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- We will begin the webinar promptly at 3 pm EST
- Attendees are muted, so please feel free to use chat panel to post questions at any time. Questions will be answered live (if time permits), or via e-mail.
- This session will be recorded, and an archived copy will be available at www.careertech.org
- Once we begin, if you are not able to hear the audio over your computer, you can dial in directly by calling 866-432-9903, press 3, and enter meeting number 207 657 684 password: green

Thank you to our webinar
host



CISCO™

Infusing Green and Sustainability Standards in the Career Clusters™ Knowledge and Skill Statements

August 16, 2012

The work reported herein by MPR Associates, Inc. and the National Career Technical Education Foundation was supported by the U.S. Department of Education, award number EDVAE10O0102. However, the contents do not necessarily represent the positions or policies of the Office of Vocational and Adult Education or the U.S. Department of Education, and you should not assume endorsement by the Federal Government

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Agenda

- Project Background
- Why Sustainability
- Overview of Standards Development Process
- Explanation of Standards Format
- Review of Standards by Cluster
- Accessing Standards and Resources
- Discussion of Standards Use

Project Background

- Project Genesis
 - Funded by U.S. Department of Education
 - Address need to incorporate green standards into existing K & S developed for National Career Clusters™
- Collaborative Effort
 - U.S. Department of Education
 - MPR Associates, Inc.
 - National Career Technical Education Foundation
 - Vivayic, Inc.

Project Background (cont.)

- Two-Year Timeline
 - Year 1: Standards Development
 - Year 2: Validation and Dissemination
- Broad Stakeholder Involvement
 - Subject Matter Experts (SME)
 - Debra Rowe, Senior Fellow in Education for Sustainability
 - Susan Gentile, Graduate Professor, Antioch University

Project Background (cont.)

- Technical Working Groups (TWG)
 - Experts from the Field
 - Six Career Cluster™ areas
 - Agriculture, Food, and Natural Resources
 - Architecture and Construction
 - Information Technology
 - Manufacturing
 - Science, Technology, Engineering, and Mathematics
 - Transportation, Distribution, and Logistics

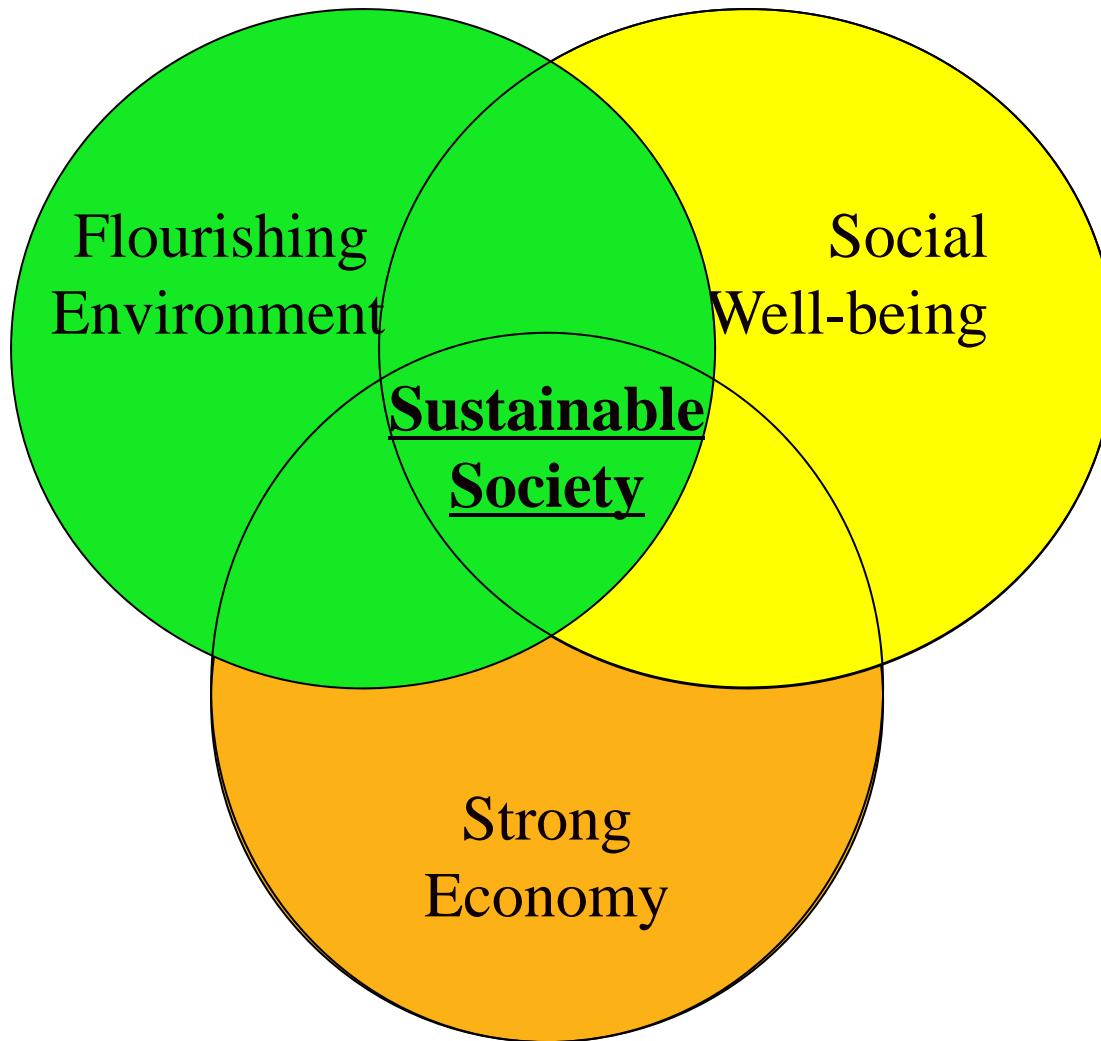
Why Sustainability?



Education for a Sustainable Society

“...enables people to develop the knowledge, values and skills to participate in decisions...that will improve the quality of life now without damaging the planet for the future.”

UNESCO World Summit on
Education for Sustainable Development
<http://www.unesco.org.uk>



Triple Bottom Line of Sustainability
“Economics as if People Mattered”



Some green/sustainability jobs: the obvious

Traditionally, community college, career and technical education and even the National Science Foundation focus on technicians:

- Energy auditor technician
- Wind energy technician
- Insulation and weatherization technician
- Photovoltaic (solar electricity) installer
- Thermal solar installer (hot water and space heating and pool heating)



“Upstream” green/sustainability jobs: jobs needed before technicians get hired

- Energy policy analysts and legislators
- Employees in state and local energy related offices
- Energy efficiency and renewable energy products financiers, manufacturers, distributors, and salespeople
- HVAC and other contractors with green, energy efficiency and renewables expertise/product line
- Energy Service Company (ESCO) employees
- Corporate social responsibility officer
- Sustainability oriented purchasing agent and business VP
- Energy manager
- Facilities director
- Green builder/designer



Some green/sustainability jobs: the less obvious

- Resource conservation/efficiency manager
- Measurement and verification technician
- Material scientist
- Environmental engineer technician
- Biomass plant designer, manager, technician
- Utility plant operatives
- HVAC/ building automation technician controls specialist
- Refuse and recycling worker
- Sustainable agriculture specialist
- Groundwater heat pump contractor/installer
- Wave power system designer/installer
- Forestry & wildlife worker



Key Government Initiatives

- U.S. Department of Education - Sustainability Summit
- Green Ribbon Schools
- Funds from multiple federal agencies in energy/environment/climate change – Environmental Protection Agency (EPA), National Science Foundation (NSF), National Oceanographic and Aeronautics Association (NOAA), etc.
- Sustainability in STEM (Science, Technology, Engineering and Math)



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Resource Center

- [▶ Solar](#)
- [▶ Wind](#)
- [▶ Green Building](#)
- [▶ Energy Efficiency](#)
- [▶ Sustainability Education](#)
- [Additional Sectors](#) COMING

Colleges In Action

Submit Resources: Contribute curricula to the SEED Center wiki. Green resources by faculty, for faculty. [Submit now.](#)

The SEED Center is a **leadership initiative**, **resource center**, and

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A more comprehensive way of looking at education for a sustainable future

1. Everyone interacts with the planet and the ecosystems we depend upon for life.
2. Everyone has an important role to play in helping to create a sustainable future.
3. Some of the most crucial jobs haven't been created yet, so we have to understand the potential sustainable economy to predict it and contribute to its strength.
4. Not just green jobs, sustainability thinking.
5. Systems thinking, creating effective change.
6. High schools have a unique and important role that requires new curricula and pedagogy.
7. Technicians are needed and much more than that.



Sustainability THINKING and ACTION

1. All technology programs need to incorporate triple bottom line, sustainability principles, skills and applications into curricula, including construction, HVAC, automotive, culinary, retail, manufacturing, electrical and plumbing, health, all clusters, and the general education courses, too.
2. All students in all degrees need to be literate about our sustainability challenges and be able to engage in problem solving as consumers, employees, community members, and investors.
3. Lifelong learning for public – use the media. Students teaching the community.



Educating For Sustainability

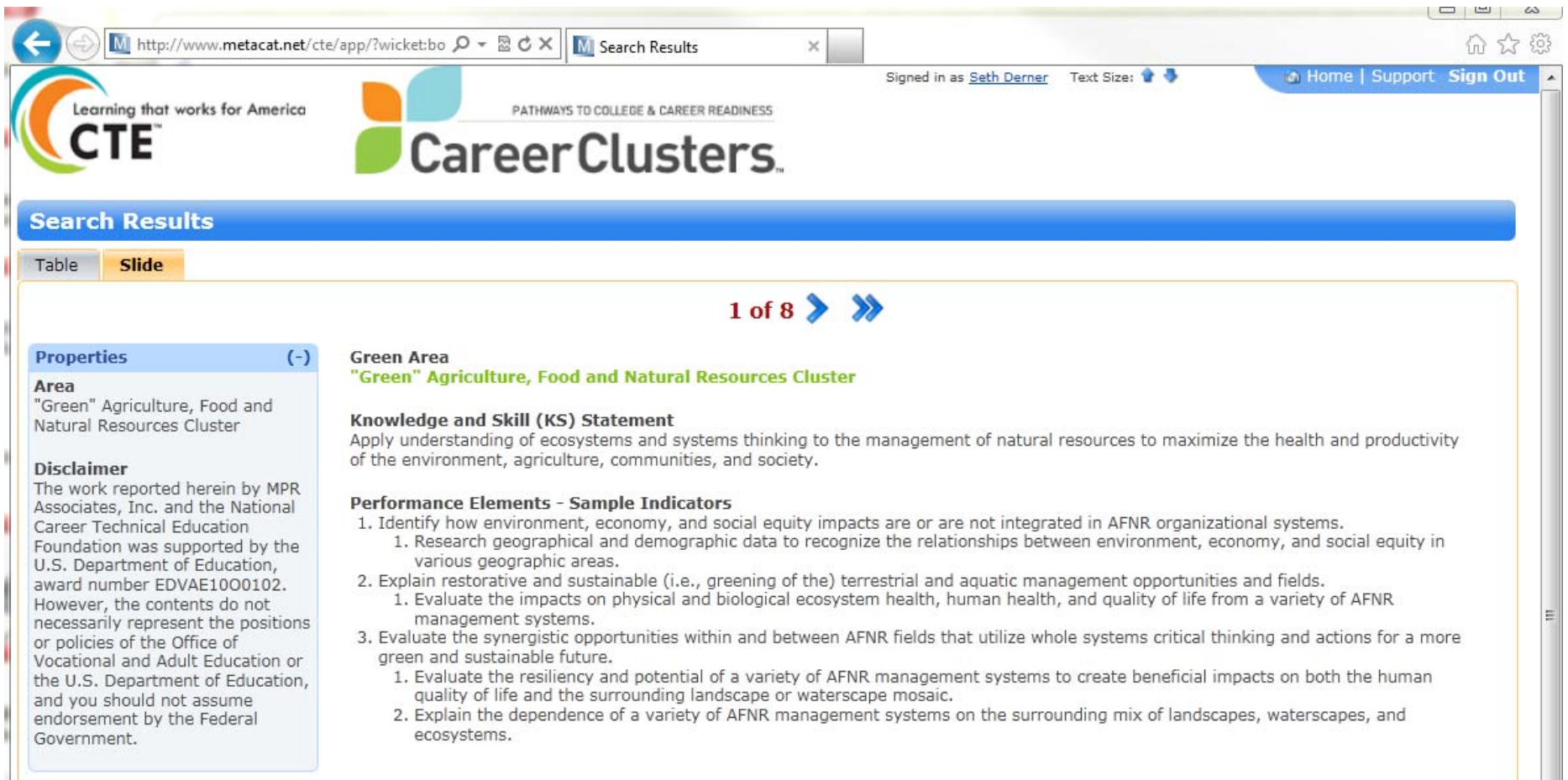
**Integrating environment, economy, and equity
through systems thinking
in all disciplines at all levels for all students**

“We hold Earth’s future in our hands. What will we decide?”

Pierre Teilhard de Chardin

Overview of the Standards Development Process

A “green” process -- Use of online, standards development portal



The screenshot shows a web browser window displaying the CareerClusters website. The browser address bar shows the URL: <http://www.metacat.net/cte/app/?wicket:bo>. The page header includes the CareerClusters logo and navigation links for Home, Support, and Sign Out. The main content area is titled "Search Results" and shows a "Slide" view of the first of eight results. The result is for the "Green Area" and includes the following information:

Green Area
"Green" Agriculture, Food and Natural Resources Cluster

Knowledge and Skill (KS) Statement
 Apply understanding of ecosystems and systems thinking to the management of natural resources to maximize the health and productivity of the environment, agriculture, communities, and society.

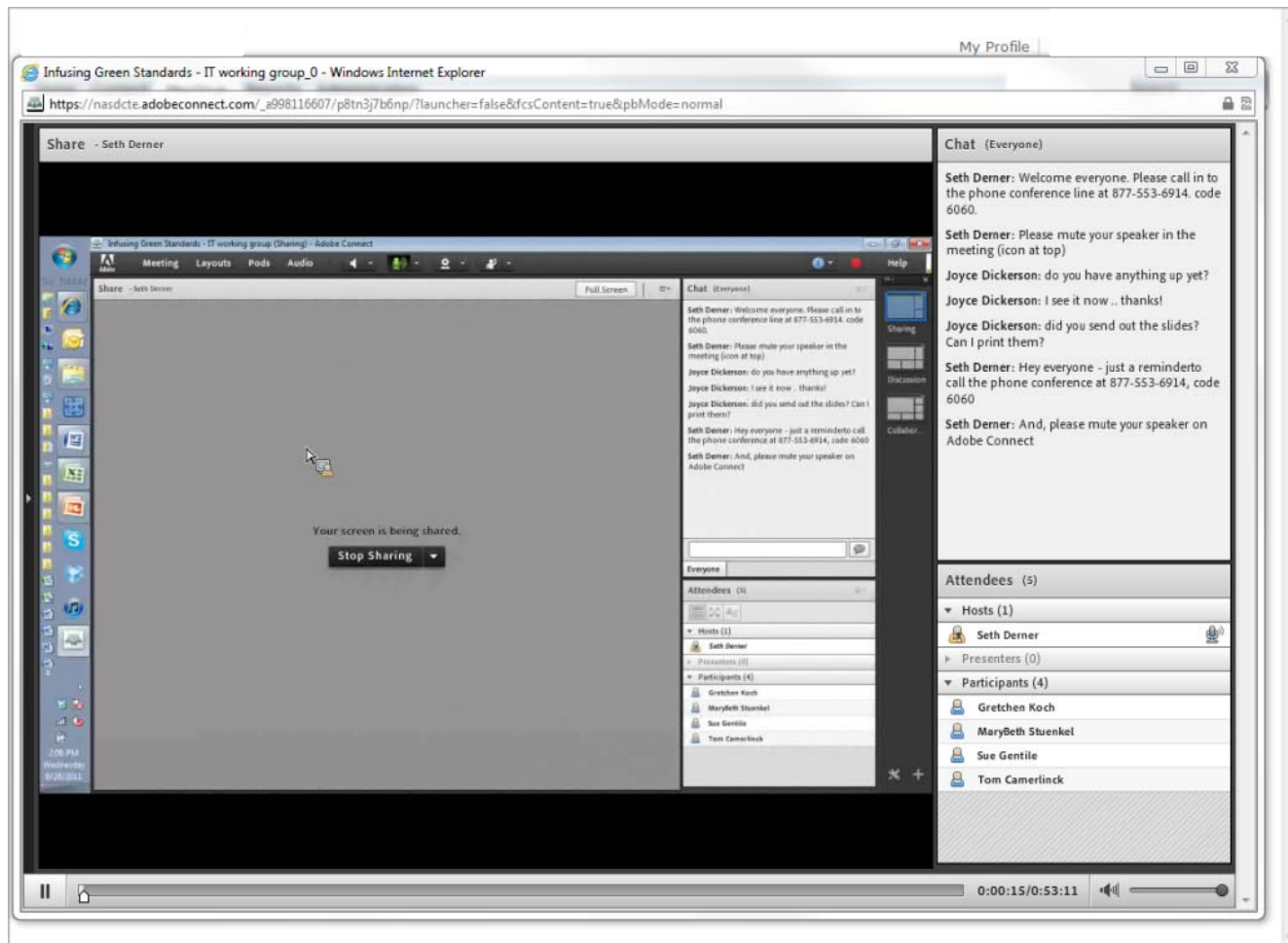
Performance Elements - Sample Indicators

1. Identify how environment, economy, and social equity impacts are or are not integrated in AFNR organizational systems.
 1. Research geographical and demographic data to recognize the relationships between environment, economy, and social equity in various geographic areas.
2. Explain restorative and sustainable (i.e., greening of the) terrestrial and aquatic management opportunities and fields.
 1. Evaluate the impacts on physical and biological ecosystem health, human health, and quality of life from a variety of AFNR management systems.
3. Evaluate the synergistic opportunities within and between AFNR fields that utilize whole systems critical thinking and actions for a more green and sustainable future.
 1. Evaluate the resiliency and potential of a variety of AFNR management systems to create beneficial impacts on both the human quality of life and the surrounding landscape or waterscape mosaic.
 2. Explain the dependence of a variety of AFNR management systems on the surrounding mix of landscapes, waterscapes, and ecosystems.

A sidebar on the left contains a "Properties" section with a minus sign, listing the "Area" as "Green" Agriculture, Food and Natural Resources Cluster and a "Disclaimer" stating that the work is supported by MPR Associates, Inc. and the National Career Technical Education Foundation, and is not necessarily endorsed by the U.S. Department of Education.

Overview of the Standards Development Process

A “green” process - use of virtual meeting technologies



Overview of the Standards Development Process

1. Initial training for TWG members
2. Individual study, discovery and contributions via online portal
3. TWG discussion and evaluation of initial offering
4. Revisions by SMEs and project coordinator
5. Additional revisions by TWG individuals via portal
6. Additional TWG meeting to discuss and evaluate

Overview of the Standards Development Process

7. Revisions by SMEs and project coordinator
8. Final review by TWG individuals
9. Copy editing
10. Validation and review via national, online process
11. Review by Career Cluster™ National Advisory Committees (if applicable)
12. Additional edits, if any made and reviewed by TWG
13. Final layout and design for access via portal and website

Explanation of the Standards Format

- Use the existing Career Cluster™ Knowledge and Skill Statements as the model
 - Knowledge and Skill Statement (Standard)
 - Performance Element – definition of performance
 - Sample Indicators – examples of tasks or products

GREEN/SUSTAINABILITY STANDARDS			
TRANSPORTATION, DISTRIBUTION, AND LOGISTICS CLUSTER—TRANSPORTATION SYSTEMS/INFRASTRUCTURE PLANNING, MANAGEMENT, AND REGULATION PATHWAY			
	KNOWLEDGE AND SKILL STATEMENT	PERFORMANCE ELEMENT	SAMPLE INDICATORS
1	Understand the relationship among systems, equipment, and human behaviors related to environmental and human health.	1. Use systems thinking to address a problem or issue with transportation systems and infrastructure. 2. Identify effective strategies to influence human behavior in ways that lead to greater transportation efficiency.	1a. Explain the relationship of people, systems, goods, vehicles, and the environment in a given situation. 1b. Find examples of changes to transportation systems and infrastructure where there is evidence of systems thinking. 2a. List human behaviors that impact transportation systems and infrastructure. 2b. Describe strategies that have influenced behavior and led to greater transportation efficiency.

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Explanation of the Standards Format

Keys to Remember

- Industry expectations still emerging
- First generation standards
 - Grain size
 - Terminology
 - Appropriate scope and depth
- Includes skills for specific green careers and the green skills needed for existing careers as expectations change.

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REVIEW OF STANDARDS – BY CAREER CLUSTER™

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Green/Sustainability Standards: All Career Clusters™

1. Define the following key terms and explain their relationship to one another:
 - Green
 - Green job
 - Sustainability
 - Sustainable development
2. Define the following core concepts of sustainability and green efforts/initiatives and explain how these concepts can contribute to the ability to solve societal, environmental and business problems while creating a more sustainable future.
 - Triple Bottom Line for business
 - Cradle-to-cradle resource use
 - Materials life-cycle analysis

Green/Sustainability Standards: All Career Clusters™

3. Define and use the following enabling concepts of sustainability and green efforts/initiatives
 - Precautionary principle
 - Ecosystem services
 - Ecological footprint
 - Tragedy of the Commons
 - Systems thinking
 - Unintended Consequences
 - Quality of life indicators
4. Utilize problem-solving skills to address a real world opportunity to help create healthier ecosystems and communities while protecting or increasing organizational health.

Green/Sustainability Standards: Agriculture, Food & Natural Resources

1. Apply understanding of ecosystems and systems thinking to the management of natural resources to maximize the health and productivity of the environment, agriculture, communities, and society.
2. Analyze community practice or policy development related to sustainability in AFNR.
3. Communicate the impact of “green” and sustainability principles on agriculture, food and natural resource systems.
4. Recognize the social, health, environmental, and economic costs and benefits of renewable energy production (e.g., solar, wind, and biofuels) in comparison to non-renewable energies (e.g., coal, oil, and natural gas).

Green/Sustainability Standards: Agriculture, Food & Natural Resources

5. Analyze energy usage, renewable energy options, and renewable materials options to promote sustainable practices across AFNR.
6. Use green technologies and sustainability practices to maintain safe and healthful working environments that sustain the natural environment and promote well being in the AFNR workplaces
7. Demonstrate an understanding of green and sustainability trends that are impacting processes and markets in AFNR.

Green/Sustainability Standards: Agriculture, Food & Natural Resources

8. Apply adaptive ecosystem management to a common pool resource (e.g., an irrigation system or fishing grounds) problem which addresses ecological (data, models, concepts, understanding and scientific responsibilities), socioeconomic (values, interests, information, assets, private sector responsibilities), and institutional (law, policies, authority, assets, public sector responsibilities) contexts.

Green /Sustainability Standards: Architecture & Construction

1. Understand the overarching significance of the building industry—design, construction and operation/maintenance—in humankind’s global “footprint” on the environment (*e.g.*, impact on air, food, water, biodiversity, medicine, energy and other ecosystem services).
2. Use integrated design process to accomplish green and sustainable outcomes in architecture and construction applications.
3. Examine the impacts on environmental and societal conditions over the life cycle of a building including frequently overlooked externalities (*e.g.*, pollution, health impacts on humans involved in material procurement, humans using the building, and environmental degradation).

Green/Sustainability Standards: Architecture & Construction

4. Evaluate the benefits and costs of green and sustainable applications in design, construction, and maintenance of the built environment.
5. Employ materials and components that are required to make the built environment more sustainable.
6. Understand options to reduce energy loads and use “green” energy sources for building applications.
7. Appreciate the regional aspects of green and sustainable building design and construction.

Green/Sustainability Standards: Architecture & Construction

8. Communicate the value of green and sustainable practices in architecture and construction to co-workers and clients.
9. Understand the standards, regulations and codes intended to create a more green and sustainable built environment.

Green/Sustainability Standards: Information Technology

1. Assess, explain, and measure how IT can be used to advance and/or enable green and sustainability measures.
2. Consider impact on human health and the environment related to IT manufacturing and disposal.
3. Consider the entire life cycle of computing components and their impact on the environment.
4. Employ behavioral change models to change the culture of the organization to integrate sustainability with IT.
5. Evaluate data center energy use, and use power usage effectiveness (PUE) and other measurements that define the environmental impacts of a data center.

Green/Sustainability Standards: Information Technology

6. Evaluate energy sourcing (including renewable and nonrenewable sources) required for IT infrastructure.
7. Explain and measure the impact IT decisions have on the environment, social conditions, and financial viability of an organization.
8. Explain green and sustainable IT policies and standards that relate to reducing permanently damaging environmental, social, and financial/economic impacts.
9. Understand and employ strategies to reduce the negative impacts of IT infrastructure on an organization's energy use.
10. Understand the impacts of an organization's storage needs (*e.g.*, virtual, archived, offline, online, physical) on green/sustainability efforts.

Green/Sustainability Standards: Manufacturing

1. Communicate the benefits of applying green and sustainability principles to manufacturing.
2. Understand the state of green and sustainability efforts in U.S. manufacturing as compared with those in other countries.
3. Demonstrate how to make the business case for green and sustainability decisions throughout manufacturing.
4. Demonstrate problem solving using sustainability skills.

Green/Sustainability Standards: Manufacturing

5. Understand and demonstrate how environmental, economic, and social sustainability are interrelated with regard to manufacturing.
6. Understand and explain existing and emerging standards, metrics, and best practices for green and sustainable manufacturing.

The following industry and curriculum resources were used as reference materials in support of completing the work of this project. Manufacturing Skills Standards Council (MSSC), May 2011, Production Standards, www.msscusa.org. Manufacturing Skills Standards Council (MSSC), October 2011, Green Production Standards, www.msscusa.org. Additional resources, assessments, certifications, and other professional development tools may exist to support engagement and implementation from the original sources.

Green/Sustainability Standards: Science, Technology, Engineering & Math

1. Understand and explain the concept of sustainability as it applies to STEM career fields.
2. Apply STEM concepts to determine both detrimental and beneficial (“green” and sustainable) behaviors, and identify/create solutions to environmental threats (e.g., chemical toxicity in the environment, water and air quality degradation, climate change, and carbon emissions) and human welfare issues (e.g., poverty reduction, access to clean water and air and healthy food, quality of life indicators).

Green/Sustainability Standards: Science, Technology, Engineering & Math

3. Apply communication strategies that incorporate principles of sustainability, as they relate to STEM, in oral, written, or visual formats to impact community practice and/or policy development.
4. Practice thoughtful consideration of green and sustainability issues related to STEM.
5. Apply principles of green/sustainability to professional activities.

Green/Sustainability Standards: Transportation, Distribution & Logistics

1. Understand the role of human behavior in planning and managing green and sustainability efforts in U.S. transportation, distribution, and logistics.
2. Explain the economic costs and benefits for green and sustainability initiatives in transportation, distribution, and logistics.
3. Understand the role of technology in advancements that promote sustainability in transportation, distribution, and logistics.
4. Understand the social and environmental impacts of business model choices in transportation, distribution, and logistics.

Accessing Standards and Resources

Accessing the Green Standards

- PDF form – for easy review and distribution
- Searchable, sortable and downloadable form

Found at: www.careertech.org/career-clusters/green

Accessing Standards and Resources

Resources

- SMEs and TWGs identified valuable resources to assist in understanding and teaching Green Standards.
- Resources provided at www.careertech.org/career-clusters/green
- These resources cataloged by the SEED Center – they will maintain and add to resources over time

Accessing Standards and Resources

Notes

- Green K & S presented as supplemental compendium separate document (PDF)
- Green K & S also included with online CTE standards database
- States may be able to have CTE standards portal directly populate state database
- NCTEF will assume responsibility for maintaining and updating Green K & S

Accessing Standards and Resources

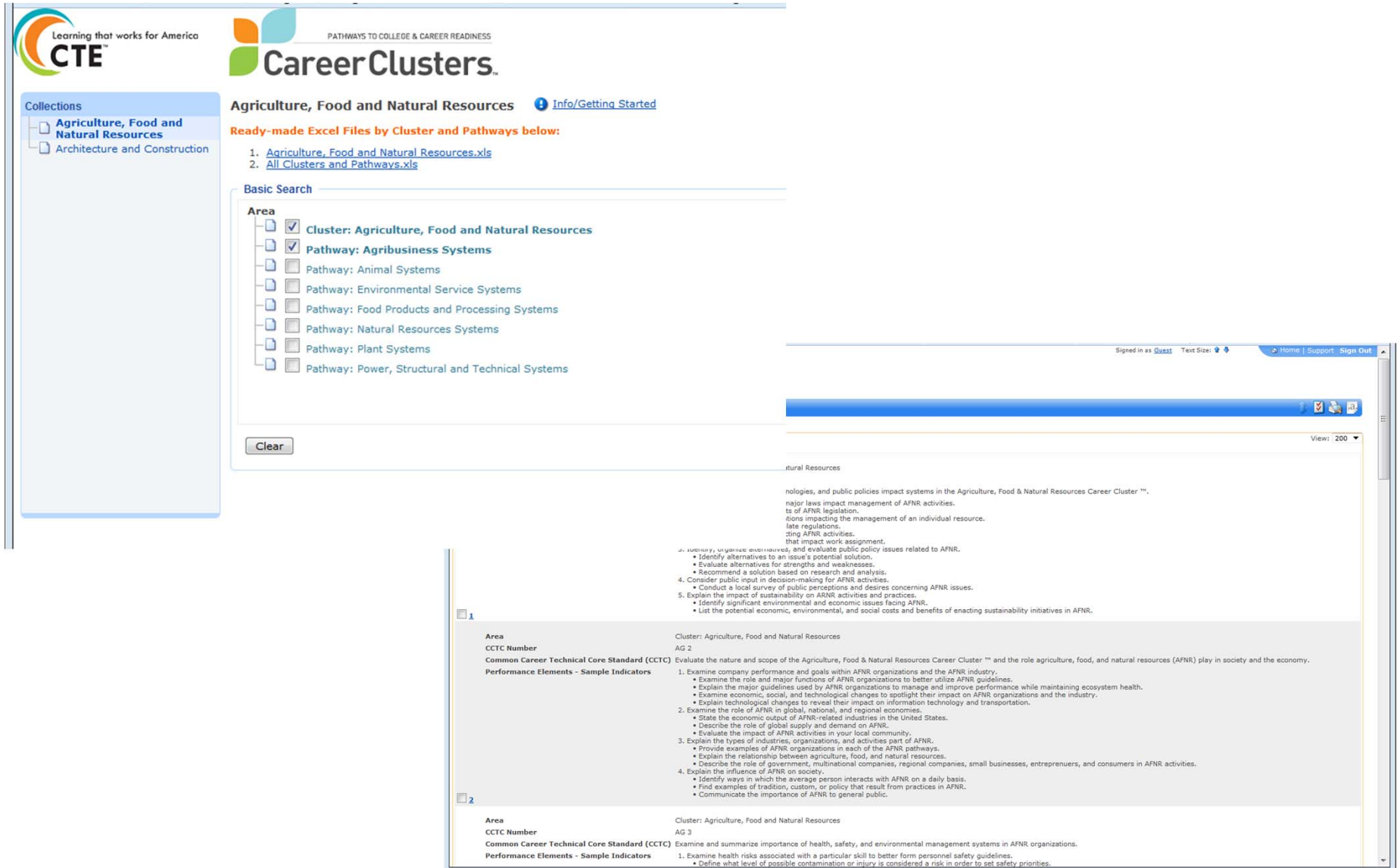
The screenshot shows the SEED center website interface. At the top, there is a navigation bar with links for Home, Help, Contact, and Member Directory. The main header features the SEED center logo (Sustainability Education & Economic Development) and an AACSB logo. A search bar and a 'SUBMIT RESOURCES' button are also present. Below the header is a horizontal menu with categories: ABOUT SEED, MEMBERSHIP, RESOURCES (highlighted), SHARING COMMUNITY, COLLEGES IN ACTION, SUPPORT, and NEWS & EVENTS.

The main content area includes several sections:

- How to Navigate This Website (Video)**: A blue button.
- SEED Resources**: A green box containing 'Webinars & Other SEED Resources Developed by AACSB & SEED Partners'.
- Resource Center**: A green box with a list of categories: Solar, Wind, Green Building, Energy Efficiency, Sust. Ag., Food & Land (marked 'NEW'), Transportation & Fuels (marked 'NEW'), and Sustainability Education. An 'Additional Sectors' link is marked 'COMING'.
- Featured Resource**: A green box with a tree icon.
- Video Greeting**: An orange box featuring a video of Arne Duncan, U.S. Secretary of Education, endorsing SEED. It includes a 'DOWNLOAD NOW' button.
- SEED Launches Two New Sectors!!!**: A blue box with icons and text: 'The AACSB's SEED Initiative officially invites you to explore our new curated collection of resources that can help educators develop and enhance quality green job training programs and courses in Sustainable Ag., Food & Land and Transportation & Fuels.'
- Connect**: An orange box with social media icons, 'Newsletter Sign-up', 'Read Past Newsletters', and a 'Sign-in/Register' form with email and password fields.
- Member Colleges**: A blue box showing '4' member colleges, with 'Elgin Community College' listed, and a 'BECOME A MEMBER COLLEGE' button.
- Colleges In Action**: A blue box featuring 'Cedar Valley College' and 'DALLAS COUNTY COMMUNITY COLLEGE DISTRICT' with a 'READ MORE' button.

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Online Database



The screenshot displays the CareerClusters Online Database interface. At the top left, the CTE logo and the text "Learning that works for America" are visible. The main header includes the CareerClusters logo and the text "PATHWAYS TO COLLEGE & CAREER READINESS".

Collections:

- Agriculture, Food and Natural Resources
- Architecture and Construction

Agriculture, Food and Natural Resources [Info/Getting Started](#)

Ready-made Excel Files by Cluster and Pathways below:

- [Agriculture, Food and Natural Resources.xls](#)
- [All Clusters and Pathways.xls](#)

Basic Search

Area

- Cluster: Agriculture, Food and Natural Resources
- Pathway: Agribusiness Systems
- Pathway: Animal Systems
- Pathway: Environmental Service Systems
- Pathway: Food Products and Processing Systems
- Pathway: Natural Resources Systems
- Pathway: Plant Systems
- Pathway: Power, Structural and Technical Systems

Search Results:

View: 200

1

Area: Cluster: Agriculture, Food and Natural Resources
CCTC Number: AG 2
Common Career Technical Core Standard (CCTC): Evaluate the nature and scope of the Agriculture, Food & Natural Resources Career Cluster™ and the role agriculture, food, and natural resources (AFNR) play in society and the economy.
Performance Elements - Sample Indicators

- Examine company performance and goals within AFNR organizations and the AFNR industry.
 - Examine the role and major functions of AFNR organizations to better utilize AFNR guidelines.
 - Explain the major guidelines used by AFNR organizations to manage and improve performance while maintaining ecosystem health.
 - Examine economic, social, and technological changes to spotlight their impact on AFNR organizations and the industry.
 - Explain technological changes to reveal their impact on information technology and transportation.
- Examine the role of AFNR in global, national, and regional economies.
 - State the economic output of AFNR-related industries in the United States.
 - Describe the role of global supply and demand on AFNR.
 - Evaluate the impact of AFNR activities in your local community.
- Explain the types of industries, organizations, and activities part of AFNR.
 - Provide examples of AFNR organizations in each of the AFNR pathways.
 - Explain the relationship between agriculture, food, and natural resources.
 - Describe the role of government, multinational companies, regional companies, small businesses, entrepreneurs, and consumers in AFNR activities.
- Explain the influence of AFNR on society.
 - Identify ways in which the average person interacts with AFNR on a daily basis.
 - Find examples of tradition, custom, or policy that result from practices in AFNR.
 - Communicate the importance of AFNR to general public.

2

Area: Cluster: Agriculture, Food and Natural Resources
CCTC Number: AG 3
Common Career Technical Core Standard (CCTC): Examine and summarize importance of health, safety, and environmental management systems in AFNR organizations.
Performance Elements - Sample Indicators

- Examine health risks associated with a particular skill to better form personnel safety guidelines.
 - Define what level of possible contamination or injury is considered a risk in order to set safety priorities.

Online Module and Guide

GreenStandardsIntro Resources



Click on a button to learn more



Overview

Background of Career Clusters™

The Need for Green Standards

Introduction to the Green Standards

Summary of Development Process



Application and Use of Green Standards

Module Home Screen

An Introduction to the Green/Sustainability Standards for Career Clusters™

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◀ PREV

Guide for Implementing Green Standards in the Career Clusters

¶

1. Introduction to the Green Standards for Career Clusters™

The Office of Vocational and Adult Education, U.S. Department of Education, sponsored this effort to infuse green standards into the Career Clusters™ knowledge and skills statements. These green/sustainability-related statements can be used by state and local education agencies to inform sequences of academic, career, and technical courses and training. Green/Sustainability Standards provide supplemental standards that could be infused into the Career Clusters™ Knowledge and Skills Statements and/or Common Career Technical Core standards for CTE programs of study and courses.¶

Green Standards (also referred to as the Green/Sustainability Standards or Green/Sustainability Knowledge and Skills) have been identified to assist states and local programs to prepare individuals for an economy attuned to green and sustainability efforts by developing a set of green/sustainable knowledge and skills that apply across all Career Clusters™.¶

Further, the initiative developed additional standards specifically for six Career Clusters™ that

Discussion of Standards Use

- Primary opportunities for using the standards
- Integration and infusion opportunities
- Alignment with emerging state and association efforts
- Additional resources and tools

Using the Standards in Courses

- Add into courses:
 - “How can you use what we are learning to make the world a better place?”
 - “How could we create these products and processes using sustainable practices?”
 - “How could we make these products and processes more sustainable?”
- Create a real world problem solving project so students can help their communities become more environmentally sound and sustainable

Using the Standards in Courses

- Integrate these green/sustainability standards into all learning objectives and assessments
- Ask textbook publishers to include these in the next revision
- Work with your school district to include these sustainability knowledge and skills in all STEM courses
- Work with your school district to include these sustainability knowledge and skills in social sciences and humanities as well
- Create a wiki or learning community about how to integrate sustainability into courses

Other Resource Sites

Disciplinary Associations Network for Sustainability – Resources page

<http://dans.aashe.org/content/resources>

Sustainability Improves Student Learning

<http://www.aacu.org/pkal/disciplinarysocietypartnerships/sisl/index.cfm>

Questions and Answers



Thank you!

Presenters

Debra Rowe

dgrowe@oaklandcc.edu

Dean Folkers

dfolkers@careertech.org