CREATING
the **CLEAN**
ENERGY
ECONOMY
IN DELAWARE, THE REGION
AND THE NATION

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Jobs and Energy Efficiency in the Manufacturing Sector
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(Preliminary)

presented by

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Overview of Green Jobs Definition

- Example: California, Oregon, Washington, Michigan, Bureau of Labor Statistics

- No consensus on the definition of a green job.

- Four principle areas: Energy Conservation
  - Renewable Energy
  - Natural Resource Conservation
  - Pollution Reduction

- Findings: Every definition contains some degree of subjectivity.

  Despite differences, most surveys find that between 2-4% of a state's workforce is green.

  Standard industry and occupational classifications are not granular enough to give a complete representation of most definitions.

- Unanswered Questions: How important will the "green" economy be in the future?

  What kind of training do states *NEED* to have to achieve different objectives?

Energy Efficiency in Delaware's Manufacturing Sector

- Why is this sector important?

- Employs 6.8% of Delaware's private nonfarm workforce

- Consume approximately 28% (83 BBTUs) of the state's energy consumption.

**Total Energy Consumption in Delaware**
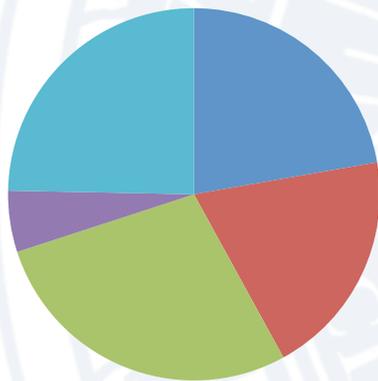
- Residential - 22%
- Commercial - 20%
- Industrial - Manufacturing - 28%
- Industrial - Non Manufacturing - 5%
- Transportation - 25%

Small improvements in energy-intensive sectors are equivalent to large improvements in less energy-intensive sectors.

- The cost of energy as a percentage of material costs.
  - 1998: 3.8%
  - 2002: 4.6%
  - 2006: 4.9%

- Most energy-saving recommendations depend on proven technology.

Employment Composition in US and Delaware Manufacturing
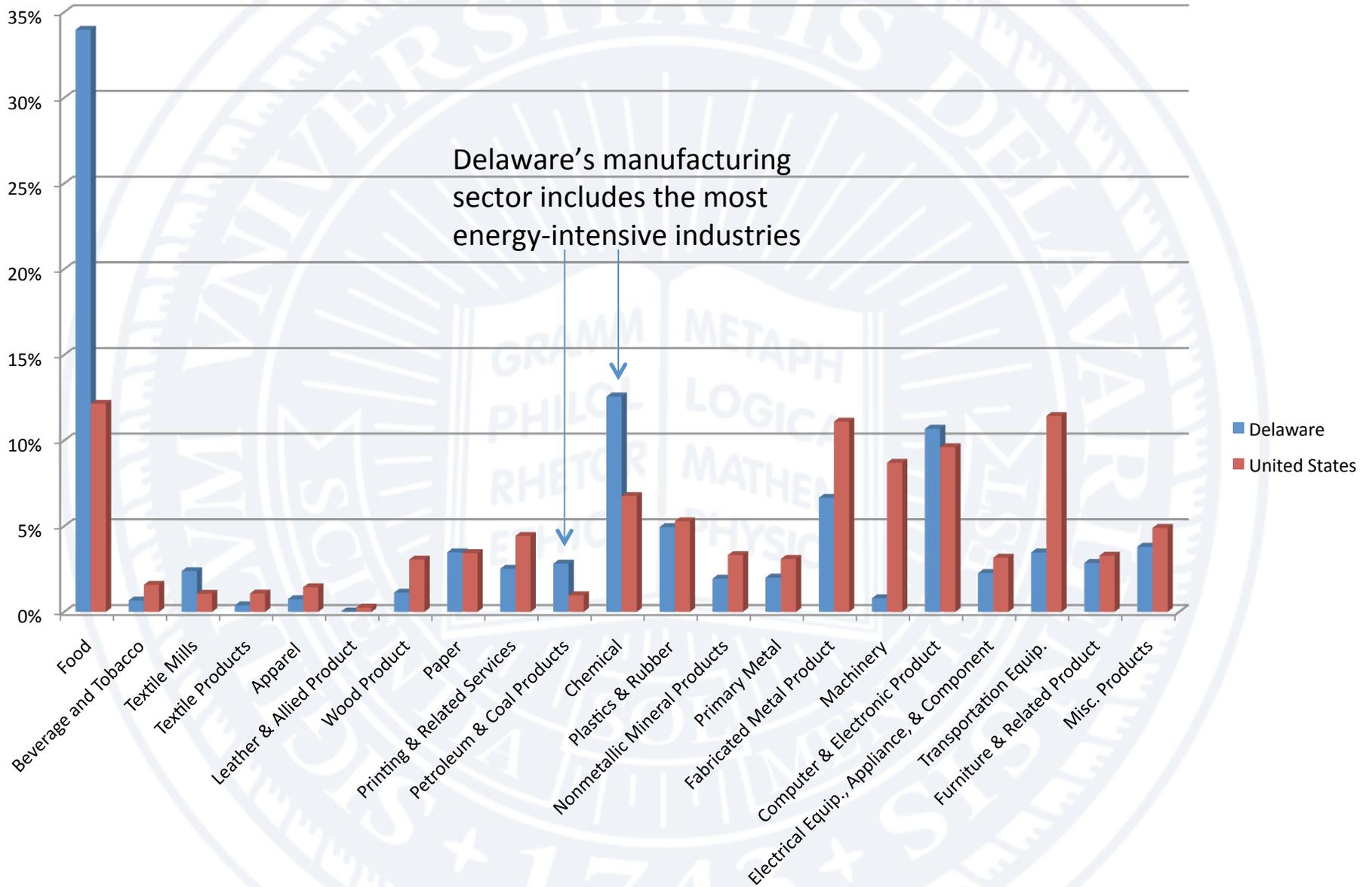
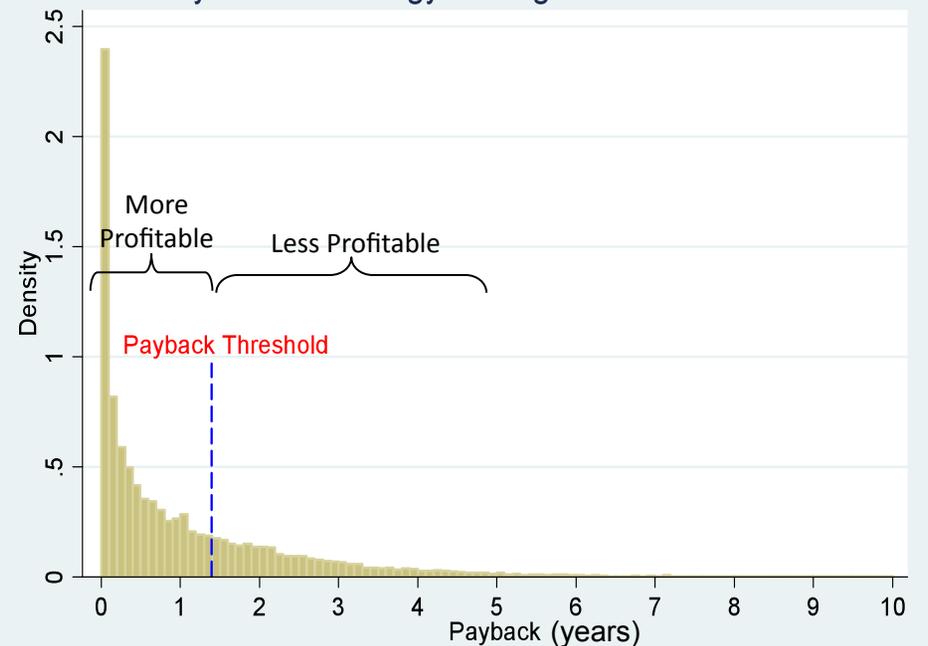# Energy Efficiency in Delaware's Manufacturing Sector

The Industrial Assessment Center database (Rutgers and US DOE) included more than 14,000 mfg plant energy assessments that have made nearly 100,000 energy-saving recommendations.

We used 5000+ assessments / 35,000+ recommendations since 2000.

Recommendation Classification

Furnaces, Heating, Boilers
Heat Recovery
Steam, hot water, process piping, refrigeration, and cooling
Space heating, ventilation, and conditioning
Insulating Machines, Equipment, and Piping
Motors and other electrical equipment
Air Compressors
Lights
Electrical Power
Windows, Doors, Roofs, Walls, Landscape
Employee behavior / Administrative

Payback for Energy Saving Recommendations

Energy Efficiency in Delaware's Manufacturing Sector

- We empirically modeled the total potential costs of different energy saving recommendations given the firm's characteristics

- The model was applied to each manufacturer in Delaware to estimate the likely recommended expenditures

- Expenditures were converted to the number of jobs necessary to implement each recommendation with two assumptions:

    1. Labor Intensive Assumption
    2. Capital Intensive Assumption

- Total job requirements were added across firms for each type of recommendation.

	Assumption 1 More Labor Intensive		Assumption 2 More Capital Intensive	
	Recommendation Type		Recommendation Type	
	More Profitable	Less Profitable	More Profitable	Less Profitable
Furnaces, etc.	51.8	174.9	31.1	88.4
Heat Recovery	94.4	156.1	57.1	87.5
Steam, hot water, etc.	13.2	13.4	5.7	4.6
Insulating, Equipment,	8.5	16.3	7.2	12.3
Space heating, etc.	10.8	3.7	6.8	2.4
Electrical Power	0.1	48.8	0.1	18.1
Lights	10.4	24.2	5.2	9.9
Motors	6.3	29.0	6.3	11.1
Air Compressors	1.8	124.4	2.0	81.8
Other Facility	26.7	2.3	13.0	1.7
Total	224.1	593.2	134.4	317.9
	817 jobs		452 jobs	

Energy Efficiency in Manufacturing

What are the Implications of this Research?

- Average expected employment needs: 630 FTE's

- <u>Heat Recovery</u>: 198 FTE's

- <u>Combustion Systems (e.g. boilers and furnaces)</u>: 173 FTE's

- <u>Air Compressors</u>: 100 FTE's

- <u>Power and electrical systems</u>: few "more profitable" opportunities.

- Other job creation not in this analysis

- Low hanging fruit for saving energy.

Understanding Green Skills

- Workforce "skill" usually refers to the level of education.

- We use the term to describe the work activities, knowledge, skills and work contexts.

- Data

  2000 – 2010 basic monthly
  Current Population Survey: 266 industries x 503 occupations

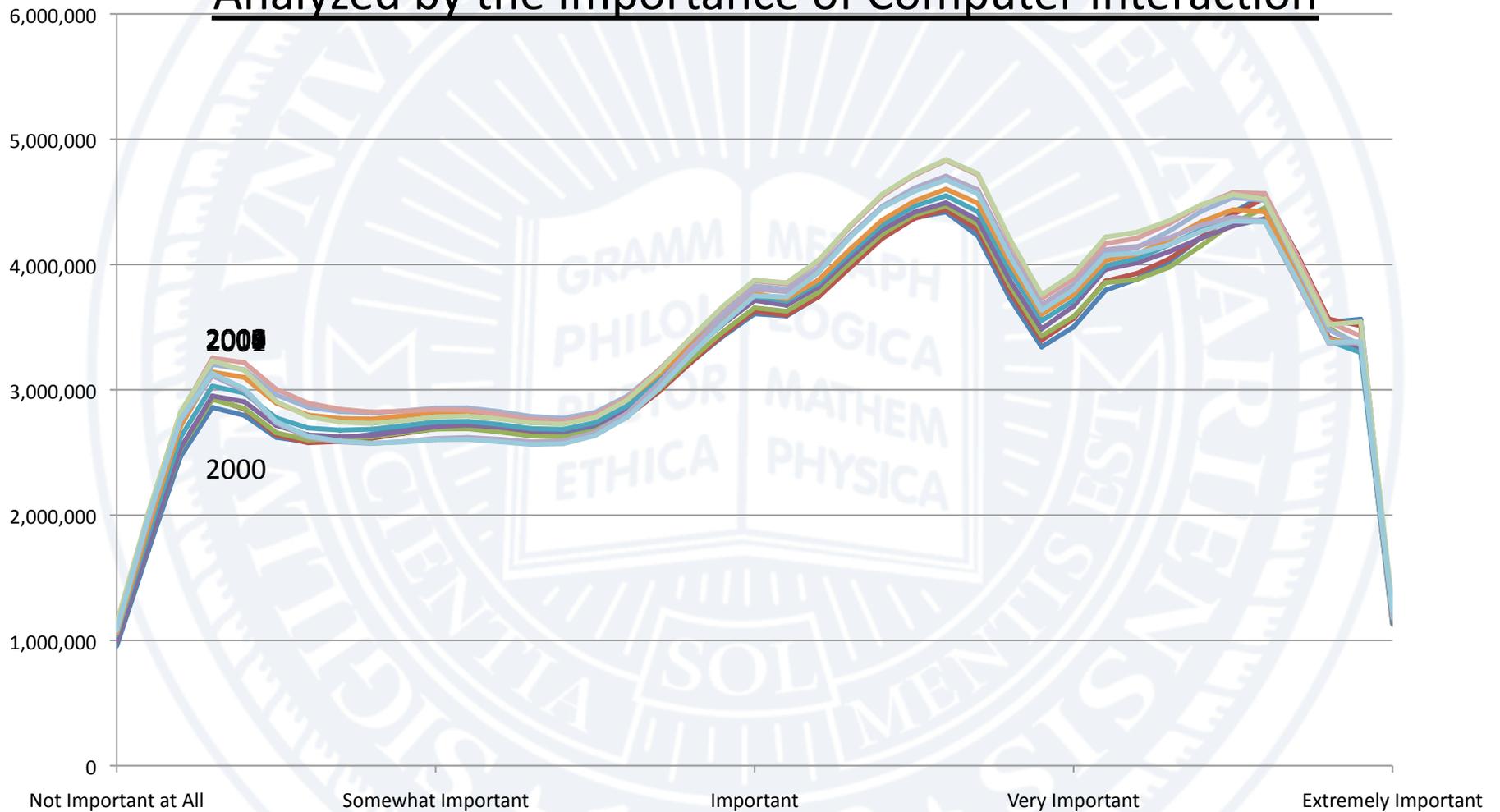 Employment, unemployment, education,
  demographic information, etc.

  ONET Online database v. 13 & 14:   900 occupations x 135 "skills"

  Skill descriptions, green jobs and green tasks identified
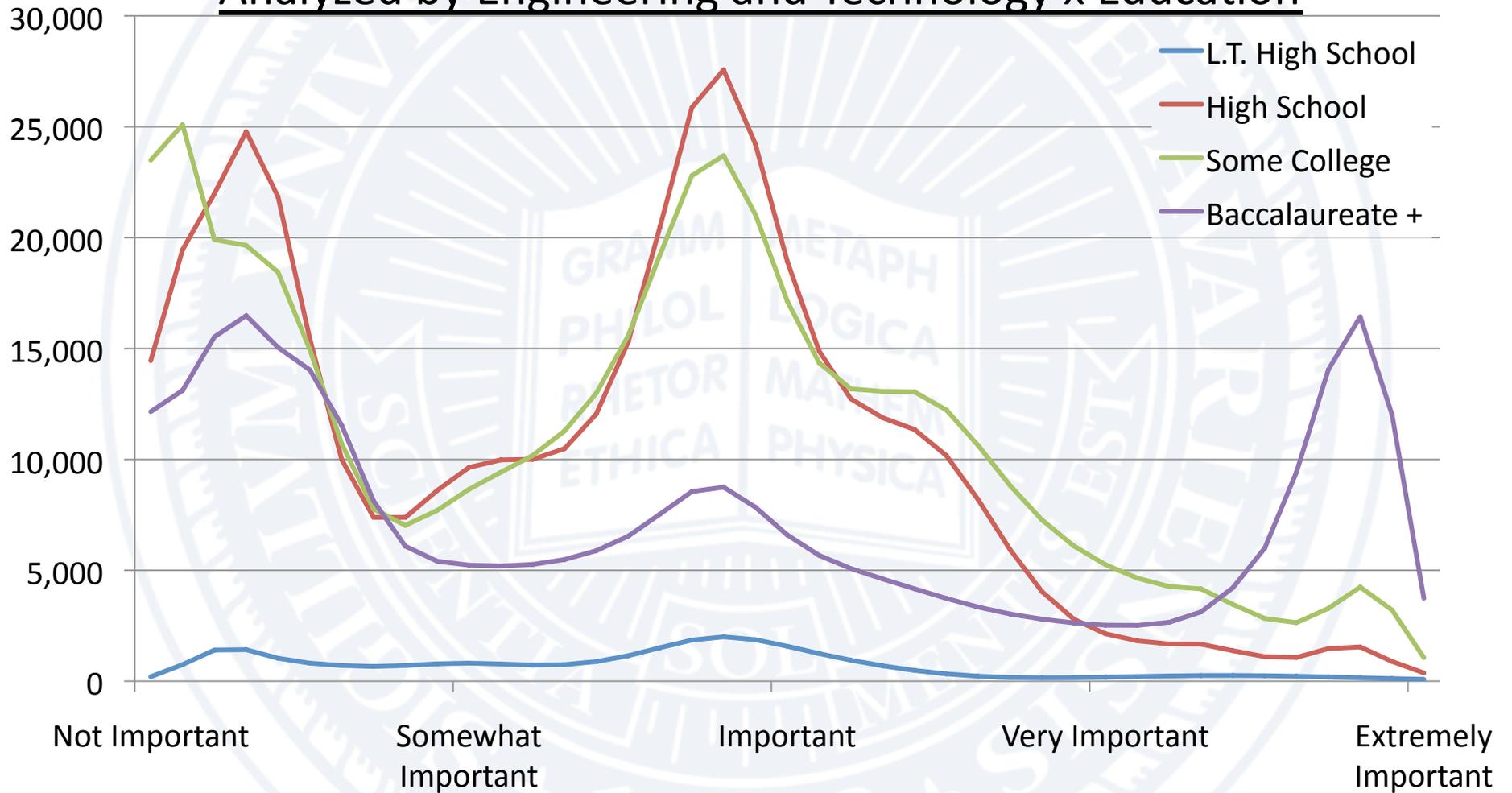
Understanding Green Skills

How are skills changing in the workforce?

Changes in unemployment rate: recession vs. historical trends
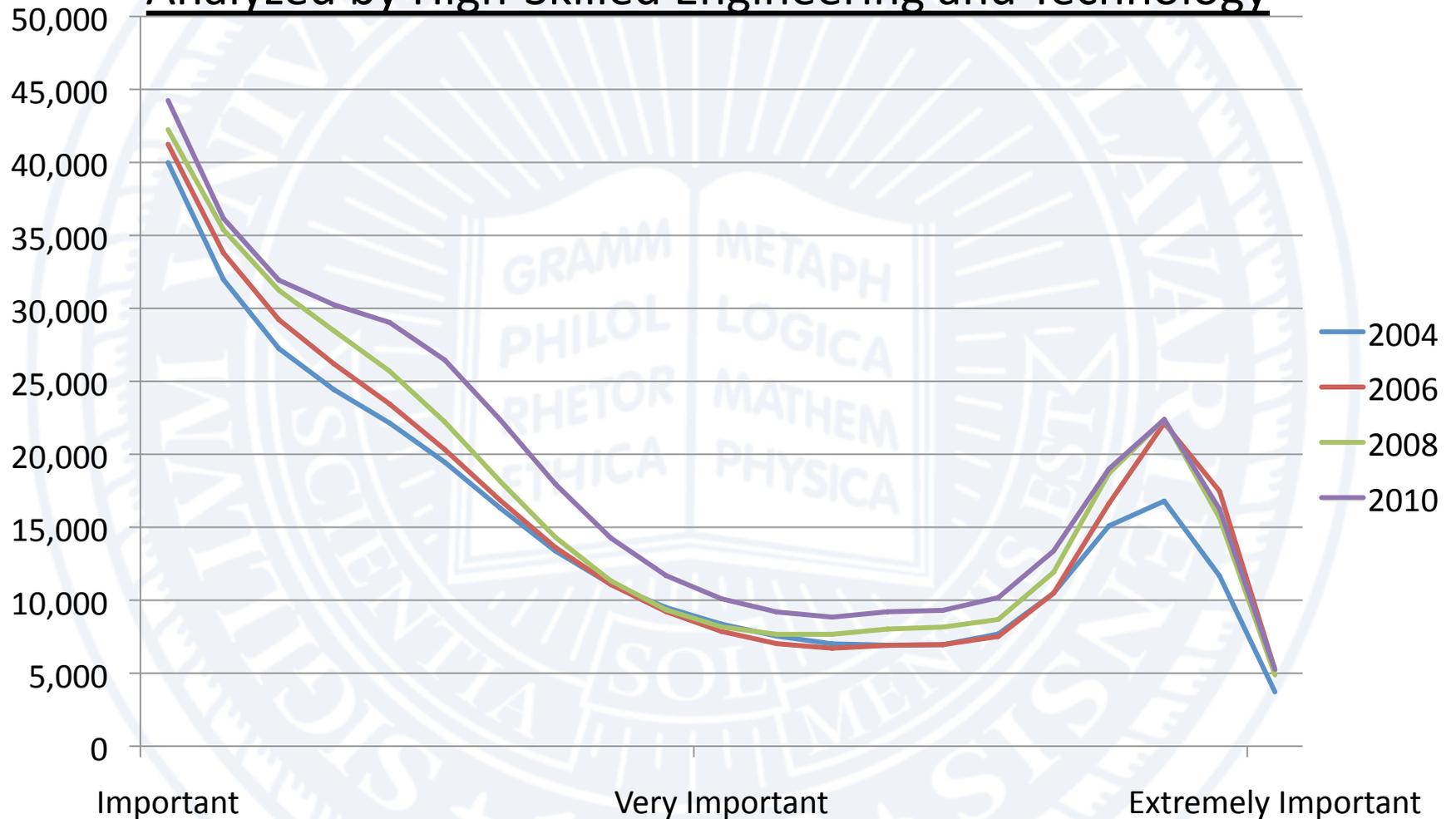
Trend	Recession	Occupations with Declining Relative Employment Opportunities
+0.10%	+1.9%	Controlling Machines and Processes
none	+1.1%	Drafting, Laying Out and Specifying Tech Devices, Parts, and Equip.
+0.10%	+2.5%	Handling and Moving Objects
+0.04%	+0.9%	Inspecting Equipment, Structures, and Material
none	+1.1%	Operating Vehicles, Mechanized Devices, or Equipment
+0.08%	+1.9%	Performing General Physical Activities
none	+1.3%	Repairing & Maintaining Electronic Equipment
+0.09%	none	Repairing & Maintaining Mechanical Equipment

Some of these characteristics are the key job tasks of specific green jobs.

(e.g.) Energy Auditors, Electricians, Millwrights, Maintenance & Repair Workers, Installers

Understanding Green Skills
How are skills changing in the workforce?

Changes in unemployment rate: recession vs. historical trends

Trend	Recession	Occupations with Rising Relative Employment Opportunities
-0.06%	-1.8%	Coordinating the Work Activities of Others 🍃
none	-1.2%	Performing Administrative Activities 🍃
-0.08%	-1.9%	Analyzing Data or Information 🍃
-0.04%	-1.8%	Interacting with Computers 🍃
-0.06%	-1.5%	Negotiation
none	-0.6%	Sales and Marketing 🍃
-0.09%	-2.4%	Writing
none	-2.0%	Mathematics* 🍃
none	-1.3%	Science* 🍃
none	-1.6%	Economics and Accounting* 🍃
-0.06%	-1.2%	Thinking Creatively 🍃
none	-2.4%	Customer & Personal Service 🍃
none	-2.0%	Personnel and Human Resources 🍃

(e.g.) Various Managers & Engineers, Marketers, Technicians, Trainers, Financial Analysts

Understanding Green Skills

Implications:

- Education is clearly important to filling key skills in the green industry.

- There may not be sufficient private sector opportunities for every type of green skill.

- Does the age of the worker influence training type?

- Probability of restructuring after recession affected by previous trend and performance in recession?

Where We are Headed

Skills in Delaware's Workforce

- Education and skills, combinations of different skills

- Looking within more industries and within Delaware

- Demographic projections

Environmental Business Survey

- Which Delaware businesses claim green goods or services?

- Relevant training programs?

- View energy efficiency?

- Are markets privately sustainable?

Where We are Headed

Delaware's Educational Pipeline Survey

- Workforce training capabilities

- Student interest, in state vs. out of state

- Important prerequisite skills

- Quality of applicants

- Graduate success, job placement