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

AED
Connecting People > Creating Change

NRC CTE
National Research Center for Career and Technical Education

TA Academy Overview

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

TA Academy Overview cont'd

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

POS Framework

A Program of Study *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

State Green POS Models

Georgia	Energy Systems
Illinois	Architecture and Construction Manufacturing
New Jersey	Sustainable Design, Construction, and Energy
Ohio	Energy and Alternative Energy Bioproducts Development Sustainable Environment Systems
Oregon	Sustainable Building

Outcomes

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

Legacy

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

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December 4, 2010

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

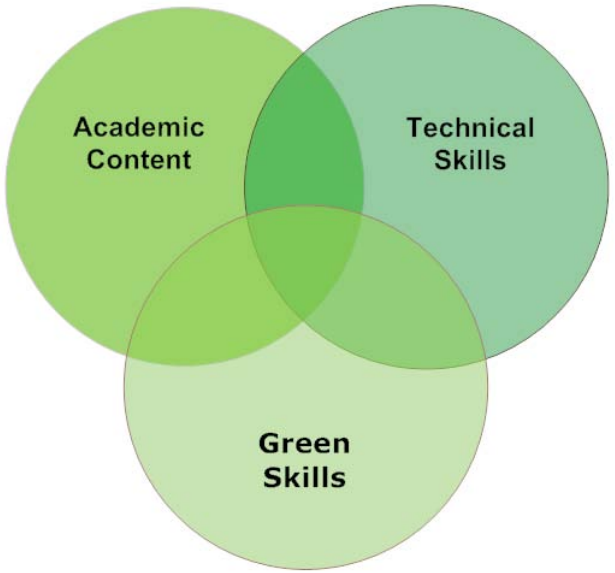
The project is supported under the National Research Center for Career and Technical Education, PR/Award No.VO51A070003 administered by the Office of Vocational and Adult Education, U.S. Department of Education.

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:

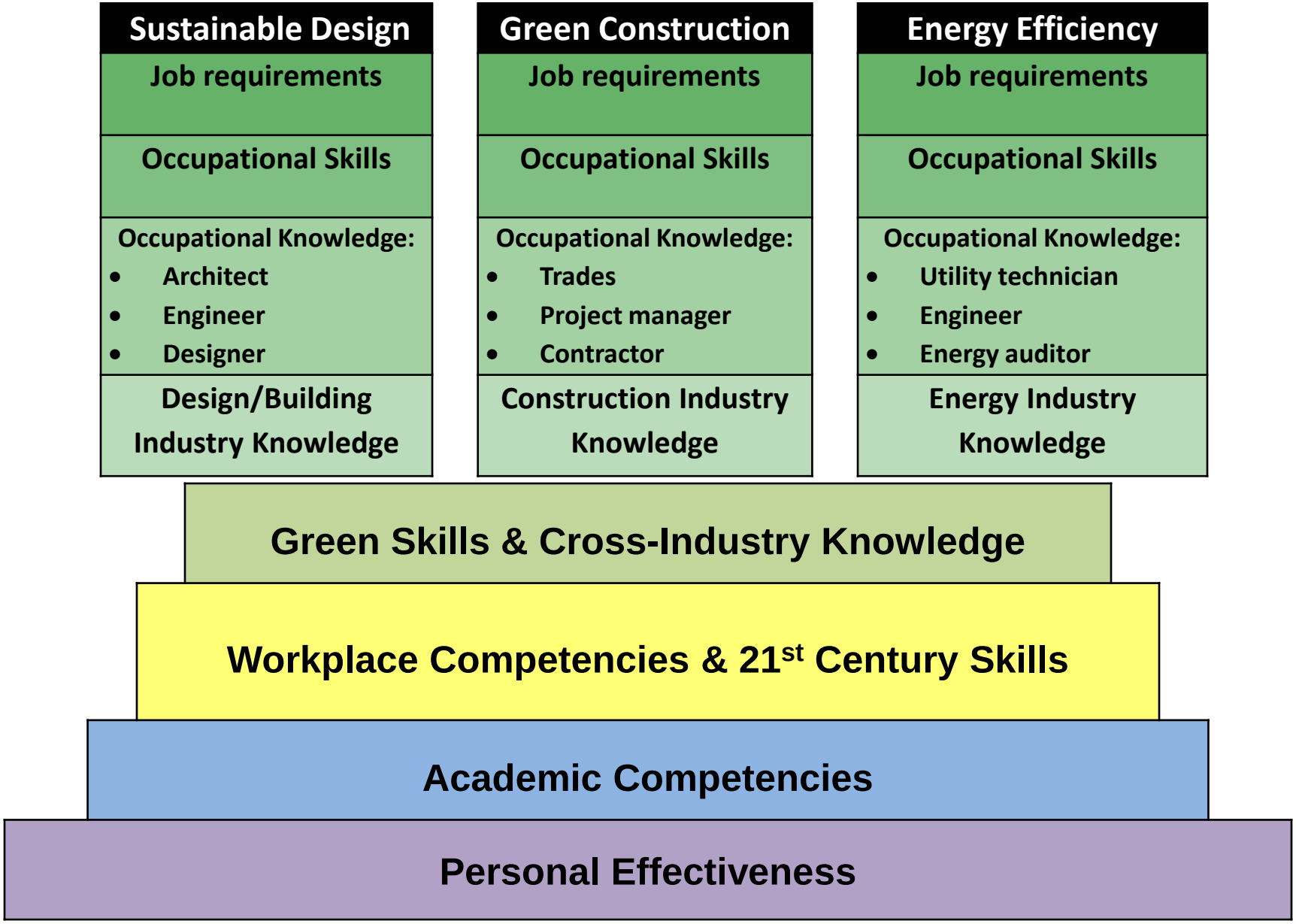
- Academic content -- language arts, math, science, social studies
- Sustainability, environmental science, energy efficiency, and renewable energy
- Work readiness skills
- Cross industry skills

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

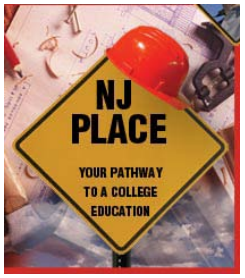

Sustainable Design
Job requirements
Occupational Skills
Occupational Knowledge:
• Architect
• Engineer
• Designer
Design/Building Industry Knowledge
Green Construction
Job requirements
Occupational Skills
Occupational Knowledge:
• Trades
• Project manager
• Contractor
Construction Industry Knowledge
Energy Efficiency
Job requirements
Occupational Skills
Occupational Knowledge:
• Utility technician
• Engineer
• Energy auditor
Energy Industry Knowledge
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

PSEG

SJI



NJIT

AIA New Jersey

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

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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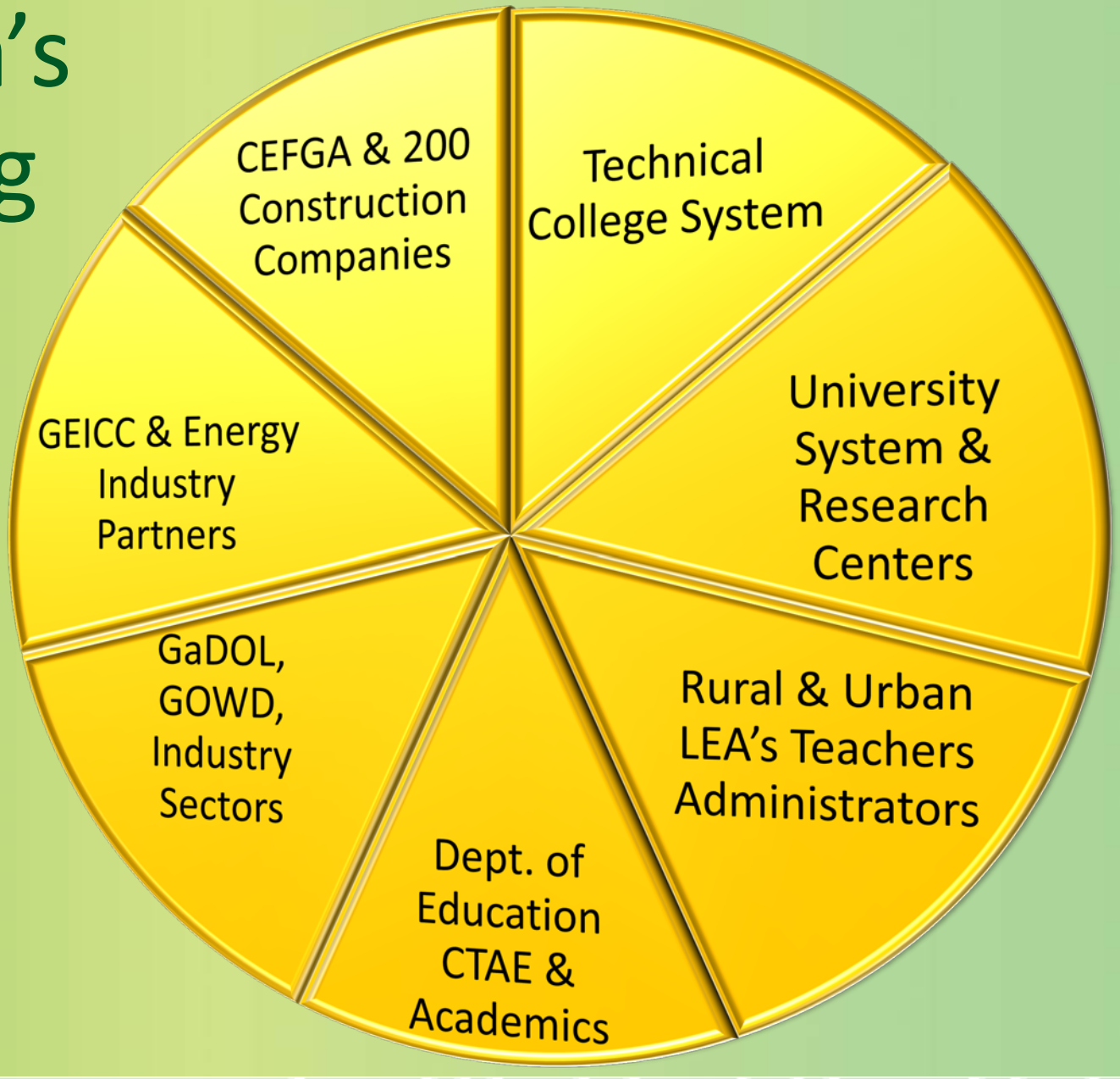
Georgia Green-focused Programs of Study: Energy Systems

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

Georgia's Growing Green Team

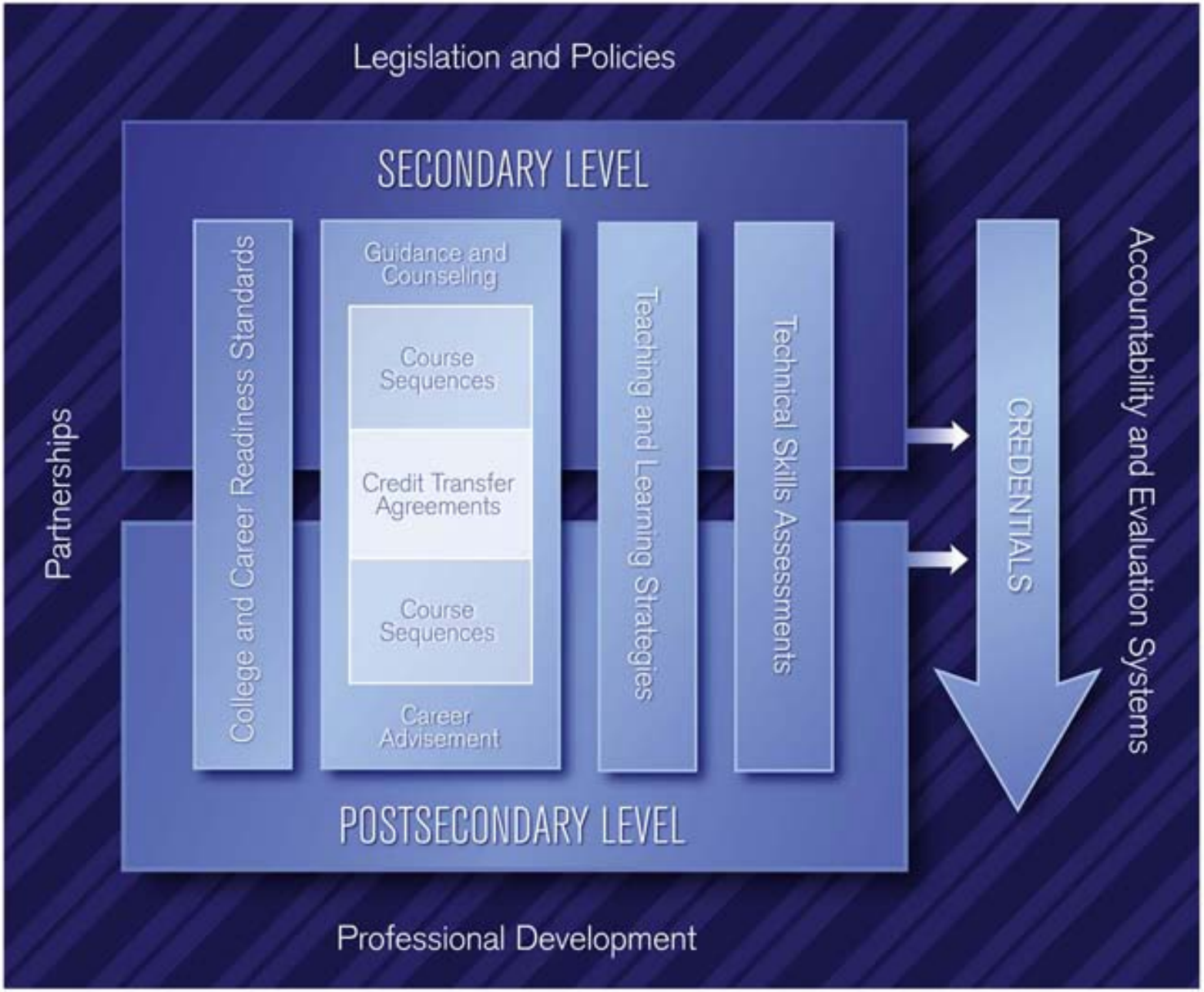
More than 40 active members on team including State Board Members, Legislators



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



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

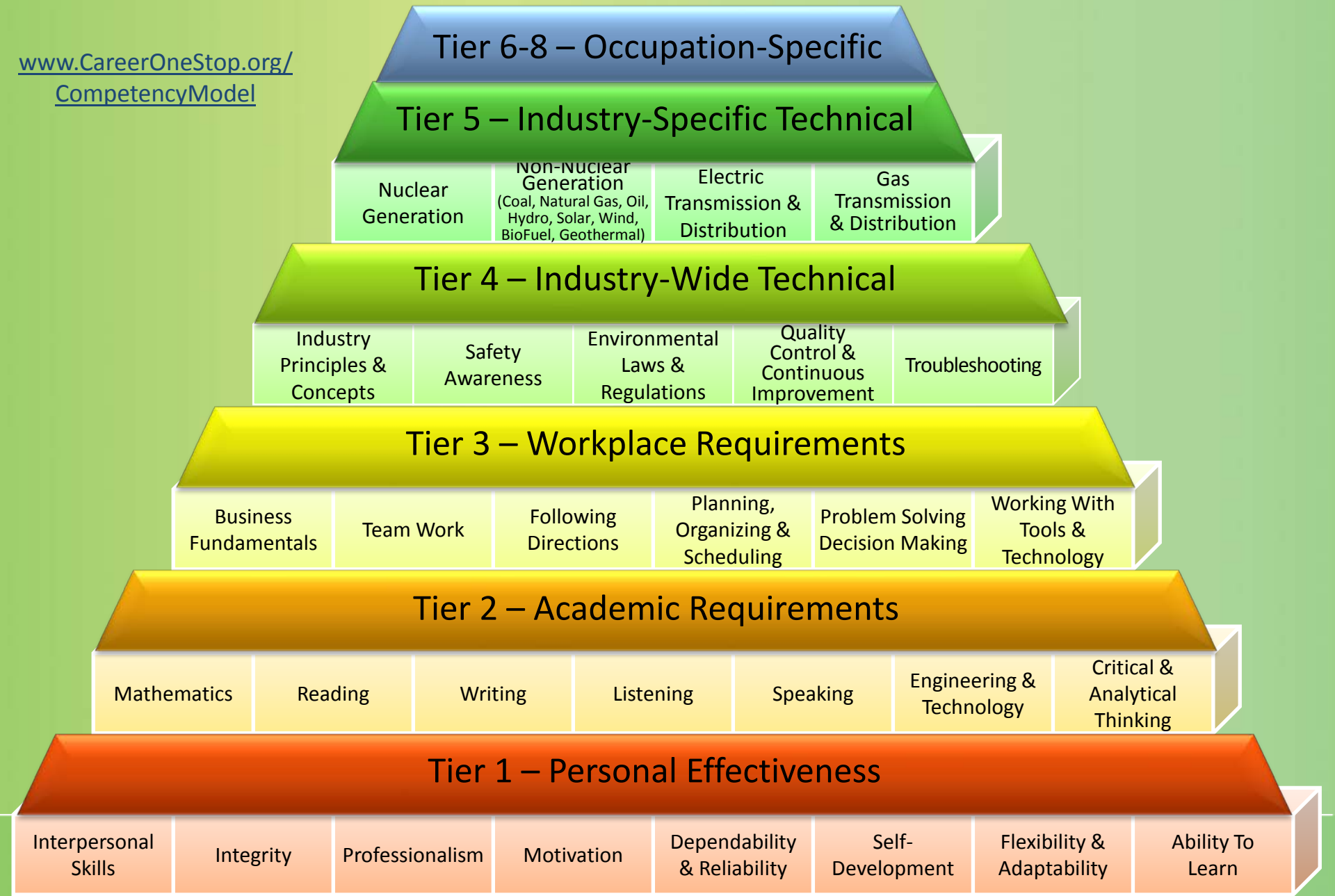
Career Pathways Curriculum and Stackable Credentials

Employers

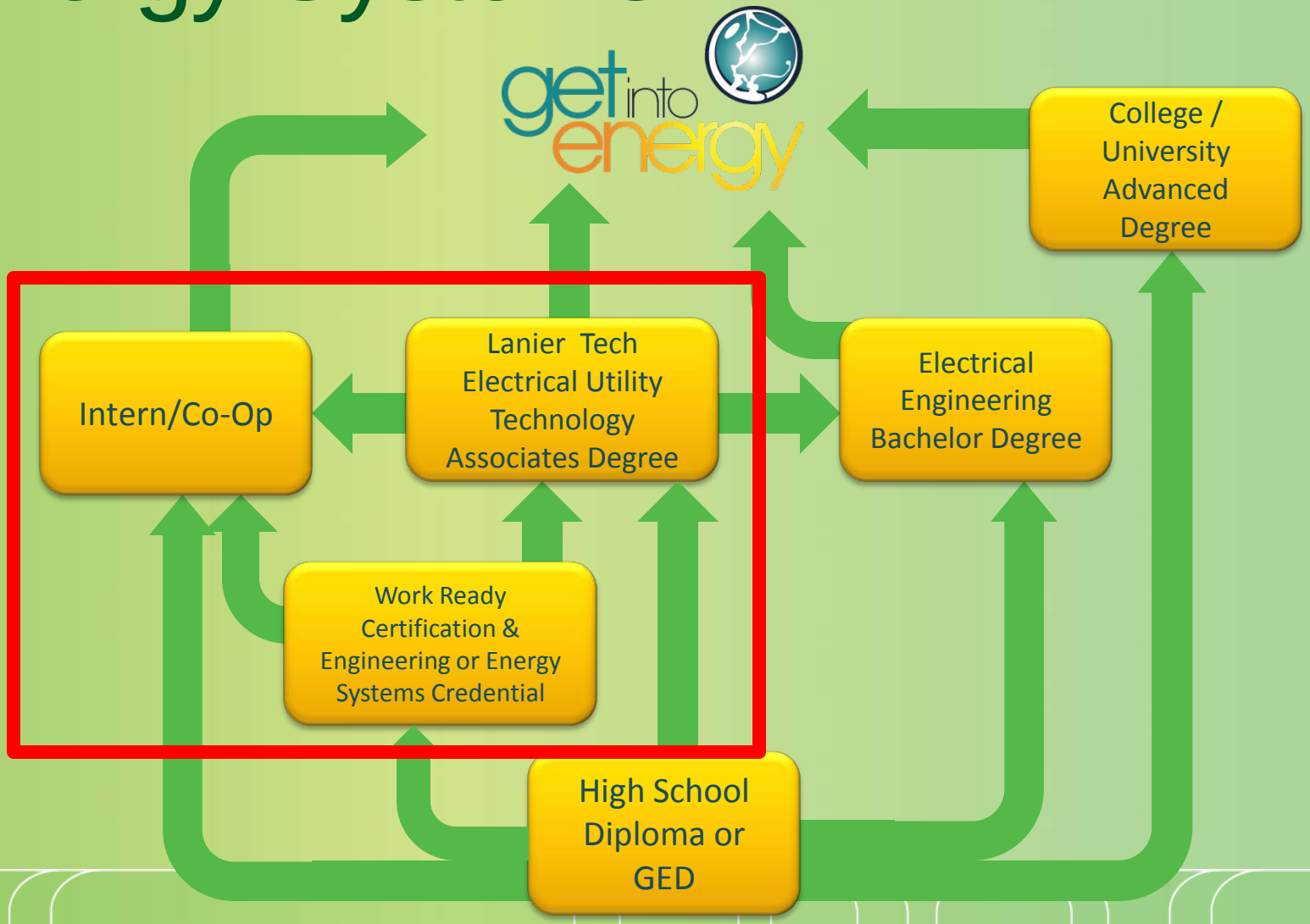
Employer Collaboration and Support

Energy Competency Model

www.CareerOneStop.org/CompetencyModel



Education Pathways: Energy Systems



Engineering and Energy System Pathway

GIE
Outreach and Career Coaching

GIE Basic Training

GIE Industry Fundamentals

- Engineer Representative
- Electrical Engineer
- Energy Auditor
- Renewable Energy
- Solar Technology

Industry involvement in all phases of workforce development leading to employment

Arabia Mountain High School

Engineering, Energy, and Environmental Magnet

Secondary Program of Study

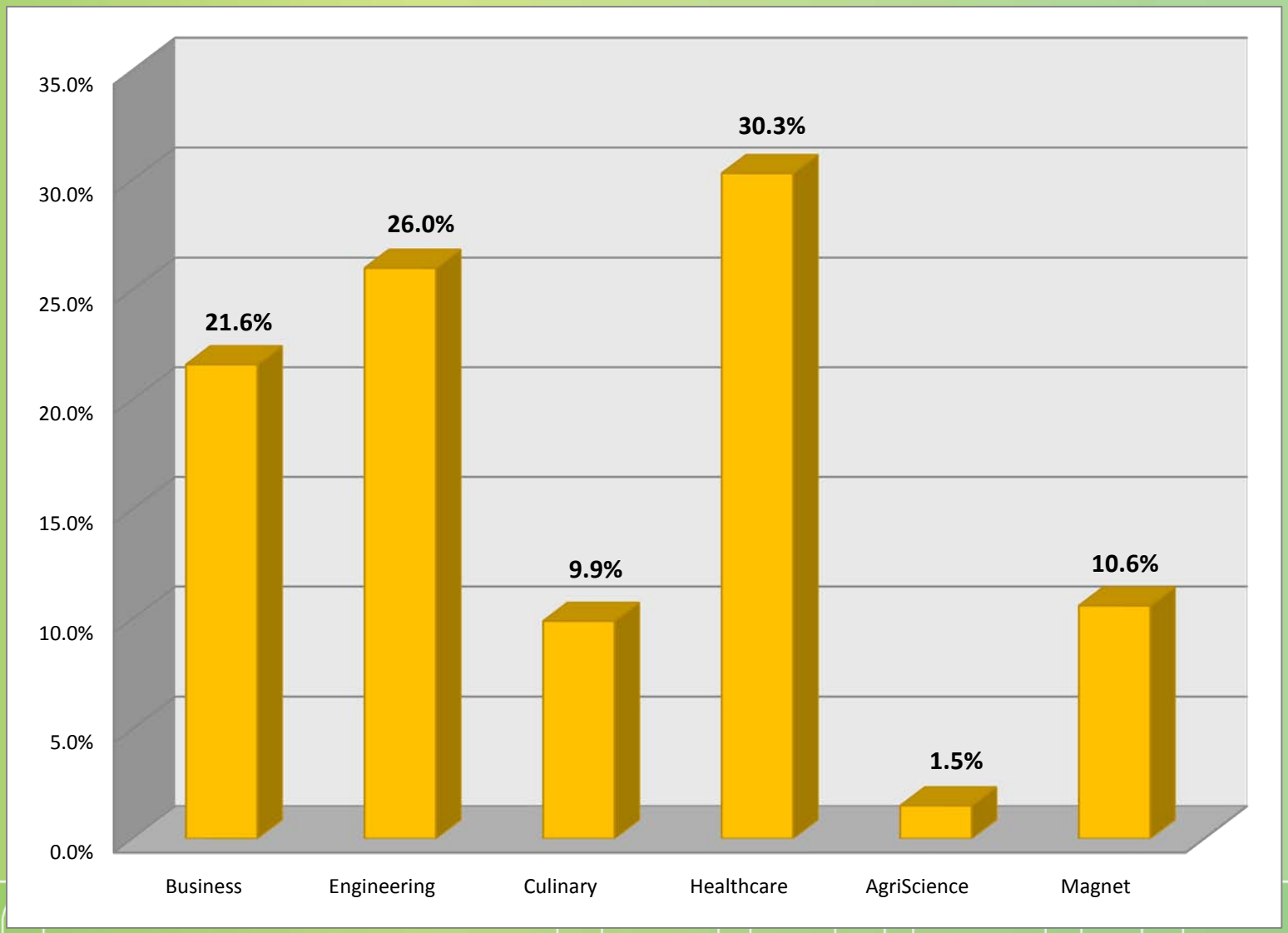
- Silver LEED Certified High School
- Accelerated Curriculum
- Energy System Career Pathway
- Environmental Investigations
- Service Learning
- Internship Programs


Low Emissions and Fuel Efficient Vehicles Only
Low Emissions and Fuel Efficient Vehicles Only

Preparing Students for Success

- Post-Secondary...
- Georgia Work Ready
- Internships
- Pathway Completion

What Is Your Career Pathway?



1st Quarter Guiding Question

How does energy access and usage influence the movement of people and objects?

Physics

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"**

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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

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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

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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 meeting minimum requirements will not guarantee admission at any institution. Institutions may set additional and/or higher requirements.

	Secondary Engineering & Technology: Energy Systems				TCSG DeKalb Technical College		USG B.S. in Electrical Eng. Tech. Southern Poly State U.	
Course/Grade	**Ninth**	**Tenth**	**Eleventh**	**Twelfth**	**Certificate 13th**	**Associates 13th and 14th**	**13th and 14th**	**15th and 16th**
English	9th grade Lit/ Composition	10th grade Lit/ Composition	American Lit/ Composition	AP World Lit/ Composition	***First Quarter*** -Composition & Rhetoric -Intro to Microcomputers -Sustainable Concepts I	***First Quarter*** -Indust. Safety Procedures -Direct Current Circuits I -Soldering Technology -Direct Current Circuits II -College Algebra -Intro to Microcomputers	-Composition I -Literature Course -Public Speaking	-Composition II -Humanities/Fine Arts Courses
Mathematics	Mathematics I	Mathematics II	Mathematics III	AP Calculus			Pre-Calculus	Calculus I
Science	Biology	Physical Science	Chemistry	Environmental Science	***Second Quarter*** -Technical Communication or Public Speaking -Sustainable Concepts II	***Second Quarter*** -Alternating Current I -Alternating Current II -Composition & Rhetoric I -Precalculus	-See Advisor before selecting Science courses	Science, Technology and Society
Social Studies		World History	US History	Government (½ unit) Economics (½ unit)			-American Context -World History	-Behavioral Science -Cultures & Societies
Required Electives	Foundations of Engineering and Technology	Energy and Power Technology	Appropriate and Alternative Energy Technologies	Health & Personal Fitness (*can be taken in grades 9-12*)	***Third Quarter*** -Sustainable Energy Production Technology -Sustainable Building Technologies -Communications for Sustainable Building Environments	***Third Quarter*** -Solid State Devices II -Linear Integrated Circuits -Introduction to Humanities -Solid State Devices I	-Survey of Engineering Graphics -Technical Writing -Calculus II	-Principles of Chemistry I -Ordinary Differential Equations
Selective Electives	Foundations of Electronics	Entrepreneurship or Modern Language	CADD Solid Modeling or Modern Language	Energy Systems Internship or Work-Based Learning		***Fourth Quarter*** -Digital Electronics I -Digital Electronics II -Microprocessor Fundamentals -Technical Communication	-Orientation -Fundamentals -Circuits I -Digital I -Circuits II -Electronics I -Digital II -Electronics II	-Digital III -Data Communications -Test Engineering -High Frequency Systems -Survey of Electric Machines -Intro to Control Systems -Signals and Systems Analysis -EET Electives

Modern Language/Latin
2 units required for admissions to Georgia University System Colleges/Universities
For a listing of Modern Language/Latin courses offered at your high school, please contact your advisor, counselor, or curriculum handbook.

Other Electives
For a listing of other elective courses offered at your high school, please check with your advisor, counselor, or curriculum handbook.

Entrance or Exit Point

Entrance or Exit Point

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 an apprenticeship program or the military; **2.** Enroll in a professional university degree program; or **3.** Enter the workforce using technical skills learned. **Jobs available after High School**: Assemblers and Fabricators, Machine Operators, Servicer 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 $63,000)* **Jobs available after University degree** Electrical Engineer, Mechanical Engineer, Chemical Engineer *($69,000 to $100,000)*.

The following link will list Board of Regents institutions offering degrees in **Energy Systems.** In the first box titled "Major," type "Electrical Engineering," "Renewable Resources," or "Environmental Engineering." Then click the button at the bottom "View Matching Campuses" for a list. It will not be necessary to fill in all the other boxes. Further research will be required for specific programs of study that align with the pathway. www.gacollege411.org/Select/MatchAsst/default.asp

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