Green Focused Programs of Study
Technical Assistance Academy

Academy for Educational Development
MPR Associates, Inc.
National Association of State Directors of Career Technical Education Consortium
for the
National Research Center for Career and Technical Education

ACTE Annual Convention
Las Vegas, NV
December 2010
Purpose:
- Develop green-focused Programs of Study (POS)
- Develop and build replicable implementation models to bring POS to scale within states

Facilitators:
- Work with state team over 10-month period
  - Regular Communication
  - State Meetings
  - TA Academy in DC
Experts:

- Consultants
  - POS
  - Green CTE, Industry

In-state meetings

Three-day facilitated TA Academy in Washington, DC

Career Clusters Institute: Presented state model and implementation process
Self Assessment

DIAGNOSTIC TOOL:

• Reflect on POS implementation progress under each component
• Identify critical strengths and weaknesses related to POS
• Identify where the TA Academy and expert consultants could most benefit the state
• Support facilitator in guiding state team’s work
• Establish priorities for POS model design
• Promote state conversation about:
  • State progress on POS components
  • POS components state should focus on
  • Components that needs further assistance to improve POS
Self Assessment cont’d

• Foster collaboration and builds commitment among stakeholders

• Build an understanding of high quality POS models

PROCESS:

• Assess state progress in achieving POS components

• Based on initial OVAE Design Framework

• Identify key POS stakeholders to complete self-assessment
A Program of Study is a comprehensive, structured approach for delivering academic and career and technical education to prepare students for postsecondary education and career success.
POS Components

• Legislation and Policies
• Partnerships
• Professional Development
• Accountability and Evaluation Systems
• College and Career Readiness Standards
• Course Sequences
• Credit Transfer Agreements
• Guidance Counseling and Academic Advisement
• Teaching and Learning Strategies
• Technical Skills Assessments
Cost Coverage

NRCCTE

- Facilitators

- TA Academy in DC
  - Travel and per diem for eight team members
  - Small stipend to support in-State meetings

- Career Clusters Meeting
  - Travel and per diem for three team members
State Responsibilities

States

• Time for state team members

• Convene series of state team meetings – cover meeting related expenses

• Communicate and market state plan

• Begin to implement POS model in 2010-2011 academic year
Action Plan

PURPOSE:

• A living document that provides a detailed plan for building and implementing state green-focused POS model(s)

PLAN COMPONENTS:

• Objectives – what the state plans to achieve
• Activities – work to be undertaken to achieve objectives
• Timeline – dates activities will be accomplished
• Outcome(s) – what state products will be
• Responsible parties – who is accountable for accomplishing activities
• Resources needed
<table>
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<tbody>
<tr>
<td>Georgia</td>
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<td>Ohio</td>
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</tr>
<tr>
<td>Oregon</td>
<td>Sustainable Building</td>
</tr>
</tbody>
</table>
Outcomes

- State action plans
- Final plan for POS rollout
- States implement POS in 2010-2011
- Final products address state specific contexts and needs
  - Responsive to political and economic factors by adapting outcomes and timelines
Legacy

Outcomes

• States developed POS model

• State will implement POS

• Planning materials applied to new POS

• States serve as resources for others (including LEAs within the state and other states)
Legacy Documentation

• Final state products collected and archived

• Planning resources and content cataloged and disseminated

• Content resources on green and POS collected, archived, and disseminated

• Summary memo detailing lessons learned

• Available on NRCCTE Website
Next Steps

• Publish documentation report

• Case study of model development and implementation process

• Continue facilitated work with sites

• Work with new RPOS sites
Follow-up and Questions

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NEW JERSEY’S GREEN PROGRAM OF STUDY:

SUSTAINABLE DESIGN, CONSTRUCTION AND ENERGY

Marie Barry
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NJ Goals for National Academy

1. Meet emerging demands for green workforce
2. Collaborate to develop a model that can be shared statewide
3. Focus on “programs of study” linking secondary/postsecondary education

The project is supported under the National Research Center for Career and Technical Education, PR/Award No.VO51A070003 administered by the Office of Vocational and Adult Education, U.S. Department of Education.
Development Team

- State education and workforce officials
- CTE educators
- Community college representatives
- Industry representatives (PSEG, NJ Building Trades, LEED-certified architect)
Green Program of Study Will Include:

- Academic content
- Work-readiness and technical skills
- Green skills and knowledge
- Job-specific skill development
- High school to college sequence
Focus on Energy Efficiency Sector

57% of current green jobs are in energy efficiency

- Utilities/energy engineers
- Electricians
- Carpenters
- Plumbers/pipefitters
Focus on Energy Efficiency Sector

57% of current green jobs are in energy efficiency

- Construction managers
- Energy auditors
- CAD/Drafters
- HVAC Technicians
Sustainable Design, Construction and Energy

Linkages to existing collegiate programs and apprenticeships

- Architecture/design
- Engineering
- Energy utility technicians
- Building trades
Three Programs in One

Three pathways share common foundation

- Sustainable architecture and design
- Green construction
- Energy for sustainable future

In Architecture and Construction cluster and STEM cluster
Sustainable Architecture & Design

Careers in

• Architecture
• Engineering
• Design
• CAD/Drafting
• Land-use planning
• Public policy
Green Construction

Careers in:

- Residential/commercial construction
- Project management
- Energy efficiency
- Craft specialties (carpentry, electrical, plumbing, insulation, and HVAC)
- Building safety and inspection
Energy Efficiency

Careers as:

• Utility managers
• Energy auditors/raters
• Engineers
• Meter installation and technicians
• Energy installation, repair & maintenance technicians
• IT/Computer specialists
Foundational Content (Grades 9-12)

All three pathways will cover:

- Academic content -- language arts, math, science, social studies
- Sustainability, environmental science, energy efficiency, and renewable energy
- Work readiness skills
- Cross industry skills
Industry and Job-Specific Content

Non-duplicated sequence of courses for 3 pathways:

- Math and science sequence for each pathway
- CTE — technical and work readiness skills
- Pathway-specific green skills and knowledge

Trying to identify linkages to two-year and four-year college programs and/or apprenticeships
Green Skills & Cross-Industry Knowledge

Workplace Competencies & 21st Century Skills

Academic Competencies

Personal Effectiveness
Pathway Advisory Groups

- An advisory group for each pathway allows broad involvement by industry, colleges, and schools
- More than 40 partners are involved
State Support following Academy

- Curriculum development
- Selecting Pilots in six school districts
- Summer professional development
- Website
- Consultants
Grade 9 Curriculum

Introduction to all three pathways

Developed by team of CTE and academic teachers (summer 2010)

Two courses:

- Science and Sustainability
- Green Careers Exploratory
Science and Sustainability

- Natural Systems
- Human Connections to Physical and Natural World
- Sustainability Values, Citizenship and Responsibility
- Balancing Environment, Society and Economics
Green Careers Exploratory

- Green job overview
- Green construction
- Sustainable architecture and design
- Energy for a sustainable future
- Computer applications
6 Pilot Sites for 2011

- $6,000 stipends – 2 years
- Funding to support implementation and summer training for teachers
- Seeking a mix of CTE centers and comprehensive high schools
- May implement one or more pathways
Pilot Sites

- Will test curriculum, provide feedback and further program development
- Must commit to program of study implementation
- Pilots should become a professional learning community
www.NJGreenProgramofStudy.org

NJ GREEN PROGRAM OF STUDY
For Sustainable Design, Construction & Energy

Information Session
December 10
Success So Far

- First collaborative program effort for NJ
- Commitment to program of study model
- Strong industry involvement
- Colleges at the table
- Strong interest among school districts
Challenges

- Statewide articulation
- Slow pace of gaining consensus on content
- Lack of resources
- Maintaining momentum with limited staff
- Time
Contact

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Georgia
Green-focused
Programs of Study: Energy Systems

Covering the Team, Process, Perspectives and Plan for making Georgia Greener with High Skill, High Wage, High Demand careers
Georgia’s Growing Green Team

More than 40 active members on team including State Board Members, Legislators
Current Situation

- Georgia is in need of developing a focused consciousness for preparing workforce for green-focused careers
  - Pockets of efforts underway sporadically in state; Some green industries closed with stymied economy
- Systems committed to green-focused program of study for secondary and post-secondary students
  - first LEED Silver Certified Public High School in Georgia in urban school system
  - Rural school system building green-related career academy
  - Energy company committed to support LEA systems
  - Start in middle school with focused career development, CTE foundational skills that align to high school career pathways
  - High school students complete end of pathway assessments, graduate high school ready for success in college, workforce, military or professional degrees
  - Seek opportunities for satisfying high skilled, high wage, high demand careers
PROGRAM OF STUDY DESIGN FRAMEWORK

Legislation and Policies

SECONDARY LEVEL

Guidance and Counseling
  Course Sequences
  Credit Transfer Agreements

Teaching and Learning Strategies

Technical Skills Assessments

POSTSECONDARY LEVEL

College and Career Readiness Standards
  Career Advisement
  Course Sequences

Partnerships

Professional Development

Accountability and Evaluation Systems

CREDENTIALS
Self-Assessment: Accomplished

- Legislation passed for dual enrollment opportunities for juniors, seniors (MOWR)
- 2 new laws focus on 6-12 career development
  - One law targets dual enrollment, seamless alignment, TAA, annual documented IGP
- State Legislators meet with Advisory Committees twice a year for program updates
- New and enhanced career guidance and postsecondary web site launched for 7-12 students, parents, teachers, administrators
Self-Assessment: Challenges & Barriers

Georgia’s team dedicated to meet the challenges and remove barriers/silos as shown in data
- Sustainable Leadership and Shared Planning
- Partnerships among Education, Business Stakeholders
- Legislation and Policies
- Aligned Secondary and Postsecondary elements
- Credit Transfer Agreements
- Accountability and Evaluation

Progress already made in some areas
What Industry told us loudly

Need evident to focus on energy-related POS

Employment of 3,500 industrial construction workers and 800 technicians needed at nuclear power plant under construction in central GA

- Need to find Power Engineer graduates in Georgia
- Georgia Power goes to Puerto Rico for these employees currently
- Warner Robins Air Base seeking engineers elsewhere
- General Electric coming to Georgia – Smart Grid
- New Biomass Power Plants under construction
Get Into Energy (GIE) Career Pathways

Stakeholders and Modules

**Students**
- Get Into Energy Outreach and Career Coaching

**Educators**
- Career Pathways Curriculum and Stackable Credentials

**Employers**
- Employer Collaboration and Support

Students

Educators

Employers
Energy Competency Model

Tier 6-8 – Occupation-Specific

Tier 5 – Industry-Specific Technical
- Nuclear Generation
- Non-Nuclear Generation (Coal, Natural Gas, Oil, Hydro, Solar, Wind, Biofuel, Geothermal)
- Electric Transmission & Distribution
- Gas Transmission & Distribution

Tier 4 – Industry-Wide Technical
- Industry Principles & Concepts
- Safety Awareness
- Environmental Laws & Regulations
- Quality Control & Continuous Improvement
- Troubleshooting

Tier 3 – Workplace Requirements
- Business Fundamentals
- Team Work
- Following Directions
- Planning, Organizing & Scheduling
- Problem Solving
- Decision Making
- Working With Tools & Technology

Tier 2 – Academic Requirements
- Mathematics
- Reading
- Writing
- Listening
- Speaking
- Engineering & Technology
- Critical & Analytical Thinking

Tier 1 – Personal Effectiveness
- Interpersonal Skills
- Integrity
- Professionalism
- Motivation
- Dependability & Reliability
- Self-Development
- Flexibility & Adaptability
- Ability To Learn

www.CareerOneStop.org/CompetencyModel
Education Pathways: Energy Systems

Intern/Co-Op

Lanier Tech Electrical Utility Technology Associates Degree

Work Ready Certification & Engineering or Energy Systems Credential

High School Diploma or GED

Electrical Engineering Bachelor Degree

College / University Advanced Degree
Industry involvement in all phases of workforce development leading to employment
Secondary Program of Study

- Silver LEED Certified High School
- Accelerated Curriculum
- Energy System Career Pathway
- Environmental Investigations
- Service Learning
- Internship Programs
Low Emissions and Fuel Efficient Vehicles Only

Low Emissions and Fuel Efficient Vehicles Only
Preparing Students for Success

- Pathway Completion
- Internships
- Georgia Work Ready
- Post-Secondary...
What Is Your Career Pathway?

- Business: 21.6%
- Engineering: 26.0%
- Culinary: 9.9%
- Healthcare: 30.3%
- AgriScience: 1.5%
- Magnet: 10.6%
1st Quarter Guiding Question

How does energy access and usage influence the movement of people and objects?
Question: How much wind energy can be harnessed into motion using sails?

- What should we make to test our question?
- What data should we collect to test our question?
- How should we present our results to best show what we’ve learned?
U. S. History

Question: What affect did the movement of the earlier settlers from Europe to the Americas have on the environment and the community and what factors influenced their move?

- What data should we gather to test our question?
- How do we document our data?
- What do we do with the data once it is collected?
Mathematics

Assess ways you and your family use energy more efficiently in your home

- Explain how power (electricity) is transferred from the generator plant to delivery to your home.
- How does society choose between different sources of energy?
- How does the efficiency of Renewable energy compare to the efficiency of Non-Renewable energy?
- How do you analyze and interpret the characteristics of linear functions using graphs, tables, and simple algebraic techniques?
In English...

- Draw conclusions based on your research
- Use the evidence to persuade the audience that your conclusions are correct
Summer Reading / Connections

Hot, Flat and Crowded by Thomas Friedman

How does the availability of energy resources affect our lives?

How do we (social system) affect the source of our energy (natural system)?

Summer Energy Camp with GA Power targeting energy efficiency and engineering
Energy Systems Pathway Standards

*Sample*

- Students will describe energy, work, power, and force and analyze the relations of each.
- Students will select and demonstrate techniques, skills, tools, and understanding related to energy and power, bio-related, communication, transportation, manufacturing, and construction technologies.
- Students will understand the differences between nonrenewable, renewable, and inexhaustible types of energy sources and how that affects their world.
Defining Academic Rigor

High Expectations
- Teacher utilizes content objectives aligned with common local, state, or external standards (i.e. Curriculum Frameworks- AP, DE, IB)
  - Teacher engages students in active reasoning and critical thinking (upper levels of Bloom’s) - questions and assigned tasks
  - Teacher ensures accountable student talk and writing
  - Teacher as “guide on the side not sage on the stage”

High Relevance
- Teacher builds on students’ prior knowledge (cultural, personal, etc.) to introduce new concepts
- Teacher presents concepts in multiple forms (i.e. graph, numerical, words)
- Teacher utilizes differentiated instructional practices
- Teacher uses a variety of assessments to inform daily instruction

Appropriate Support
- Teacher and students cultivate positive relationships with one another in order to enhance learning
- Teacher gradually releases responsibility to students
- Teacher uses word walls, graphic organizers, technology in the classroom to support students
- Teacher individualizes support based on student needs

Higher Student Engagement and Learning
- Students actively and responsibly participate in the learning process. They know what’s expected of them
- Students raise questions, solve problems, analyze, apply, synthesize, evaluate and, or create
- Students engage with classmates regarding the content
- Students complete rigorous, relevant high-level assignments in multiple forms
- Students understand their own learning styles
Technical College System of Georgia

- 26 Technical Colleges
  - Mergers to improve state-wide efficiency
  - Centralization
- Curriculum revisions
- Quarter to Semester
- HOPE Grants and Scholarships
DeKalb Technical College

• Locations (6 locations in metro Atlanta)
• Covers 60 mile radius
• Enrollment (FY09)
  – Credit Enrollment = 7,140
  – Adult Education/GED = 8,830
  – 28% increase in 2010 Spring Quarter
Sustainable Technologies

- Three Quarter Program, 28 Credit Hours

Sustainable Technology Certificate aligns to:
- Home Technology Integration Specialist
- Automotive Technology (biofuels, hybrids)
- Building Automation Systems
- Commercial Refrigeration
- Computer Graphics & Design (3-D, CAD, mechanical)
- Electronics and Computer Engineering

Programs lead to state’s focus on Construction, Environmental issues, Transportation, Energy
Outcomes for Students

Post-secondary students can receive:

- Certificate, diploma or associates degree
- Certification in given technical area
- Articulation of some courses to university/college
- Technical skills mastered, needed for work force
- Employers waiting on Sustainable Technology graduates
Southern Polytechnic State University

- Senior Technology University of the University System of Georgia
- Located in Marietta, Georgia
- Founded in 1948
- Approximate Enrollment of 5500 Traditional and Non-traditional Students
- Entering Freshmen Rank in Top Four Highest SAT Scores in the University System of Georgia
- Ranked # 2 in the Total Number of Engineering Technology Degrees Awarded
- Ranked as # 1 in African-American Students Receiving Engineering Technology Degrees
- Ranked # 5 in the Number of Engineering Technology Degrees Awarded to Women
- Nationally Accredited Programs
# Peach State Pathways: Program of Study

*Student Name _____________________________*  
*Date _____________________________*

**Student Signature** _____________________________  
**Advisor/Counselor Signature** _____________________________  
**Parent/Guardian Signature** _____________________________

This plan of study should serve as a guide, along with other career planning materials, as you continue your education. Courses listed within this plan are only recommended coursework and should be individualized to meet each learner’s educational and career goals. All plans will meet minimum high school graduation requirements as well as minimum college entrance requirements.

Applicants to Board of Regents institutions should be advised that minimum requirements will not guarantee admission at any institution. Institutions may set additional and/or higher requirements.

## Secondary Engineering & Technology: Energy Systems

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<th>Course/Grade</th>
<th>Ninth</th>
<th>Tenth</th>
<th>Eleventh</th>
<th>Twelfth</th>
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<tbody>
<tr>
<td><strong>English</strong></td>
<td>9th grade Lit/Composition</td>
<td>10th grade Lit/Composition</td>
<td>American Lit/Composition</td>
<td>AP World Lit/Composition</td>
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<td><strong>Mathematics</strong></td>
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<td>Mathematics II</td>
<td>Mathematics III</td>
<td>AP Calculus</td>
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<td><strong>Science</strong></td>
<td>Biology</td>
<td>Physical Science</td>
<td>Chemistry</td>
<td>Environmental Science</td>
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<td><strong>Social Studies</strong></td>
<td>World History</td>
<td>US History</td>
<td>Economics</td>
<td>Government (1/2 unit)</td>
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<td><strong>Required Electives</strong></td>
<td>Foundations of Engineering and Technology</td>
<td>Energy and Power Technology</td>
<td>Appropriate and Alternative Energy Technologies</td>
<td>Health &amp; Personal Fitness (can be taken in grades 9-12)</td>
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<td><strong>Selective Electives</strong></td>
<td>Foundations of Electronics</td>
<td>Entrepreneurship or Modern Language</td>
<td>CADD Solid Modeling or Modern Language</td>
<td>Energy Systems Internship or Work-Based Learning</td>
</tr>
</tbody>
</table>

### TCSG DeKalb Technical College Certificate

- **First Quarter**
  - Composition & Rhetoric
  - Intro to Microcomputers
  - Sustainable Concepts I

- **Second Quarter**
  - Technical Communication or Public Speaking
  - Sustainable Concepts II

- **Third Quarter**
  - Sustainable Energy
  - Production Technology
  - Sustainable Building Technologies
  - Communications for Sustainable Building Environments

- **Fourth Quarter**
  - Digital Electronics I
  - Microcontroller Fundamentals
  - Technical Communication

### USG B.S. in Electrical Eng. Tech. Southern Poly State U.

- **1st and 2nd Year**
  - Composition I
  - Literature Course
  - Public Speaking

- **3rd and 4th Year**
  - Calculus I
  - Pre-Calculus
  - Science, Technology and Society

- **5th and 6th Year**
  - Behavioral Science
  - Principles of Chemistry I
  - Digital III

In a POS, students have many options to enter and exit from their academic studies or the workforce. When a student graduates from high school, they are eligible to choose one of many entrance point options: 1. Enroll in either a 2 or 4 year post-secondary program, 2. Enroll in an apprenticeship program or the military, or 3. Enter the workforce using technical skills learned. When a student finishes a 2- or 4-year degree program, they may choose to exit and 1. Enroll in a professional university degree program, or 2. Enroll in a technical vocational program, or 3. Enter the workforce using technical skills learned. Jobs available after High School: Assemblers and Fabricators, Machine Operators, Service and Tenders, Computer-Controlled Machine Tool Operator ($22,000 to $36,000 a year) Jobs available after Technical College: Electronics Engineering Technician, Environmental Engineering Technician, Nuclear Technicians ($34,000 to $53,000) Jobs available after University Degree: Electrical Engineer, Mechanical Engineer, Chemical Engineer ($66,000 to $100,000).

The following link will list Board of Regents institutions offering degrees in Energy Systems: [www.gacollege411.org/Select/Match4Asst/default.aspx](http://www.gacollege411.org/Select/Match4Asst/default.aspx).
2 major changes to our process

Need to refocus our plan after analyzing pre-assessment data
  - Data deficiencies evident from most agencies, schools, industries input
  - Efforts to integrate 10 components of a rigorous Program of Study realized

Struggle to bring whole team to common area
  - Different ends in mind for project and interpretations of Perkins IV
  - Changed focus to local agreements between LEAs and post-secondary colleges/universities
Lessons Learned: Articulation

- Develop Model For GaDOE/TCSG/SPSU Articulation
  - Umbrella Agreement
  - Detailed Program to Program Articulations
  - Provide Coordinated Educational Path
  - High School Through Bachelors and Beyond
  - Locally Available (Classroom, Online and/or Low Residency)
  - Seamless Transitions, No Transition Courses
- Establish Enhanced TCSG/SPSU Collaboration
- Meet Expanding Forecasted Demand (STEM, Healthcare, Construction, Small Business, Biorelated)
Rigorous Programs of Study

- The rigorous POS development has been a tremendous opportunity for state agencies to
  - align to industry needs for strong GA workforce
  - work together for students
  - develop seamless process for students to matriculate through secondary and post-secondary institutions,
  - help students and parents understand POS process
  - incorporate Georgia Work Ready initiatives
Implementation Status

- Work to finalize Statewide Articulation plans
- Continue to communicate BRIDGE, MOWR, POS, Work Ready, TSA, DE, and graduation to parents/students
- Work with the 90 plus school systems with Energy System pathways, feeder technical colleges and universities/colleges to implement POS
  - Call on industry to help secondary/postsecondary
- Listen to partners, schools, industry, parents to improve process and outcomes for our students
- Move on to Construction, Environmental POS pathways
We Thank You for this Opportunity