The work reported herein was supported under the National Research Center for Career and Technical Education, PR/Award (No. VO51A070003) as administered by the Office of Vocational and Adult Education, U.S. Department of Education. 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.

National Research Center
University of Louisville
James R. Stone III
Director
It is (or isn’t) easy to be “Green”
Part of a larger POS agenda

• A Longitudinal Study of the South Carolina Personal Pathways to Success Initiative
• Rigorous Test of Student Outcomes in CTE Programs of Study
• Programs of Study: A PS Longitudinal Analysis – Backward Mapping
Agenda

• What is green?
• The green economy
• The nature of green employment (the new “high tech?”)
  • Green enhanced demand occupations
  • Green enhanced skills occupations
  • New and emerging green occupations
• Implications for Career and Technical Education
  • New green programs
  • Expanding existing green programs
  • Greening of existing programs
The Green Context

Demand is growing for products and services that:
- Leverage renewable energy sources
- Conserve energy and natural resources
- Reduce greenhouse gas emissions and pollution
- Repurpose waste

The drivers of this new business activity include:
- Public policy: new standards and incentives
- Volatile fuel costs
- Conservation efforts as a recession buffer
- Growing concern about global climate change
- Reduce dependence on foreign, non-renewable energy sources
Growth in Green Investment

Venture Capital Investment in Clean Technology
UNITED STATES
Millions of Dollars Invested

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dollars Invested (Inflation Adjusted)</td>
<td>$0</td>
<td>$1,000</td>
<td>$1,200</td>
<td>$1,500</td>
<td>$2,000</td>
<td>$3,000</td>
<td>$4,000</td>
<td>$5,000</td>
<td>$5,700</td>
<td>$7,000</td>
</tr>
</tbody>
</table>

+51%
The Green Economy
The Green Economy: Green sectors  (Dierdoff et al, 2009)

- Renewable energy
- Energy efficiency
- Green construction
- Energy trading
- Energy and carbon capture and storage
- Research design and consulting
- Environmental protection
- Agriculture and forestry
- Manufacturing
- Recycling and waste reduction
- Government and regulatory administration
- Transportation
Career Categories: Claiming Turf

- Wind Power
- Solar Power
- Organic Farming
- Natural Building
- Mass Transit
- Hydropower
- Holistic Alternative Medicine
- Green Engineering
- Geothermal Power
- Energy Efficient Automobiles
- Environmental Science
- Conservation Sustainability
- Clean Energy
- Cellulosic Biofuels
- Carbon/Co2 Emissions
- Building Retrofitting

- Energy-efficient building, construction and retrofits;
- Renewable electric power;
- Energy-efficient and advanced drivetrain vehicles;
- Biofuels;
- Deconstruction and materials use;
- Energy efficiency assessment industry;
- Manufacturers
Green Employment: Myth vs Reality

Estimated 750,000 "green jobs" in 2006 (The Obama Administration wants to create 5 million NEW green jobs over 10 years)

Context
- 156,000,000 (2007) estimate of labor force
- Current green employment is .005 of the workforce (or .05%)
- Goal would lift this to 3% of current workforce levels

http://www.time.com/time/health/article/0,8599,1809506,00.html
Retrieved 11/14/2009

Economic Growth between 1998 and 2007

- Green Jobs vs Total Jobs
- Denominators Matter

Green Skills

Figure 2. Skills Sought by Green Jobs Employers

- Sustainability
- Green technologies
- Green standards
- Green processes
- Life cycle analysis

Learned in tandem with core skills

Source: John J. Heldrich Center for Workforce Development, 2009.
Increased employment demand for an existing occupation: changed context but no change in skills
Blue today; Green tomorrow

**Blue Collar**
- Mfg: working on an SUV in a Ford plant
- Mfg: welding a boiler for a coal fired energy facility
- Truck driver
- Electrician
- Computer tech?
- Many others...

**Green Collar**
- Mfg: working on a hybrid in a Ford plant
- Mfg: welding the components for a wind energy machine
Green enhanced-skills for existing occupations

Significant change to the work and worker requirements of an existing occupation
Changing the work requirements

Old tech
- Roofer
- HVAC
- Salesperson
- Pool installer
- Travel planner/tour guide
- Architect
- Coal company attorney

Green tech
- Solar & PV Installer
- Solar hot water installer
- Solar radiant heat installer
- Solar sales
- Solar-thermal installer
- Eco-tour guide
- LEED certified architect
- Environmental lawyer
New & Emerging Green Occupations

Creation of unique work and worker requirements; new generation of a new occupation OR one born of existing Occupation.
New Green Jobs

• “Green” jobs should “contribute substantially to preserving or restoring environmental quality”. (UNEP, 2008)

• (Elements) Provide products/services that promote renewable resources, reduce pollution; exist in skilled trades and professional occupations; provide a fair, living wage and support local economy (NASDCTEc, 2009)

• (most) Green jobs are “middle skill” jobs—cannot be outsourced.
Examples of New Green Jobs

- Solar operations engineer
- Solar lab technician
- Photovoltaic fabrication testing technician
- Energy retrofitting
- Waste composting
- Green landscaping
- Whole home performance analysts
- Hybrid car maintenance
Three green effects on the workplace

Three green responses from CTE
Greening CTE Programs

Greening Programs of Study
Greening CTE Curricula
Creating NEW green CTE programs
Green *Programs of Study*: Sample of Certification Providers

- Association of Energy Engineers (HVAC, Geothermal)
- North American Board of Energy Practitioners (Photovoltaic & solar thermal installers; enhanced construction and trades)
- Building Performance Institute (Building analysts, systems design, energy efficiency, renewable energy)
- Energy Star (Building contractors-efficient building design)
- Solar Energy International (Renewable Energy)
- Green Building Certification Institute (LEED Accreditation)
State Technical Assistance Academy for Career and Technical Education

Green-Focused Programs of Study

- Georgia
- Illinois
- New Jersey
- Ohio
- Oregon
Example from one state

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

- Industry Partners Include:
  - American Electric Power
  - Solid Waste Authority
  - Department of Agriculture
  - POET Biorefining
Example 2

Bio-Products

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

Industry Partners Include:

- Univenture
- University Bioproducts Innovation Center
- Channel Bio Corporation
Example 3

Precision Agriculture for Sustainability
- Sustainable production practices
- Production efficiency
- Energy Reduction
- Reduce dependence with demand growing

• Industry Partners Include:
  - Agricultural Research and Development Center
  - Farm Bureau
  - Agriculture Technical Institute
Potential for supporting low income workers

**NJ Place Program**
- NJ Council of CCs & NJ DOL
- CCs and Unions developed program to obtain national accreditation of union apprenticeships to build “stackable” credentials leading toward Associates degree

**Los Angeles**
- Green Careers Training Initiative
- Apollo Alliance & City’s Green Retrofits program
- Creation of Green Career Ladders
Greening CTE Curricula

- Sustainability
- Green technologies
- Green standards
- Green processes
- Life cycle analysis

Figure 2. Skills Sought by Green Jobs Employers

Source: John J. Heldrich Center for Workforce Development, 2009.
Potential NEW green CTE programs

Adapt Existing

- Plumbing (retrofitting)
- Bio-diesel production
- Green landscaping (Xeriscaping)
- Air conditioning specialist
- Green building/LEED certification
- Horticulture/environmental technology

Create New

- Home energy auditor
- Pollution control technician
- Home solar power
- Home weatherization management
- Lighting efficiency
- Energy management tech
- Sustainable design
- Alternative fuels tech
Green Challenges

- Ownership
- Evangelical spirit
- Green collar inflation
For more information, contact:

James R. Stone III
Director NRCCTE

James.Stone@nrcccte.org
www.nrcccte.org