instituted sustainability skills educational initiatives at various levels.

For example:

- In Illinois, 48 campuses in all 39 community college districts are members of the Illinois Green Economy Network (IGEN), a statewide consortium of colleges and employers focused on expanding deployment of clean technologies and employment opportunities.<sup>3</sup>
- At least 300 faculty at 60 community colleges involved with the Greenforce Initiative have adapted more than 500 courses to reflect economic demand in the clean economy and serve approximately 7,500 students each year.<sup>4</sup> In these 6 states alone (Illinois, Michigan, North Carolina, Texas, Virginia, and Washington)—all of which have diverse economies—instructors are adapting traditional courses in more than two dozen disciplines, including energy, business, and engineering.
- Building on the successes of its members, the American Association of Community College's Sustainability Education and Economic Development (SEED) Program—which includes 444 member colleges representing 3.5 million students in credit-level programs—offers members an online platform for sharing sustainability skills curricula and other resources across 8 green economy topics and sectors.<sup>5</sup> In addition, colleges can participate in peer mentoring partnerships to learn from other leading colleges that have already integrated sustainability skills into their educational offerings.

By integrating sustainability skills into the curricula for a host of programs of study, colleges are contributing to their students' future success, responding to the needs of local employers,

supporting regional environmental health, and providing benefits for students and local economies.

## BUILDING ON EFFECTIVE PRACTICES

Based on the successful experiences of leading community colleges in sustainability skills education, there are commonalities between strong career and technical education programs that incorporate sustainability skills. These include:

- Use of labor market information to align programs and career pathways with demand.
- Strong partnerships with clean economy employers in program design and implementation.
- Collaboration with community and labor partners to expand programs and services.
- Increased communications around effective educational approaches.
- Professional development and capacity-building opportunities at multiple levels (state, regional, and local).
- Use of data analytics to support continuous program improvement.

## FINANCING STRATEGIES TO SUPPORT EFFECTIVE IMPLEMENTATION AND SCALING

### RECOMMENDATIONS: EXPANDING WHAT WORKS

Seven key stakeholder groups can help support the scaling of sustainability skill initiatives through the concerted actions summarized below and detailed in the report.

#### Presidential Leadership

- Host a global career and technical education summit for corporate leaders, community college presidents, and other higher education stakeholders to celebrate and advance best practices for creating a skilled workforce, focusing on the sustainability skills and STEM skills that can help to grow the clean economy.



- Issue a national call to employers to partner with community colleges to articulate and accelerate sustainability skills education and other career advancement opportunities for students.
- Highlight successful examples of employer and community college partnerships around clean economy programs integrating sustainability skills.

## Federal Leadership

- Sustain and scale up the University Sustainability Program authorized as part of the Higher Education Opportunity Act of 2008, increasing funding to support capacity building in faculty professional development around sustainability skills education; and employer incentive grants for sustainability skills internships, apprenticeships, and other work-based learning approaches.
- Make community college clean economy programs integrating sustainability skills a key focus of existing federal discretionary grants and awards<sup>6</sup> across the nine federal agencies distributing these grants, and reduce barriers to community college eligibility for funding and other resources.
- Assess and catalog community college sustainability skills education initiatives across the U.S., document state-level initiatives, and facilitate tracking of successful completion and job placement outcomes.
- Raise the visibility of clean economy careers by clarifying the general and specialized sustainability skills across the five major categories of clean economy jobs, maintaining updated websites providing career-focused information, and cross-linking the various federal initiatives under way to support education and training in clean economy sectors and their outcomes.
- Identify and adopt a set of core curricula around sustainability and STEM skills, including revision of course objectives, modules, assignments, and experiential learning.
- Designate a high-level point person who can speak and act on behalf of the community college system in response to employer needs.
- Provide tax credits, renewable energy portfolio standards, and other policies that drive demand for sustainability skills and provide incentives to employers to engage in related partnerships with community colleges (and, where possible, tie employer incentives to hiring).
- Address legal and institutional barriers to hands-on learning in clean economy programs (including liability, financing, and zoning). For example, many colleges are unable to fully utilize their institutions' own sustainability projects as applied learning projects due to liability concerns.
- Facilitate international exchanges among U.S. community college leaders, policymakers, and economic development professionals and their global peers to exchange best practices, challenges, and lessons learned regarding sustainability skills education, policies, and practices.

## Employers and Industry Associations

- Work with community college leaders to identify and communicate sustainability skill needs, competencies, credentials, and career opportunities.
- Develop a sustainability skills education quality assurance process within each industry sector to ensure high market value and national consistency in the skills and competencies recognized by each credential, while also allowing some flexibility and responsiveness to local needs.

## State and Local Governments

- Produce state blueprints for advancing community college and employer partnerships for sustainability and STEM skills development.
- Convene annual state gatherings of employers and educational stakeholders focused on growing the clean economy and the necessary skilled workforce, as well as on tracking and documenting successful career placement.



- Work with governmental and nongovernmental intermediaries to document the value of sustainability skills to workforce and company operations and to disseminate this information nationally and beyond.
- Advocate for state incentives to help business and industry collaborate with community colleges and to provide work experience opportunities for their students.

## Community Colleges

- Infuse sustainability skills education across disciplines through campus- and system-wide curriculum planning and assessment.
- Provide faculty with incentives for adapting courses to enhance sustainability knowledge and skills such as professional development, release time, and recognition.
- Link postsecondary education with the public workforce development system (Workforce Investment Boards/Career Centers) to create career pathways in clean economy programs integrating sustainability skills that begin with shorter-term certificates and articulate toward higher-level two- and four-year degrees.
- Implement work-based and cooperative learning approaches to sustainability skills education that align with student learning outcomes, facilitate applied learning and advancement along a career pathway, and engage employers.
- Enhance project-based learning opportunities for students around sustainability skills by including student training opportunities in contract specifications, engaging students in campus sustainability projects aligned with course learning outcomes, and advocating for related campus or state policies to support hands-on learning.
- Align sustainability skills training with the larger shift toward industry-recognized credentials and competency-based delivery modalities in community college training programs.
- Appoint a high-level champion within each college (and at the system level) to facilitate sustainability planning, assessment, and reporting; coordinate partnerships with

employers; identify job demand and skill needs; and articulate project- and work-based learning to defined sustainability competencies.

- Help employers develop and share sustainability goals with the broader community and identify and document the related education and skills needs through sustainability plans and reports, hiring criteria, and job postings.
- Link sustainability skills with work-readiness skills as a core general education requirement that addresses needs commonly identified by employers for professional and civic engagement.
- Support national sustainability education curriculum sharing and assessment initiatives and encourage coordination among them.
- Educate policymakers, legislators, and economic development and government leaders about how public investments in sustainability skills lead to high-quality jobs that provide vital services to communities and boost economic competitiveness.

## Intermediaries, Unions, and Community-Based Organizations

- Collaboratively convene cross-organization partnerships in strategic locations (both urban and rural) in every state to meet the demand for a skilled workforce in a growing clean economy.
- Strengthen community college and union partnerships to promote articulation of apprenticeship programs with college credits and credentials.
- Provide relevant professional development tools and resources to support scale up of sustainability skills education by faculty across disciplines, including use of current business intelligence and other best curriculum design and teaching practices.
- Enhance community college capacity to support the development of workers with sustainability skills through advocacy initiatives at the federal and state levels.
- Engage with the more than 40 disciplinary societies in STEM fields to help infuse sustainability skills across professional development offerings.

- Support and recognize governmental and nongovernmental efforts to advance best practices in sustainability skills education among both two- and four-year institutions.

### **Students and Student Organizations**

- Advocate for financial awards, professional development, and other incentives related to sustainability skills education through student government associations and other student groups.
- Partner with faculty, through internships or assistantships, in conducting research and

assisting in adapting courses to incorporate sustainability skills education.

- Advocate at the federal, state, and local levels for funding for sustainability skills education initiatives at community colleges and beyond.
- Network and collaborate with students across the country that are bringing sustainability skills training opportunities to their campuses and communities.



A man in a yellow safety vest is looking down at a tablet device. He is standing in front of a large array of solar panels. In the background, a wind turbine is visible against a clear blue sky. The foreground is filled with tall green grass.

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EQUIPPING 20 MILLION STUDENTS WITH SUSTAINABILITY  
KNOWLEDGE AND CAREER SKILLS BY 2025<sup>7</sup>





# INTRODUCTION

As business leaders and policymakers seek to expand the U.S. economic base, there is growing demand for workers who can add value to businesses by helping them to become more efficient and profitable enterprises. In the U.S.—and across the globe—human capital remains the number one challenge for CEOs in 2015, with many employers looking to “grow their own” talent.<sup>8</sup> However, this talent development challenge is amplified by the need to enhance innovation; strengthen customer relationships and trust while increasing corporate and brand reputation; facilitate global expansion while addressing government regulation and minimizing global political and economic risks; and increase operational excellence while addressing sustainability.<sup>9</sup> There is now wide recognition among business leaders and policymakers about the tremendous challenge presented by diminishing natural resources and by negative environmental trends on the viability of business operations.<sup>10</sup> This acknowledgement of the need to create more environmentally friendly processes and products is helping to fuel the growth of the clean economy. **1** Sitting at the nexus of talent development and sustainability, community colleges can play a central role in developing the workforce needed in this emerging market.

## **1** Defining The Clean Economy

While various characterizations of the clean economy exist, for the purposes of this report, the authors have adopted the definition offered by Muro et al. (2011):

“The clean economy is economic activity—measured in terms of establishments and the jobs associated with them—that produces goods and services with an environmental benefit or adds value to such products using skills or technologies that are uniquely applied to those products.”

## THE CLEAN ECONOMY IS GROWING

With over 2.7 million jobs<sup>11</sup> in 2010 located within diverse industry sectors across the country, the clean economy presents important opportunities for employing workers in occupations that are both economically and environmentally meaningful.

Though regional differences exist, categories of the clean economy include agricultural and natural resources conservation, education, compliance, energy and resource efficiency, greenhouse gas reduction, environmental management, recycling, and renewable energy, with a strong focus on manufacturing across the categories<sup>12</sup> (Table 1). These jobs also pay a higher median wage—13 percent higher—than the overall median wage in the nation's 100 largest metro areas.<sup>13</sup> As local and state policymakers and economic development actors focus more on expanding regional industry clusters

and needed policy supports, the clean economy is continuing to grow, thereby strengthening economic competitiveness for clean economy businesses and improving economic opportunity for the workers that these businesses employ.<sup>14</sup>

Serving half of all students enrolled in U.S. higher education, community colleges are the primary engine for U.S. workforce development, preparing the majority of low-income and lower-skilled students for high-demand, clean economy careers.<sup>15</sup> While many of the 2.7 million jobs currently needed in the U.S. clean economy require a high school diploma and on-the-job training, others will require postsecondary credentials. These clean economy jobs will pay \$53,000 on average and will create opportunities for economic mobility for lower-skilled adults with the necessary sustainability skill sets.<sup>16</sup>

**TABLE 1. TOP CLEAN ECONOMY INDUSTRIES BY EMPLOYMENT, 2010**

INDUSTRY <sup>17</sup>	JOBS	EXAMPLES OF MIDDLE-SKILL, CLEAN ECONOMY OCCUPATIONS <sup>18</sup>
<b>Manufacturing</b>	687,116	<ul style="list-style-type: none"> <li>› Machinists</li> <li>› Maintenance and repair workers</li> <li>› Mechanical engineers</li> </ul>
<b>Public Administration</b>	574,795	<ul style="list-style-type: none"> <li>› Urban and regional planners</li> <li>› Civil engineers</li> <li>› Soil and water conservationists</li> </ul>
<b>Transportation and Warehousing</b>	341,041	<ul style="list-style-type: none"> <li>› Shipping, receiving, and traffic clerks</li> <li>› Transportation managers</li> <li>› Transportation, vehicle and systems inspectors</li> </ul>
<b>Administrative and Support and Waste Management and Remediation Services</b>	299,409	<ul style="list-style-type: none"> <li>› Environmental engineering technicians</li> <li>› Environmental science and protection technicians</li> <li>› Refuse and recyclable materials collectors</li> </ul>
<b>Professional, Scientific and Technical Services</b>	278,621	<ul style="list-style-type: none"> <li>› Architects</li> <li>› Geophysical data technicians</li> <li>› Marketing managers</li> </ul>
<b>Wholesale Trade</b>	157,476	<ul style="list-style-type: none"> <li>› Sales representatives</li> <li>› Wholesale and retail buyers</li> </ul>
<b>Utilities</b>	155,875	<ul style="list-style-type: none"> <li>› Electrical engineers</li> <li>› Training and development specialists</li> </ul>
<b>Construction</b>	106,109	<ul style="list-style-type: none"> <li>› Heating and air conditioning mechanics and installers</li> <li>› Construction and building inspectors</li> <li>› Construction laborers</li> </ul>
<b>Agriculture, Forestry, Fishing, and Hunting</b>	31,373	<ul style="list-style-type: none"> <li>› Agricultural technicians</li> <li>› Farm and ranch managers</li> </ul>

This report, a “greenprint,” proposes a set of policy and system changes that can help the nation’s community colleges meaningfully boost students’ sustainability skills to support the expansion of the clean economy, including skills related to career preparedness STEM (science, technology, engineering, and math) fields. Building on effective practices to date, these recommendations offer important strategies for college administrators, program directors, and faculty seeking to expand and scale these practices to current and new community colleges. At the same time, decision-makers—especially new Congressional leaders and governors—will find strategic opportunities to address high-level workforce and environmental policy priorities at the federal, state, and local levels.

## SUSTAINABILITY SKILLS MATTER

As the clean economy in the U.S. grows—including the need to conserve natural resources and protect biodiversity—employers seek employees with the sustainability skills **2** that contribute to essential, widely shared goals: profitable enterprises, environmental stewardship, and worker health, safety, and productivity.

Mastering sustainability skills makes workers and jobseekers more competitive in their regional labor markets. Sustainability skills often encompass STEM skills as well as problem solving and systems thinking skills (i.e., understanding the linkages and interactions between the components of a system).<sup>19</sup> For example, manufacturing employers often note a need for a workforce that can implement “lean and green” manufacturing processes while also streamlining processes that foster greater

operational, environmental, and cost efficiencies. As a result, sustainability skills are good for businesses, good for workers, and good for the environment.

## SUSTAINABILITY SKILLS SUPPORT HIGH-LEVEL WORKFORCE AND POLICY PRIORITIES

As regional economies continue to grow, national policy priorities are creating a window of opportunity to further support and invest in community college-based career and technical programs that can expand economic competitiveness and economic opportunity. Increasing the capacity of U.S. community colleges to incorporate sustainability skills across the STEM curriculum and other disciplines will help the U.S. address a number of high-level workforce and environmental policy priorities, including:

- **Strengthening job-driven training for middle-skill careers.** Preparing jobseekers and incumbent workers for growing clean economy careers can address existing business talent needs while also creating a pipeline of middle-skilled workers as employer demand for these occupations increases.
- **Closing the achievement gap.** The vision to better meet workforce demands by 2025 focuses on increasing educational attainment for groups not historically well served.<sup>20</sup> Efforts around sustainability skills education encompass stronger focus on increasing workers’ STEM skills, enhancing college and career readiness, and incorporating stronger competency-based education and real-world application of learning.

### **2** Outlining Sustainability Skills

Sustainability skills refer to the enhanced or new tasks, competencies, knowledge, or worker requirements necessary to fill clean economy occupations that produce or add value to goods and services with an environmental benefit.

**Please see other important concepts and definitions that inform the meaning of education for sustainability and related skills on page 5.**

*This definition is adapted from Dierdorff et al. 2011 and Muro et al. 2011.*



- **Growing the clean economy.** Businesses in clean economy industry sectors are striving to expand their operations and a workforce with required sustainability skills is an essential element of these efforts. Some companies have embraced the 100 x 100 plan, which calls for 100,000 businesses worldwide to invest \$100 million to create the \$10 trillion clean energy economy by 2020 needed to prevent the worst impacts of climate change.<sup>21</sup> Given its position as a global economic leader, the U.S. needs to encourage its companies to embrace this plan.
- **Addressing climate change.** Together with the business-led efforts noted above, additional federal, state, and local efforts are required to address climate change. For example, the President's Climate Action Plan (and its objective to cap concentrations of greenhouse gas emissions in the earth's atmosphere) seeks to maintain a healthy, livable planet for current and future generations through a series of bold actions across sectors. Having a skilled workforce

that understands the environmental implications of its work processes will be essential to implementation.<sup>22</sup>

In response to these priorities, community college faculty all across the U.S. are working at the cutting edge of 21st century American innovation, convening employers and other stakeholders, offering new credentials in response to industry demand, inventing new course content and teaching methods, incorporating entrepreneurship skills, and bringing additional dollars and visibility to their colleges.

Moreover, college leaders themselves are enhancing higher education by increasing the number of sustainability projects on their own campuses and in the wider community that engage various vendors and contractors and provide applied learning opportunities for students. These employer partners are also often in a position to hire students or to offer internships or apprenticeships where students can further utilize the sustainability skills they are gaining in college.

## Sustainability Skills: Key Underlying Concepts

Biodiversity	
The extraordinary variety of life on earth—from genes and species to ecosystems and the valuable functions they perform.	A. Alonso, et al. "Biodiversity: Connecting with the Tapestry of Life: Smithsonian Institution Monitoring and Assessment of Biodiversity Program." <i>President's Committee of Advisors on Science and Technology</i> . Washington, DC, 2001.
Ecological Services	
Fundamental needs produced by biodiversity, such as fresh water, clean air, food, medicines and shelter.	<i>Ibid.</i>
Ecological Sustainability	
The capacity of ecosystems to maintain their essential functions and processes, and retain their biodiversity in full measure over the long term.	<a href="http://BusinessDictionary.com">BusinessDictionary.com</a>
Sustainable Development	
Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.	United Nations. "Our Common Future: Report of the World Commission on Environment and Development, Chapter 2: Towards Sustainable Development." 1987.
Sustainability Learning Objectives	
Professors involved in a multidisciplinary curriculum assessment project at Indiana University propose a three-part framework for organizing student learning for sustainability: (1) appreciating human dependence on ecosystems (ecosystem services) (2) understanding how humans impact ecosystems (ecological footprint) (3) learning effective stewardship of ecosystems (sustainability)	Heather L. Reynolds, et al. "Teaching Environmental Literacy." <i>Indiana University Press</i> . 2009.
Triple Bottom Line	
A phrase, coined by John Elkington in his 1997 book "Cannibals with Forks: The Triple Bottom Line of 21st Century Business," that describes the separate financial, social, and environmental "bottom lines" of companies.	<i>Investopedia</i> .

**TABLE 2. EXAMPLES OF SUSTAINABILITY SKILLS FOR SELECTED CLEAN ECONOMY MIDDLE-SKILL AND HIGHER-LEVEL OCCUPATIONS**

SELECTED OCCUPATIONS	EXAMPLES OF SUSTAINABILITY SKILLS <sup>23</sup>
<b>Mechanical engineers</b>	<ul style="list-style-type: none"> <li>› Design integrated mechanical or alternative systems, such as mechanical cooling systems with natural ventilation systems, to improve energy efficiency</li> <li>› Recommend the use of utility or energy services that minimize carbon footprints</li> </ul>
<b>Soil and water conservationists</b>	<ul style="list-style-type: none"> <li>› Advise land users, such as farmers or ranchers, on plans, problems, or alternative conservation solutions</li> <li>› Evaluate or recommend geographic information systems (GIS) applications to address issues such as surface water quality, groundwater quality, ecological risk assessments, air quality, or environmental contamination</li> </ul>
<b>Shipping, receiving, and traffic clerks</b>	<ul style="list-style-type: none"> <li>› Compare shipping routes or methods to determine which have the least environmental impact</li> </ul>
<b>Environmental science and protection technicians</b>	<ul style="list-style-type: none"> <li>› Analyze potential environmental impacts of production process changes and recommend steps to mitigate negative impacts</li> <li>› Provide information or technical or program assistance to government representatives, employers, or the general public on the issues of public health, environmental protection, or workplace safety</li> </ul>
<b>Marketing managers</b>	<ul style="list-style-type: none"> <li>› Develop business cases for environmental marketing strategies</li> <li>› Integrate environmental information into product or company marketing strategies, policies, or activities</li> </ul>
<b>Wholesale and retail buyers</b>	<ul style="list-style-type: none"> <li>› Identify opportunities to buy green commodities, such as alternative energy, water, or carbon-neutral products for resale to consumers</li> <li>› Compare transportation options in order to determine the most energy and cost efficient</li> </ul>
<b>Electrical engineers</b>	<ul style="list-style-type: none"> <li>› Design electrical systems or components—such as lighting systems designed to account for natural lighting—that minimize electric energy requirements</li> <li>› Develop systems that produce electricity using renewable energy sources such as wind, solar, or biofuels</li> </ul>
<b>Heating and air conditioning mechanics and installers</b>	<ul style="list-style-type: none"> <li>› Install and test automatic, programmable, or wireless thermostats in residential or commercial buildings to minimize energy usage for heating or cooling</li> <li>› Install or repair self-contained ground source heat pumps or hybrid ground or air source heat pumps to minimize carbon-based energy consumption and reduce carbon emissions</li> </ul>
<b>Farm and ranch managers</b>	<ul style="list-style-type: none"> <li>› Monitor and adjust irrigation systems to distribute water according to crop needs and to avoid wasting water</li> <li>› Direct livestock or crop waste recycling operations</li> </ul>



# BUILDING ON EFFECTIVE COMMUNITY COLLEGE PRACTICE

Given the accomplishments of several hundred community colleges in addressing the growing demand for sustainability skills, there is strong practice on which to build these innovations. Of the 1,200 two-year colleges in the U.S., nearly 40 percent have instituted some aspect of sustainability skills educational initiatives at various levels.<sup>24</sup> For example:

- Community colleges and other training organizations engaged in the U.S. Department of Labor-funded GreenWays project to support employer-led workforce partnerships in advanced manufacturing, construction and deconstruction, landscape and forestry, renewable electrical power and resources, and transportation. Over 1,900 participants completed their programs and gained sustainability skills, with 87 percent achieving nearly 5,400 industry-relevant credentials. Over 1,100 of these participants were placed in high-demand clean economy occupations across the 8 regions.<sup>25</sup>
- Faculty at 60 community colleges across 6 states involved in the Greenforce Initiative indicate that at least 300 faculty have adapted more than 500 courses to reflect economic demand in the clean economy and serve approximately 7,500 students each year.<sup>26</sup> In these six states alone (Virginia, North Carolina, Illinois, Michigan, Texas, and Washington), which have diverse economies, instructors are adapting traditional courses in more than two dozen disciplines, including energy, business, and engineering. Faculty are offering several new credentials and are pursuing continuing education through such programs as the American Association of Energy Engineering (AAEE), Building Performance Institute (BPI),



and North American Board of Certified Energy Practitioners (NABCEP). Community college administrators and instructors are also hosting campus and regional convenings to learn about new educational approaches and resources and to gain insights for shifting course content and teaching approaches.<sup>27</sup>

- Building on the successes of its members, the American Association of Community Colleges' SEED program—which includes 444 member colleges representing 3.5 million students in credit-level programs—offers members an online platform for sharing sustainability skills curricula and other resources across 8 green economy topics and sectors.<sup>28</sup> In addition, colleges can participate in peer mentoring partnerships to learn from other leading colleges that have integrated sustainability skills into their educational offerings.
- Over 127,000 participants were engaged in U.S. Department of Labor-funded training programs supported by the American Recovery and Reinvestment Act, including green jobs, energy training, and energy partnership programs

focused on integrating sustainability skills. About 83 percent of the participants (over 104,000) engaged in these programs—often offered by community colleges—earned industry-relevant certificates upon completion.<sup>29</sup>

Some states have led system-wide approaches to incorporating sustainability skills into career and technical education at their community colleges:

- **Virginia's Weatherization Training Center** provides training and certification in both weatherization and residential energy conservation and efficiency practices at 10 community colleges across the state of Virginia. VWTC offers courses serving individuals interested in career opportunities, contractors seeking additional training, and homeowners interested in saving money and reducing their energy footprint. For example, Thomas Nelson Community College worked with VWTC to create a "Weatherization Training Pipeline," including a series of courses leading to the Virginia Governor's Career Readiness Certificate and credentials offered by the Occupational Health and Safety Administration (OSHA) and BPI.

- **North Carolina's Community College System** undertook a system-wide curriculum review process, the Code Green Super CIP (Curriculum Improvement Project), across its 58 community colleges to better align education across several disciplines with employer needs and to create a common core for all technical programs. Altering course objectives and incorporating sustainability skills, the Super CIP resulted in the redesign of curriculum program standards for 5 industry sectors: energy, transportation, engineering technology, environment, and building. The project affected approximately 360 courses and better aligned occupational training programs with career competencies and related credentials.<sup>30</sup>
- **The Illinois Green Economy Network** is a statewide consortium of all 39 districts and 48 campuses in the Illinois Community College System whose vision is to serve as a global leader in transforming education and the economy for sustainability. IGEN combines the power of a network with the deep community connections of individual colleges to expand deployment of clean energy technologies and to increase employment opportunities. Through a 3-year initiative funded by the U.S. Department of Labor, 17 Illinois community colleges are collaboratively developing 32 degree and certificate programs for green workforce training.<sup>31</sup>

Based on these successful experiences, strong community college career and technical education programs that incorporate sustainability skills must:

- Utilize traditional and real-time labor market information to identify clean economy occupations with strong labor market demand and economic development potential.

- Develop strong partnerships with clean economy employers in the design and implementation of education and training programs and clean economy career pathways, including work-based and project-based learning opportunities.
- Collaborate with community and labor partners to expand programs and services available to jobseekers and incumbent workers.
- Raise the visibility of effective approaches to integrating sustainability skills through strategic communications and convenings.
- Create local, regional, and state professional development and capacity building opportunities to expand and maintain successful education and training strategies, including the development of sustainability skills curricula.
- Use data analytics to understand what is working well and to identify opportunities for continuous improvement.
- Develop financing strategies to support effective implementation and scaling, including reallocation or reprioritization of existing funding resources.
- Utilize policy and systems changes to remove barriers to program implementation and to support continuation of programs.

These lessons learned are reflected in the recommendations and examples that follow.





## EXPANDING WHAT WORKS: LEADERSHIP ROLES FOR KEY STAKEHOLDERS

The achievements of community colleges (noted above and throughout this document) show strong promise for how to engage even more colleges in developing a competitive workforce for the clean economy, including conservation of natural resources and protection of biodiversity. Precedents that can be built upon nationally to sustain and scale this innovation already exist. Community colleges will need considerable additional capacity to develop faculty, to serve students, and to engage employers and the wider community. As new colleges and clean economy programs expand and engage greater numbers of students, faculty cite the need for professional development around core sustainability skills (including the principles that underlie them), better information about regional job demand, more clarity on relevant credentials in the emerging economy, more support from employers, and more internships and other incentives for students.

A diverse group of nearly 100 national thought leaders from higher education, government, and industry associations spanning several economic sectors, including agriculture, renewable energy, manufacturing and transportation,<sup>32</sup> was convened by the Greenforce Initiative (a partnership of the National Wildlife Federation and Jobs for the Future) over the course of a year to explore opportunities to respond to this challenge. Hundreds of ideas were generated and prioritized into recommendations for 7 key stakeholder groups that can assist with this scale up through system changes (state, local,

and organizational), increased communications and coordination, partnership development, career pathway enhancements, new policy measures, and new funding allocations.<sup>33</sup>

## PRESIDENTIAL LEADERSHIP

- Host a global career and technical education summit for corporate leaders, community college presidents, and other higher education

stakeholders to celebrate and advance best practices for creating a skilled workforce, focusing on the sustainability skills and STEM skills that can help to grow the U.S. clean economy. **3**

- Issue a national call to employers to partner with community colleges to articulate and accelerate sustainability skills education and other career advancement opportunities for students. **4**

### **3 Disseminating Best Practices Through Community College Peer Networks**

The experiences of the Greenforce Initiative demonstrate the power of this convening approach. Through 15 regional summits as well as a national virtual summit, the initiative brought together business leaders with community college instructors, staff, and students to share best practices in developing career pathways incorporating sustainability skills and connecting campus sustainability to hands-on teaching and learning. Employers also shared the ongoing value of sustainability skills in developing a fully prepared workforce and how skills translate into greater economic competitiveness, employee satisfaction, community engagement, and environmental stewardship.<sup>34</sup>

### **4 Community Colleges Share Information About Career Pathways in the Clean Economy**



#### **Rappahannock Community College**

An annual Green Vendor Fair provides information about career pathways across Virginia and the Mid-Atlantic region.



#### **Wake Technical Community College**

Students participate in the Green Symposium employment lab hosted by Wake Tech in Raleigh, North Carolina, where they learn how green businesses operate and what skills are needed for success in a clean economy.



## FEDERAL LEADERSHIP

- Sustain and scale up the University Sustainability Program authorized as part of the Higher Education Opportunity Act of 2008, increasing funding to support capacity building in two areas:
  - » Faculty professional development around sustainability skills education and its link to the development of STEM skills. **5**
- » Employer incentive grants to match stipend and training costs for sustainability skills internships, apprenticeships, or other work-based learning approaches. **6**
- Make community college clean economy programs integrating sustainability skills a key focus of existing federal discretionary grants and awards<sup>35</sup> across the nine federal agencies distributing these grants and reduce barriers to community college eligibility for funding and other resources.

### **5** Helping Faculty Strengthen STEM Skills for Clean Economy Careers

Funded by the [NASA Innovations in Climate Education](#) (NICE) program, the Greenforce Initiative's Building a Diverse, Green Workforce Project illustrates how this professional development might work. Nine faculty in three community colleges (Edgecombe Community College in North Carolina, Wayne County Community Colleges District in Michigan, and Wilbur Wright College in Illinois) were engaged in capacity-building activities and classroom pilots to strengthen course content, instructional practices, and STEM career education options for low-income and underrepresented students. Incorporating NASA earth-observing satellite data and other curriculum tools, over 560 students were engaged in these college-level classes and noted that they learned about STEM skills, STEM careers, and climate change education. Faculty noted that these students increased their STEM skills, including problem solving in a technology-rich environment, applying data analysis to real-world situations, and presenting strong arguments incorporating appropriate data.

### **6** Learning and Earning in the Clean Economy

The [Massachusetts Clean Energy Center](#) (MassCEC) Internship Program is a leading example of work-based learning approaches in the clean economy. Offered by MassCEC and the New England Clean Energy Council, the program provides paid internship opportunities for college students and recent graduates to enhance the talent pipeline for Massachusetts-based clean energy. During these sessions, MassCEC provides Massachusetts-based clean energy companies with stipends of up to \$12 per hour for up to 10 weeks for each full-time intern, with a cap of \$4,800 per intern. Over the past three summers, the program placed over 500 students and recent graduates in internships at more than 120 clean energy companies across Massachusetts. As a result of the internship program, more than 49 students gained full-time or part-time employment.<sup>36</sup>

- Assess and catalog community college sustainability skills education initiatives across the U.S., document state-level initiatives, and facilitate tracking of successful completion and job placement outcomes. **7**
- Raise the visibility of clean economy careers by clarifying the general and specialized sustainability skills across the five major categories of clean economy jobs, maintaining updated websites providing career-focused information, and cross-linking the various federal initiatives underway to support education and training in clean economy sectors and their outcomes.

## STATE AND LOCAL GOVERNMENTS

- Produce state blueprints for advancing community college and employer partnerships toward sustainability and STEM skills development. **8**
- Convene annual state gatherings of employers and educational stakeholders focused on growing the clean economy and the necessary skilled workforce as well as on tracking and documenting successful career placement. **9**
- Highlight successful examples of employer and community college partnerships around clean economy programs integrating sustainability skills. **10 11**

“With the baby boomers ready to retire, we need to be very active and aggressive in how we go out and source and recruit the future PG&E employees. We can’t just go out and get fully trained utility workers at the drop of a dime.”

—Kevin Knap, Vice President, Gas Distribution, PG&E, speaking about the PowerPathway program<sup>37</sup>

### **7 Responding to Employer Demand for Skilled Clean Economy Workers**

Delta College’s [Fast Start Training Program](#) is a partnership between Delta College, Michigan Works!, and area advanced chemical, solar, and battery manufacturers to retrain workers for available jobs in emerging clean economy industries. First offered in October 2008, Fast Start supplies employers that are creating or expanding product lines with employees who have industry-specific technical, critical thinking, teamwork, and communication skills. Delta College conducts an ongoing job placement assessment of the courses offered through Fast Start and the program is proving to be quite successful in its job-placement rate: Of 140 students who completed the Solar Manufacturing course, 120 have been placed into solar-related jobs (84 percent).<sup>38</sup>

### **8 Engaging Clean Economy Employers as Partners with Community Colleges Across the State**

The Illinois Green Employer Alliance is a partnership of Illinois community colleges, businesses, professional associations, and other interested stakeholders led by the [Illinois Green Economy Network](#). Engaging dozens of employers across the state, IGEA is working to develop objectives for policy and market transformation toward a greener economy, advise on curriculum development to prepare the workforce for Illinois’ evolving green economy, help community colleges identify evolving skill needs and green job trends, provide experiential learning opportunities for the emerging green workforce, and identify and implement solutions to help employers achieve positive green economic outcomes.<sup>39</sup>

## 9 Employers Share Intelligence About Talent Pipeline Needs

In March 2014, IGEN and IGEA hosted the 2014 IGEA Green Connections: The Future is Now summit, which brought together representatives from 34 Illinois employers from across the state—along with community colleges, nonprofit organizations, and municipal governments—to discuss trends in employment opportunities and workforce training needs associated with Illinois’ emerging clean economy.<sup>40</sup>

**You're Invited!**

Join us at the Illinois Green Employer Alliance Summit

**Green Connections,  
The Future is Now!**

March 5, 2014  
8:00am - 3:15pm  
Lincoln Land Community College  
Springfield, IL

Lodging and travel information  
available at  
[http://www.igence.org/igea\\_smi](http://www.igence.org/igea_smi)  
and when you register.

**REGISTER NOW!**

**Guest Speakers include:**

-  Julie Urlaub  
Founder and  
Managing Partner of  
Taiga Company and  
the author of *The  
Business Sustainability  
Handbook*
-  Ed Cholek  
Director of Business  
Development for  
FGM Architects
-  Don Schlorff  
Executive Vice  
President with  
Busey Bank

 **IGEIA**  
Illinois Green Employer Alliance

Funded in part by a TAACCCT Department of Labor Grant

## 10 Enhancing Community College Curricula through Employer-Endorsed Skills and Certifications

Gateway Technical College in Kenosha, Wisconsin, has partnered with Snap-on Incorporated to provide students the opportunity to learn advanced systems and green practices. Snap-on has sponsored a green garage bay, which uses alternative fuels in the diesel training, in the Advanced Propulsion lab for diesel technicians. Through the partnership, Snap-on has also created a national torque certification program designed to meet the needs of the growing global wind industry. This program in torque technology provides students with hands-on learning of torque techniques, bolting applications, and tool set-up and selection concepts within today's wind industry.<sup>41</sup>

## 11 Building a Clean Economy Talent Pipeline through Effective Partnerships

Through PG&E's PowerPathway™ Training Network in California, diverse community college, university, and union partners collaborate with PG&E to provide training and educational courses that respond to California's growing energy workforce needs. Together, they create technical training programs and career pathways in anticipation of industry workforce trends in such areas as energy efficiency, renewables, smart grid, and skilled crafts.

- Identify and adopt a set of core curricula around sustainability and STEM skills, including revision of course objectives, modules, assignments, and experiential learning.
- Designate a high-level point person who can speak and act on behalf of the community college system in response to employer needs. **12**
- Provide tax credits, renewable energy portfolio standards, and other policies that drive demand for sustainability skills and provide incentives to employers to engage in related partnerships with community colleges (and, where possible, tie employer incentives to hiring). **13**
- Address legal and institutional barriers to hands-on learning in clean economy programs (including liability, financing, and zoning). For example, many colleges are unable to fully utilize their institutions' own sustainability projects as applied learning projects due to liability concerns.
- Facilitate international exchanges among U.S. community college leaders, policymakers, and economic development professionals and their global peers to exchange best practices, challenges, and lessons learned regarding sustainability skills education, policies, and practices.

## EMPLOYERS AND INDUSTRY ASSOCIATIONS

- Work with community college leaders to identify and communicate sustainability skill needs, competencies, credentials, and career opportunities.
  - » Assist with the identification, evaluation, and validation of industry-recognized credentials, helping to ensure that they have market value and are competency based.
  - » Ensure that human resources staff and recruiters are aware of their employers' sustainability practices and hiring goals and are actively recruiting graduates from the programs that are fostering the relevant sustainability knowledge and skills.

### **12 Giving Employers a Single Point of Contact Across the College System**

One of the roles of the executive director of IGEN is to connect community colleges across the state of Illinois to employers and professional associations through the development of IGEA. The executive director, who is appointed by the President's Steering Committee, engages IGEA employer partners to ensure the training and education offered at community colleges across the state help create demand and accelerate the green economy.

### **13 Increasing Community College Responsiveness to Employer Needs**

In 2013 and again in 2014, Massachusetts funded a [Rapid Response Incentive Program](#) that authorizes the Commissioner of Higher Education to competitively issue funds that "enable community colleges to respond in a timely manner to the workforce development needs of employers." These include programs that respond within 90 days to workforce training requests from local employers and offer accelerated degrees, certificates, or workforce training programs built around the scheduling needs of working adults.<sup>42</sup>

- Develop a sustainability skills education quality assurance process within each industry sector to ensure high market value and national consistency in the skills and competencies recognized by each credential while also allowing some flexibility and responsiveness to local needs. **14**
- Publicly communicate a commitment to working with community colleges to prepare a skilled workforce and to hire graduates with sustainability credentials and degrees. **15**
- Work with governmental and nongovernmental intermediaries to document the value of sustainability skills to workforce and company operations and to disseminate this information nationally and beyond. **16**
- Advocate for state incentives to help business and industry collaborate with community colleges and to provide work experience opportunities for their students.

#### **14 Increasing Quality of Community College Training Programs**

The [Interstate Renewable Energy Council](#) is a national leader in the development of competency standards, accreditation and certification programs for clean energy educators, and training programs in renewable energy and energy efficiency. IREC is the National Administrator of the Solar Instructor Training Network, working with renowned solar training facilities across the U.S. to build workforce capacity in solar system design, installation, sale, and inspection. IREC's goal is to foster consistency among training programs by establishing a common set of objectives and guiding principles as well as education standards based on industry-valued, marketable skills.<sup>43</sup>

#### **15 Infusing Sustainability in Talent Development and Business Operations**

In November 2010, Unilever—which has 400 brands in 14 categories and makes such products as Lipton, Knorr, Dove, and Suave—launched the [Unilever Sustainable Living Plan](#), which serves as its business blueprint for its portfolio in all countries. The plan addresses the value chain, from material sourcing to manufacturing, and the way consumers use their products. To engage employees in implementing this plan, in 2013 Unilever created an online knowledge hub—The Sustainable Living Lab—that provides a collaborative space to share ideas, tools, and daily news. Unilever also encourages innovation through a Small Actions Big Difference budget that has so far funded more than 50 employee-created projects to reduce water waste in manufacturing sites around the world.<sup>44</sup>

## 16 Documenting Sustainability Skills and Practices

Corporate sustainability reporting is an international movement to analyze, document, report, and continuously improve environmental performance. Examples include:

[Global Reporting Institute \(GRI\) Sustainability Reporting Framework](#). GRI's mission is to make sustainability reporting standard practice for all companies and organizations. Its Framework is a reporting system that provides metrics and methods for measuring and reporting sustainability-related impacts and performance. Currently there are over 6,400 organizations represented and over 19,000 reports.

[The 21st Century Corporation: The Ceres Roadmap for Sustainability](#). Founded by a small group of investors in 1989 in response to the Exxon Valdez oil spill, Ceres works to bring sustainability strategies and practices to companies, investors, and other key economic players. In 2010, Ceres released "The 21st Century Corporation: The Ceres Roadmap for Sustainability," a self-described "owner's manual for the sustainable corporation."

[International Organization for Standardization's ISO 1400](#) is a set of consistent, internationally recognized environmental management standards to assess and foster ongoing improvement of environmental performance in all aspects of business and operations.

[Bank of America runs a goal-driven program of social and environmental responsibility](#) that includes annual reporting. For example, as of the end of 2014, Bank of America reduced greenhouse gas (GHG) emissions by 26 percent and is on track to exceed its goal of a 15 percent reduction in GHG emissions, across all of its global operations, between 2010 and 2015.

## COMMUNITY COLLEGES

- Infuse sustainability skills education across disciplines through campus- and system-wide curriculum planning and assessment.
- Provide faculty with incentives for adapting courses to enhance sustainability knowledge and skills such as professional development, release time, and recognition. **17**
- Link postsecondary education with the public workforce development system (Workforce Investment Boards/Career Centers) to create career pathways in clean economy programs integrating sustainability skills that begin with shorter-term certificates and articulate toward higher-level two- and four-year degrees.
- Implement work-based and cooperative learning approaches to sustainability skills education that align with student learning outcomes, facilitate

## 17 Integrating Sustainability into Community College Curricula

IGEN's Greening Your Curriculum is a faculty professional development program that assists faculty across disciplines throughout the state's community college system in integrating core sustainability and green economy principles. Community college faculty, and ultimately students, are introduced to core sustainability concepts while learning about career pathways and job skill clusters in the clean economy.<sup>45</sup>

applied learning and advancement along a career pathway, and engage employers.

- Enhance project-based learning opportunities for students around sustainability skills by including student training opportunities in contract specifications, engaging students in campus sustainability projects aligned with course

learning outcomes, and advocating for related campus or state policies to support hands-on learning. **18**

- Align sustainability skills training with the larger shift toward industry-recognized credentials and competency-based delivery modalities in community college training programs. **19**

**Figure 1. Environmental Sciences Career Pathway**

	<b>Education:</b> Master's Degree (typically), occasionally Bachelor's Degree <b>Industry-Valued Certification:</b> Certification through American Institute of Hydrology <b>Median Pay:</b> \$36.31/hour, \$75,530/year <b>Projected Job Growth:</b> 10%	<b>Hydrologist:</b> Hydrologists work closely with engineers, scientists, and public officials to study and manage the water supply.	<b>Skills and Competencies:</b> analyze data, write reports, present information, assess risks, develop plans, work in teams, physical stamina, physical and biological sciences, math
<b>High-Level</b>	<b>Education:</b> Bachelor's Degree <b>Industry-Valued Certifications:</b> American Academy of Environmental Engineers and Scientists (AAEES) offers Board Certified Environmental Scientist (BCES), and the Soil and Water Conservation Society offers Certified Environmental Professional (CEP) <b>Median Pay:</b> \$30.56/hour, \$63,570/year <b>Projected Job Growth:</b> 15%	<b>Environmental Scientists and Specialists:</b> Environmental scientists and specialists use their knowledge of the natural sciences to protect the environment and human health. They may clean up polluted areas, advise policy makers, or work with industry to reduce waste.	<b>Skills and Competencies:</b> collect data, analyze data, write technical reports, present information, problem-solving, self-motivation
<b>Middle-Skill</b>	<b>Education:</b> Associate's Degree <b>Industry-Valued Certifications:</b> American Academy of Environmental Engineers and Scientists (AAEES) offers Board Certified Environmental Scientist (BCES) <b>Median Pay:</b> \$19.83/hour, \$41,240/year <b>Projected Job Growth:</b> 19%	<b>Environmental Science and Protection Technician:</b> Environmental science and protection technicians do laboratory and field tests to monitor the environment and investigate sources of pollution, including those affecting public health.	<b>Skills and Competencies:</b> data analysis, data monitoring, critical thinking, physical and biological sciences, math, computer science, communications
<b>Entry-Level</b>	<b>Education:</b> HS diploma or equivalent <b>Industry-Valued Certification:</b> The Board of Safety Professionals (BCSP) offers the following certifications at the technician level: Construction Health and Safety Technician Certification (CHST), Occupational Health and Safety Technologist Certification (OHST), and Safety Trained Supervisor (STS) <b>Median Pay:</b> \$22.81/hour, \$47,440/year <b>Projected Job Growth:</b> 11%	<b>Occupational Health and Safety Technician:</b> Occupational health and safety technicians conduct tests and measure hazards in the workplace.	<b>Skills and Competencies:</b> use of computers and testing equipment, collection of samples, communication skills, compliance with safety standards and regulations, physical stamina, ability to diagnose and solve problems

Adapted from the information provided in the Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2014-15 Edition*, Conservation Scientists and Foresters, at <http://www.bls.gov/ooh/life-physical-and-social-science/conservation-scientists.htm> (accessed November 20, 2014).

## **18 Putting Sustainability Skills into Practice**

At Grand Rapids Community College, students are applying the sustainability skills they are learning while building the capacity of the college to provide this education. Students helped to remodel and relocate a model green home, converting it into an on-campus functional learning lab for teaching sustainable construction, energy efficiency and conservation, and renewable energy. After these campus-based internships, students participate in up to 300 hours of paid external internships, related to their training, that often leads to full-time employment.



- Appoint a high-level champion within each college (and at the system level) to facilitate sustainability planning, assessment, and reporting; coordinate partnerships with employers; identify job demand and skill needs; and articulate project- and work-based learning to defined sustainability competencies. <sup>20</sup>
- Help employers develop and share sustainability goals with the broader community and identify and document the related education and skills needs through sustainability plans and reports, hiring criteria, and job postings. <sup>21</sup> Link sustainability skills with work-readiness skills as a core general education requirement that addresses needs commonly identified by

### **19 Developing Clean Economy Career Pathways Based on Industry Demand**

Through California's Green College Initiative and with the support of funding opportunities from federal, state, local, and foundation sources, Los Angeles Trade-Technical College developed green programs of study, utilizing labor market research and input from the college's Regional Economic Development Institute on clean economy occupations. These changes included integrating sustainability course content and curriculum into existing courses, certificates, and degree programs and creating new training and education programs for high-demand and emerging green-related industries. Other important initiatives at LA Trade Tech include a Sustainability Industry and Educators Forum that defined green industry sector trends and needs, including career and academic pathways; research on the demand/supply side of green construction, transportation, and energy sectors in the Los Angeles Region; and the creation of 10 new stacked and latticed certificate and degree programs in renewable energy.

### **20 Expanding Roles of Higher Education Sustainability Staff to Include Workforce Education**

Many higher education institutions are already incorporating key staff positions focused on sustainability within their colleges. The Association for the Advancement of Sustainability in Higher Education (AASHE) published [Salaries and Status of Sustainability Staff in Higher Education](#) in 2013, finding that nearly half of all 2012 respondents were in positions created or upgraded since 2010; sustainability offices are increasingly becoming the norm (the rate of positions housed in such offices increased from 23 percent in 2010 to 67 percent in 2012); and full-time positions focused on sustainability are increasingly common. However, there is a need for a stronger focus from these positions on connecting with key workforce development and educational leaders within institutions to better align efforts around sustainability skills education.

### **21 Enhancing the Sustainability Practices of Local Businesses**

The Haywood County Chamber of Commerce Green Business Initiative partnered with Haywood Community College in North Carolina to support green businesses in the community and to communicate the value of sustainability. The college's former president, Dr. Rose Johnson, formed and served as chair of the Green Initiative Committee. Since the foundation of the Green Business Initiative in 2010, the Chamber has encouraged over 20 area businesses to improve their green business practices and set forth sustainable goals and associated strategies to achieve their green leader certification status.

employers for professional and civic engagement. <sup>22</sup>

- Support national sustainability education curriculum sharing and assessment initiatives and encourage coordination among them.<sup>46</sup>
- Educate policymakers, legislators, and economic development and government leaders about

how public investments in sustainability skills lead to high-quality jobs that provide vital services to communities and boost economic competitiveness. <sup>23</sup>

## **22 Technical Skills Are Not Enough**

From sustainable farming to renewable energy occupations, technical know-how is a prerequisite for middle-skill work. But technical skills are no longer enough to ensure success on the job. Employers need new hires with solid workforce-readiness skills, such as teamwork, collaboration, written and oral communication, professionalism, time management, critical thinking, and problem solving.<sup>47</sup> Unfortunately, too many workers do not have these skills when they are hired, and employers do not want the responsibility of teaching them. Employers do not think they do it well and instead prefer to provide training specific to their business.<sup>48</sup> In order to ensure that new employees are successful in the workplace, it is important for education and training providers to integrate workforce-readiness instruction into their Adult Basic Education and technical training programs.

## **23 Linking Sustainability Skills to Economic Development Efforts**

[The Oberlin Project](#) partnership is an example of how the leadership and inspiration of one college or organization can facilitate a region-wide sustainable development and skills training effort. With goals to transition to a carbon-free energy system, develop a green arts district, and establish a 20-acre greenbelt, the regional project builds on several model sustainability initiatives at Oberlin College, including the first entirely solar-powered, zero-emissions building on a U.S. campus: the Adam J. Lewis Center.

Equipping students at all educational levels with the analytical skills, technical knowledge, and vision necessary to become leaders in sustainable economic revitalization is a priority for the Oberlin Project, which engages more than 25 community partners, including Lorain County Community College, state and local government leaders, a municipal utility, civic organizations, private companies, and nonprofits.<sup>49</sup>

## INTERMEDIARIES, UNIONS, AND COMMUNITY-BASED ORGANIZATIONS

- Collaboratively convene cross-organization partnerships in strategic locations (both urban and rural) in every state to meet the demand for a skilled workforce in a growing clean economy.
- Strengthen community college and union partnerships to promote articulation of apprenticeship programs with college credits and credentials. <sup>24</sup>
- Provide relevant professional development tools and resources to support scale up of sustainability skills education by faculty across disciplines, including use of current business intelligence and other best curriculum design and teaching practices. <sup>25</sup>
- Enhance community college capacity to support the development of workers with sustainability skills through advocacy initiatives at the federal and state levels.

### <sup>24</sup> Working with Labor Organizations to Enhance Sustainability Skills for Incumbent Workers

Washtenaw Community College in Ann Arbor, Michigan, is a great example of a strong relationship between a college and trade unions. WCC has educational partnerships with four building trade unions that provide great benefit to the college, the community, the unions, and individual union members. WCC provides on-campus union instructor training programs during the summer and online classes for union members that can lead to certificates or degrees. These partnerships provide unions members with excellent shop facilities and instruction and WCC and the community with additional students and revenue. Union members are also able to advance in their careers by earning additional credentials with value in the labor market. <sup>50</sup>

### <sup>25</sup> Scaling Faculty Professional Development through Online Tools

The Greenforce Initiative is creating two online professional development workshops for instructors based on its work with 100 community colleges over the last few years. The first online seminars, which Jobs for the Future is developing, will focus on strategies to align programs and courses more strongly with labor market needs and employer demand. The National Wildlife Federation is creating the second online workshop, which will help colleges integrate sustainability across the curriculum. Both are geared toward helping programs enhance content and pedagogy so that students increase their marketability and competitiveness upon completion.

- Engage with the more than 40 disciplinary societies in STEM fields to help infuse sustainability skills across professional development offerings.
- Support and recognize governmental and nongovernmental efforts to advance best practices in sustainability skills education among both two- and four-year institutions. <sup>26</sup>

## STUDENTS AND STUDENT ORGANIZATIONS

- Advocate for financial awards, professional development, and other incentives related to sustainability skills education through student government associations and other student groups.
- Partner with faculty, through internships or assistantships, in conducting research and assisting in adapting courses to incorporate sustainability skills education.
- Advocate at the federal, state, and local levels for funding for sustainability skills education initiatives at community colleges and beyond.
- Network and collaborate with students across the country that are bringing sustainability skills training opportunities to their campuses and communities. <sup>27</sup>

### **26 EXPANDING EDUCATIONAL BEST PRACTICES THROUGH POLICY EFFORTS**

Two national organizations exemplify this focus on advancing educational best practices around sustainability. The National Wildlife Federation organizes a series of national and state policy initiatives to advance ecological literacy at all education levels and to boost career skills for wildlife, conservation, and sustainability.<sup>51</sup> The [Campaign for Environmental Literacy](#) identifies and advances key national environmental education policy initiatives, providing updates on new sources of professional development and funding and boosting opportunities for recognition.

### **27 Building Student Career Skills and Leadership in Sustainability Programs**

In 2014, The National Wildlife Federation launched the [EcoLeaders Initiative](#), an online leadership and career credentialing program that supports, connects, and recognizes student leadership for wildlife and the environment.







## ENDNOTES

<sup>1</sup> Middle-skill jobs are those that require more than a high school diploma but less than a Bachelor's degree.

<sup>2</sup> Rothwell, Jonathan. 2013. *The Hidden STEM Economy*. Metropolitan Policy Program at Brookings Institution.

<sup>3</sup> Illinois Green Economy Network website. <http://www.igence.org>.

<sup>4</sup> Keniry, Julian. 2014. *Five Lessons for Boosting Career Skills for Clean Economy*. Wildlife Promise. The National Wildlife Federation.

<sup>5</sup> American Association of Community College's SEED website. <http://www.theseedcenter.org/Sharing-Community/Share-and-Review-Curricular-Materials---Wiki>

<sup>6</sup> Many examples include the Partnership for Sustainable Communities <http://www.sustainablecommunities.gov/>; Pell grants <http://www2.ed.gov/programs/fpg/index.html>; and reauthorization of the Elementary and Secondary Education Act [https://www.google.com/search?q=NTER&rlz=1C1GGGE\\_enUS359US359&oq=nter&aqs=chrome.69i59j69i57j69i60i3.624j0j8&sourceid=chrome&es\\_sm=93&ie=UTF-8#q=elementary+and+secondary+education+act+reauthorization](https://www.google.com/search?q=NTER&rlz=1C1GGGE_enUS359US359&oq=nter&aqs=chrome.69i59j69i57j69i60i3.624j0j8&sourceid=chrome&es_sm=93&ie=UTF-8#q=elementary+and+secondary+education+act+reauthorization)

<sup>7</sup> "Twenty million community college students by 2025" represents a critical mass of at least one-quarter of the 80 million or more U.S. community college students anticipated to be enrolled over that time span (2015-2025). According to U.S. Digest of Education Statistics (2012-2013), 560,000 instructors serve 7.8 million students at 1,200 community colleges annually.

<sup>8</sup> The Conference Board. 2015. *CEO Challenge 2015: Creating Opportunity Out of Adversity—Building Innovative, People-Driven Organizations*, p. 2.

<sup>9</sup> *Ibid.*

<sup>10</sup> For example, The Conference Board notes that an increasing number of U.S. companies (27% in 2014 compared to 5% in 2013) are disclosing potential risks associated with climate change in their annual SEC reports. More companies are also disclosing greenhouse gas emissions and other environmental practices, such as waste generation and recycling efforts. See: *The Conference Board's Sustainability Practices 2015: Key Findings*, p. 8-11.

<sup>11</sup> Muro, Mark, Rothwell, Jonathan, & Saha, Davashree with Battelle Technology Partnership Practice. 2011. *Sizing the Clean Economy: A National and Regional Green Jobs Assessment*. Metropolitan Policy Program at Brookings Institution, p. 17. The authors note that the estimate of 2.7 million jobs is a more conservative and reliable assessment, as it emphasizes only jobs in clean economy establishments creating goods or services with an environmental benefit that are listed in national databases. Furthermore, the estimate excludes indirect jobs created by these establishments as well as jobs that create traditional goods and services (with no explicit environmental benefit) that are developed using more environmentally friendly processes. See report for further explication of the study's parameters.

<sup>12</sup> *Ibid*, p. 16.

<sup>13</sup> *Ibid*, p. 23.

<sup>14</sup> *Ibid*, p. 7.

<sup>15</sup> Coyle, Kevin & Flynn, Maria. 2010. *The Greenforce Initiative Supports Workforce Development and Sustainability Practices at Community Colleges*. ACUPCC Implementer, Second Nature.

<sup>16</sup> Rothwell, Jonathan. 2013. *The Hidden STEM Economy*. Metropolitan Policy Program at Brookings Institution.

<sup>17</sup> Industry sectors and job numbers are drawn from Muro et al, p. 55.

<sup>18</sup> Dierdoff, Erich C., Norton, Jennifer L., Rivkin, David, & Lewis, Phil. 2011. *Greening of the World of Work: Revisiting Occupational Consequences*. National Center for O\*NET Development.

<sup>19</sup> The Institute for Systemic Leadership. Basic Principles of Systems Thinking as Applied to Management and Leadership.

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<sup>20</sup> Lumina Foundation. 2013. *Lumina Foundation Strategic Plan 2013 to 2016*.

<sup>21</sup> Keniry, Julian. 2013. Jigar Shah's appearance at this week's Green Business Roundtable. *Transform to Sustainability*. Available at <http://www.steveoffutt.com/2013/11/jigar-shahs-appearance-at-this-weeks.html>

<sup>22</sup> Executive Office of the President. 2013. *The President's Climate Action Plan*. Available at <http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf>

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<sup>24</sup> McIntosh, Mary, et al. 2008. *Campus Environment 2008: A National Report Card on Sustainability in Higher Education*. Princeton Survey Research Associates International (PSRAI) and National Wildlife Federation

<sup>25</sup> Jobs for the Future. "GreenWays: Creating Career Pathways in the Green Economy." <http://www.jff.org/initiatives/greenways>

<sup>26</sup> Keniry, Julian. 2014. *Five Lessons for Boosting Career Skills for Clean Economy*. Wildlife Promise. The National Wildlife Federation.

<sup>27</sup> Greenforce Initiative. 2013. *College Faculty Survey Results*.

<sup>28</sup> American Association of Community College's SEED website. <http://www.theseedcenter.org>

<sup>29</sup> Impaq International. 2012. *Green Jobs and Healthcare Implementation Study: Final Report*. U.S. Department of Labor Employment and Training Administration, p. ix. Numbers also include participants for health care and other high-growth training programs.

<sup>30</sup> North Carolina Community College System. 2014. *Code Green Super Curriculum Improvement Project (CIP)*. Available at <http://www.ncccommunitycolleges.edu/academic-programs/code-green-super-curriculum-improvement-project>.



- <sup>31</sup> Illinois Green Economy Network. 2015. "A Community College Partnership." <http://www.igencec.org>.
- <sup>32</sup> Keniry, Julian. 2013. *Advancing U.S. Workforce for 21st Century: National Thought Leaders Convene*. Wildlife Promise. The National Wildlife Federation.
- <sup>33</sup> Massachusetts Clean Energy Center. 2014. *Massachusetts Clean Energy Internship Program*. Available at <http://www.masscec.com/programs/massachusetts-clean-energy-internship-program>
- <sup>34</sup> Jones, Kristy. 2012. *How Community Colleges Are Advancing Greener Careers and Campuses*. Wildlife Promise. The National Wildlife Federation.
- <sup>35</sup> Many examples include the Partnership for Sustainable Communities <http://www.sustainablecommunities.gov>; Pell grants <http://www2.ed.gov/programs/fpg/index.html>; and reauthorization of the Elementary and Secondary Education Act (ESEA) [https://www.google.com/search?q=ENTER&rlz=C1GGGE\\_enUS359US359&oq=nter&aqs=chrome.69i59j69i57j69i60i3.624j0j8&sourceid=chrome&es\\_sm=93&ie=UTF-8#q=elementary+and+secondary+education+act+reauthorization](https://www.google.com/search?q=ENTER&rlz=C1GGGE_enUS359US359&oq=nter&aqs=chrome.69i59j69i57j69i60i3.624j0j8&sourceid=chrome&es_sm=93&ie=UTF-8#q=elementary+and+secondary+education+act+reauthorization)
- <sup>36</sup> As an example, see the U.S. Department of Transportation's University Transportation Center grants program: <http://www.rita.dot.gov/utc>
- <sup>37</sup> PG&E. *About PowerPathway*. Quote by Kevin Knap, Vice President, Gas Distribution in video here: <http://careers.pge.com/career-training-development>
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- <sup>41</sup> Massachusetts Department of Higher Education. "Office of Workforce Coordination." Available at <http://www.mass.edu/owc/home.asp>
- <sup>42</sup> Unilever. 2015. "Embedding Sustainability." Available at <http://www.unilever.com/sustainable-living-2014/our-approach-to-sustainability/embedding-sustainability>
- <sup>43</sup> Interstate Renewable Energy Council. Available at <http://www.irecusa.org>
- <sup>44</sup> These skills are identified by a variety of names, ranging from "21st-century skills" to "soft skills," with various definitions, but generally include basic professional competencies.
- <sup>45</sup> Illinois Green Economy Network. "Greening Your Curriculum." [http://theseedcenter.org/Resources/Resource-Center/Illinois-Green-Economy-Network-\(IGEN\)--Greening-Yo](http://theseedcenter.org/Resources/Resource-Center/Illinois-Green-Economy-Network-(IGEN)--Greening-Yo)
- <sup>46</sup> These include: The National Training and Education Resource: <https://www.ntelearning.org/about>; American Association of Community College's SEED Center's sharing community wiki: <http://www.theseedcenter.org/Sharing-Community/Share-and-Review-Curricular-Materials---Wiki>; the National Council on Science and Environment's Climate, Adaptation, Mitigation and E-Learning curriculum peer review and sharing site: <http://www.ncseonline.org/programs/education-careers/climate-change-education/camel-project>, and the American Association of Sustainability in Higher Education STARS initiative: <https://stars.aashe.org>
- <sup>47</sup> These skills are identified by a variety of names, ranging from "21st century skills" to "soft skills," with various definitions, but generally include basic professional competencies.
- <sup>48</sup> Wright, Mary & Cassner-Lott, Jill. 2009. *The Ill-Prepared U.S. Workforce*. The Conference Board.
- <sup>49</sup> The Oberlin Project. 2011. *A Collaborative Venture Among Oberlin College, the City of Oberlin, Oberlin City Schools and Private Sector Organizations to Build a Prosperous Post-Fossil Fuel Based Economy*.
- <sup>50</sup> Washtenaw Community College. 2015. "Union Partnerships Provide Many Benefits." Available at <http://www.wccnet.edu/unions/>
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# RESOURCES

## CAREER PATHWAYS

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## COLLEGE SUSTAINABILITY

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