

# *Navigating through the Maze of Green Jobs*

Barbara Anderegg  
Co-Principal Investigator  
October 11, 2010

# Everyone wants to work in green energy

- Is a green job right for me?
- Where are the green jobs?
- How do I educate myself for a green job?
- Where do I find employers?
- What is the best green job sector to get into?
- How much additional education do I need?
- If I finish this associates degree, can I get a green job?

# The variables

- Hard to classify green jobs and thus track them
- These jobs often rise and fall with price of gas and oil
- The market is changing dramatically, driven by “overdue” policies that are removing market barriers
- The economy is in a radically new place
- The effect of federal, state, and stimulus grants are just starting to kick in
- Many of these jobs are still largely entrepreneurial

- It was the best of times, it was the worst of times...

- Don Wichert, Focus on Energy quoting Charles Dickens, A Tale of Two Cities

**Nationwide**

# Center on Wisconsin Strategy

## COWS

- Think and do tank at the University of Wisconsin - Madison
- My favorite – Sarah White
- Numerous studies and labor reports
- <http://www.cows.org/>

# GREENER

How Credentials Create Value in the Clean Energy Economy

# SKILLS

2010 SARAH WHITE with LAURA DRESSER and JOEL ROGERS

# GREENER PATHWAYS

Jobs and Workforce Development in the Clean Energy Economy

EDITED BY  
SARAH WHITE & JASON WALSH

CENTER ON WISCONSIN STRATEGY - THE WORKFORCE ALLIANCE - THE APOLLO ALLIANCE  
2011

# GREENING WISCONSIN'S WORKFORCE

## Training, Recovery, and the Clean Energy Economy

**E**scalating economic crisis and a bold federal response have intensified the regional promise of green jobs – that a green wave might lift all boats, rebuilding a prosperous industrial heartland on a sustainable bedrock of energy efficiency and renewable energy. Recession, climate change, and energy insecurity may not signal the end of the middle-American dream. A coordinated state response to these challenges could build a vibrant green economy based on clean energy and decent jobs for all.

The task is enormous, and urgent. Wisconsin lost nearly 75,000 jobs in the last twelve months, with more than half of that loss in the last four months. Precipitous job loss across all sectors follows years of anemic overall job growth and dramatic decline of the state's critical manufacturing sector, which lost over 14 percent of its jobs base between 2001-2004 and shed an additional 13,000 jobs even before last fall's economic collapse.\*

But the challenges in Wisconsin's labor market predate the recession and require long-term solutions. If green jobs are to begin restoring regional prosperity, any stimulus plan to create them must address larger underlying challenges facing the state's working families.

More than one in five Wisconsin workers hold poverty-wage jobs.\* Those without post-secondary education can no longer earn their way out by dint of hard work, and social supports are inadequate to close the gap. Nearly a quarter of working families in Wisconsin are low income.† Living below 200 percent of the federal poverty line – a bar that often serves as a proxy for self-sufficiency – these families face serious and increasing problems making ends meet. Factoring in race highlights further inequality: a breathtaking 47 percent of Wisconsin's minority working families are low income.‡

Building a green economy offers one compelling solution, and the American Reinvestment and Recovery Act holds much promise to help the state do so. Additional injections of federal dollars may accompany climate and energy bills later this year. But money isn't enough.

The state and key stakeholders need to spend it on building a high-road recovery, creating and retaining high-quality jobs, developing appropriate training pathways, and providing broad access to both. To do this, workforce policy-makers and practitioners need to think smart, build partnerships, and deliver equity.

The state's technical colleges will play a key role here. This paper offers a brief overview of green-collar training programs already in place at campuses across the state, related Recovery Act resources, and some suggestions as to how the technical college system and its partners can most effectively move forward in greening Wisconsin's workforce.

\* January work is directly related to an ICD Current Employment Statistics report.  
 † This paper uses the 2007 Census of Income as the source for the poverty data. The 2007 Census of Income is the most recent data available for the purpose of this report. The 2008 Census of Income will be available in the near future.  
 ‡ Working Poor Families Project report, ICD, 2007. Working Poor Families Project (WPFP) report.  
 Available at: <http://www.wisconsinpolicy.com/workingpoor>  
 4 | 5

### About COWS

The Center on Wisconsin Strategy (COWS) is a nonprofit, nonpartisan "think-and-do tank" dedicated to improving economic performance and living standards in the state of Wisconsin and nationally. Based at the University of Wisconsin-Madison, COWS works to promote "high road" strategies to support living wages, environmental sustainability, strong communities, and public accountability.

### Acknowledgements

Author Sarah White is a senior advisor at the Center on Wisconsin Strategy (COWS).

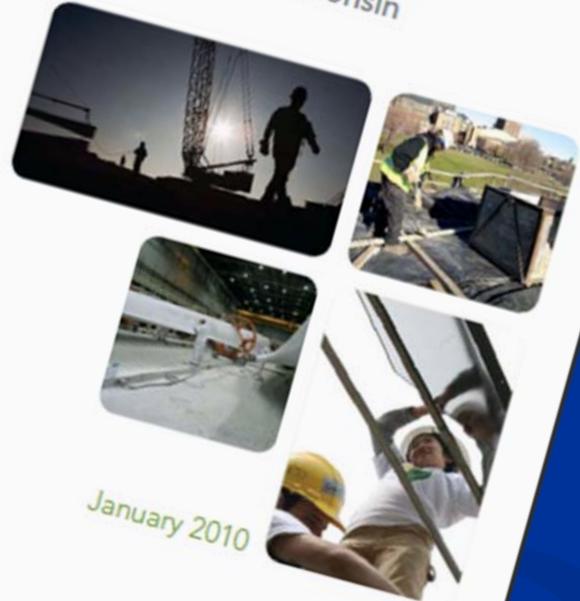
Thanks to Adrienne Kaufman at COWS for assistance with this report, and to the Wisconsin Department of Workforce Development for financial support.

COWS

of

of

# Mapping Green Career Pathways: Job Training Infrastructure and Opportunities in Wisconsin



January 2010



**COWS**  
center on wisconsin strategy

“Beyond the cadre of highly skilled engineers and innovators... and a limited number of green-collar workers in just-invented jobs, the new energy economy will be built and sustained by middle-skill workers in traditional occupations.”

Sarah White, Center on Wisconsin Strategy

Search



- ABOUT SEED
- JOIN SEED
- RESOURCES
- SHARING COMMUNITY
- COLLEGES IN ACTION
- SUPPORT
- NEWS & EVENTS

**Resource Center**

- ▶ Solar
- ▶ Wind
- ▶ Green Building
- ▶ Energy Efficiency
- ▶ Sustainability Education
- Additional Sectors COMING



**Colleges In Action**

The SEED Center is a **leadership initiative**, **resource center**, and online **sharing environment** for **community colleges** to ramp up programs to

**Connect with SEED**

**Sign-in/Register**

Email

Password

[Register >>](#)

**Newsletter Sign-up**

[Sign-up >>](#)

**Connect with us**

<http://www.theseedcenter.org/>

# SEED Center

- Sustainability Education & Economic Development (SEED) is American Association of Community College's comprehensive initiative to help colleges and other education and job training providers lead in the green economy. This SEED Center Web site is a starting point as it consolidates important curricular resources and promising practices – for free. The web site also facilitates stronger collaboration, allowing for the exchange of knowledge among educators and experts throughout the country.

# Greening of the World of Work: Implications for O\*NET-SOC and New and Emerging Occupations Report

- Existing green occupations in greater demand
- Existing green occupations with significant change
- New and emerging green occupations

<http://www.onetcenter.org/reports/Green.html>

# Advanced Technological Education

NSF [www.nsf.gov](http://www.nsf.gov)

<u>Award Number</u>	<u>Title</u>	<u>NSF Organization</u>	<u>Program(s)</u>	<u>Start Date</u>	<u>Principal Investigator</u>	<u>State</u>	<u>Organization</u>
1003199	<a href="#">OP-TEC: The National Center for Optics and Photonics Education</a>	DUE	<a href="#">ADVANCED TECH EDUCATION PROG</a>	09/01/2010	<a href="#">Hull, Daniel</a>	TX	<a href="#">CORD</a>
1002653	<a href="#">CREATE Renewable Energy Regional Center</a>	DUE	<a href="#">ADVANCED TECH EDUCATION PROG</a>	08/15/2010	<a href="#">Alfano, Kathleen</a>	CA	<a href="#">College of the Canyons</a>
1002750	<a href="#">Photovoltaic and Renewable Integration to STEM Modules (PRISM)</a>	DUE	<a href="#">ADVANCED TECH EDUCATION PROG</a>	08/15/2010	<a href="#">Sidor, Stanley</a>	FL	<a href="#">Daytona State College</a>
1003879	<a href="#">The Technician of the Future: Mechatronics as a Statewide Transferable Skill Set Supporting Green Industry</a>	DUE	<a href="#">ADVANCED TECH EDUCATION PROG</a>	08/15/2010	<a href="#">Green, Denis</a>	OR	<a href="#">Linn Benton Community College</a>
1002535	<a href="#">Solar Energy Technology Project</a>	DUE	<a href="#">ADVANCED TECH EDUCATION PROG</a>	08/01/2010	<a href="#">Stanley, Jack</a>	TX	<a href="#">Amarillo College</a>
1003452	<a href="#">Growing a New Generation of Energy Technicians and Professionals</a>	DUE	<a href="#">EXP PROG TO STIM COMP RES, ADVANCED TECH EDUCATION PROG</a>	07/01/2010	<a href="#">Olson, Edward</a>	WY	<a href="#">Laramie County Community College</a>
1003730	<a href="#">Preparing a New Workforce for a Sustainable Economy</a>	DUE	<a href="#">ADVANCED TECH EDUCATION PROG</a>	07/01/2010	<a href="#">Gibson, James</a>	IL	<a href="#">Illinois Valley Community College</a>
1003674	<a href="#">Creating An Energy Systems Technology Technician Workforce in Florida</a>	DUE	<a href="#">ADVANCED TECH EDUCATION PROG</a>	07/01/2010	<a href="#">Awtonomow, Sheryl</a>	FL	<a href="#">Brevard Community College</a>
1003735	<a href="#">Sustainable Energy Education Delivery System (SEEDS)</a>	DUE	<a href="#">ADVANCED TECH EDUCATION PROG</a>	07/01/2010	<a href="#">Eberle, Dan</a>	MO	<a href="#">Crowder College</a>
1003525	<a href="#">Energizing STEM Education</a>	DUE	<a href="#">ADVANCED TECH EDUCATION PROG</a>	06/01/2010	<a href="#">Marchegiano, Mary</a>	DE	<a href="#">Delaware Technical &amp; Community College - Stanton-Newark Campus</a>
0902309	<a href="#">The SEET Project: Sustainable Energy Education and Training Workshops for Future Energy Technicians</a>	DUE	<a href="#">ADVANCED TECH EDUCATION PROG</a>	10/01/2009	<a href="#">Kabat Lensch, Ellen</a>	IA	<a href="#">Eastern Iowa Community College</a>
0903293	<a href="#">Consortium for Resources in Renewable Energy Technologies</a>	DUE	<a href="#">ADVANCED TECH EDUCATION PROG</a>	09/01/2009	<a href="#">Walz, Kenneth</a>	WI	<a href="#">Madison Area Technical College</a>
0902811	<a href="#">NPT2 -- Building a Technologically Advanced Pulp, Paper, and Allied Industries Workforce and</a>	DUE	<a href="#">EXP PROG TO STIM COMP RES, ADVANCED TECH</a>	08/15/2009	<a href="#">Shepherd, Charles</a>	AL	<a href="#">Alabama Southern Community College</a>

# Center for Energy Workforce Development <http://www.cewd.org>



## Our Mission

*Build the alliances, processes, and tools to develop tomorrow's energy workforce*

[HOME](#)

[ABOUT US](#)

[NEWS&EVENTS](#)

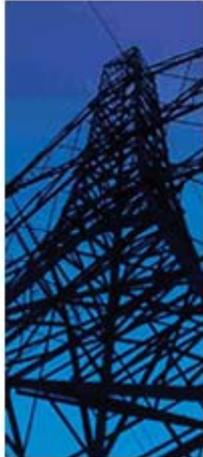
[KNOWLEDGE CENTER](#)

[MEMBERS ONLY](#)

[JOIN](#)

Welcome, Guest

[LOG IN](#)



Working together to build the skilled energy workforce of the future.

[REGISTER NOW](#)

[MEMBER RESOURCES](#)

[QUICK LINKS](#)

Upcoming: Mark Your Calendars!

To register for all events, please [click here](#)

[Add Training/Job Postings](#)

Remembering techniques allow you to live your

**REGIONAL ENERGY CONVERSATIONS**

*Energy*

**JOBS**

**POWER**

**EFFICIENCY**

*sustainability*

**TECHNOLOGY**

*Technician*

**ADVANCED TECHNOLOGY ENVIRONMENTAL AND ENERGY CENTER**

<http://www.ateec.org/index.htm>

## Northwest

- Renewable energy systems installer
- Energy auditing technician (residential)
- Maintenance technician
- Utilities technician
- Manufacturing technician



## Southwest

- Alternative Fuel Vehicle (AFV) repair/maintenance technician
- Energy auditor
- Renewable energy systems installer
- Solar photovoltaic technician
- Electrical controls technician



## West

- Energy auditor
- Building analyst
- Solar/wind manufacturing production technician
- Wind turbine mechanic
- Power quality engineer



## South Central

- Solar/wind/wave/geothermal resource assessor
- Oil & gas field technician
- DCS programmer/operator
- Energy optimization technician
- Geothermal technician
- Oil refinery/process technician



## North Central

- HVAC technician
- Energy auditor
- Wind turbine technician
- Solar system installer
- Controls technician



## Mid-Atlantic

- Plans, Review, and/or Building Inspector
- Skilled construction tradesperson
- Mechanical maintenance technician
- Plant operator
- Electrical maintenance technician
- Instrumentation control technician



## Southeast

- Solar panel installer
- Wind turbine technician/mechanic
- Lineman
- Hydropower maintenance technician
- HVAC technician
- Energy auditor



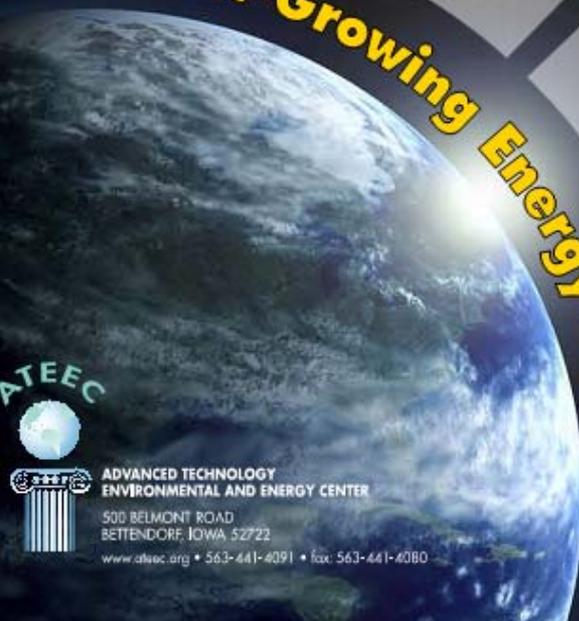
# Fastest-Growing Energy Jobs



ADVANCED TECHNOLOGY ENVIRONMENTAL AND ENERGY CENTER

500 BELMONT ROAD  
BETTENDORF, IOWA 52722

www.ateec.org • 563-441-4091 • fax: 563-441-4080



# Regional Energy Conversations

- Regional technician-level jobs
- Certifications for these jobs
- Regional labor market data resources for the region
- Most prevalent and fastest-growing jobs
- Educator and training best practices
- Core technical skills
- Employability skills
- Future trends

# Findings from the 7 regions

- Energy auditing is consistently the highest ranking occupation in all 7 regions
- Utilities agree there will be significant need for utility workers in next 5 to 10 years
- Most of these jobs will not be new

# Fastest Growing Occupations

- Energy efficiency, including building design/construction, facilities operation and maintenance, and energy assessment
  - Energy auditors
  - System verification technicians
  - Building operators
- Renewable energy: wind, solar PV, and solar thermal
  - Installers and maintenance technicians
  - Large- and small-scale technicians

## NORTH CENTRAL ENERGY CONVERSATION

### JOB CATEGORIES AND TITLES

Note: Highlighted text in this section indicates a regional difference in the job title from the national job titles. It may indicate a difference in wording of the job title or a job title specific to a region that was not identified as a national job title. (National job titles are based on those listed in the national report, *Defining Energy Technologies and Services* ([www.ateec.org/store/](http://www.ateec.org/store/))).

#### FASTEST-GROWING JOBS IN NORTH CENTRAL U.S.

Energy Conversation participants identified the following occupations as high-demand and rapidly growing jobs in their region. The jobs in black were ranked highest.

- HVAC tech
- Wind turbine tech
- Controls tech (industrial)
- Pipefitter
- Hybrid auto tech
- Transportation planner permit specialist
- Maintenance tech (transportation)
- Energy engineering tech (building)
- Building & construction tech
- Building inspector
- Agri-science tech
- Biorefinery tech
- Process tech (biomass)
- Turbine maintenance & repair tech
- Electronic/electrical tech (wind)
- Transmission tech (wind)
- Site assessor (solar)
- Electrician (solar)
- Inspection/tester (solar)
- Electrical engineering tech
- Lineman
- Meter specialist
- Energy manager (industrial)
- Energy auditor
- Solar system installer
- Plumber
- Well driller

# JOBS

## Fastest growing jobs in our area:

- HVAC tech
- Wind turbine tech
- Controls tech (industrial)
- Energy auditor
- Solar system installer

Transportation  
CAD operator  
Fuel analyst  
Hybrid auto tech  
Logistics tech  
Maintenance tech  
Surveyor  
Transportation planner permit specialist

Utilities  
Cartographer  
Computerized machinist CNC operator  
Dispatcher  
Electrical engineering tech  
Gas tech  
Lineman  
Meter specialist

Wind  
Cement civil works engineering tech  
Crane operator  
Turbine maintenance & repair  
Electronic/electrical tech  
Land agent  
Machinist  
Meteorological tech  
Sheet metal worker  
Sound tech  
Transmission tech  
Welder  
Wind turbine tech

#### Labor Market Data Resources

American Solar Energy Society  
Apollo Alliance  
American Wind Energy Association  
Community college program advisory committees (local)  
Center on Wisconsin Strategy (COWS) reports (cows.org)  
Energy Information Services  
Focus on Energy  
IBEW (apprenticeships)  
Interstate Renewable Energy Council  
Midstate Technical College-Wisconsin Rapids  
Midwest Renewable Energy Association  
NBB Biodiesel Board  
OEI  
Professional associations (e.g., architects, engineers, state chapters)  
PWD—Projections

Regional partnerships  
Renewable Fuels Association  
Renew Wisconsin  
Rise Project/WIRED  
Roger Bezbeck reports  
SCIA  
Specific company needs  
Union of Concerned Scientists  
U.S. Green Building Council chapters  
Wage and Economic Development Council  
WI Regional Training Partnership

#### Best Practices

Advanced Technology Education community (National Science Foundation)  
Advanced Technology Environmental and Energy Center (ATEEC)  
Alliant Partnerships—(pipeline, K-12)  
Appalachian State College  
Build America—U.S. Department of Energy  
Career fairs  
Clean Energy Corps—President Obama Energy Academy (high school)—Mid-State Energy Center of Wisconsin  
Equipment manufacture/training  
Equipment training  
Farm Kids  
Florida Solar Energy Center  
Great Lakes Renewable Energy  
Integrated skills  
Internships  
Interstate Renewable Energy Council  
Lane Community College  
LA Trade Tech  
Madison Area Technical College/CERET  
MidState Renewable Programs  
Midwest Renewable Energy Association  
Military training  
NFA curriculum/codes  
North Carolina State University diploma series  
On-the-Job Training (OJT)/job experience  
PLTW/Wisconsin Energy Education Program  
RESNET  
Rise Partnership  
Solar Energy International  
State agencies (e.g., Department of Natural Resources)  
University of Wisconsin Extension Offices  
Wisconsin Public Utilities Institute  
Wisconsin Energy Conservation Corps  
Wisconsin Regional Training Partnership

JOBS

15

# Labor Market Data Resources

- America Solar Energy Society
- Apollo Alliance
- American Wind Energy Association
- Community College program advisory committees
- COWS
- Energy Information Services
- Focus on Energy
- IBEW
- Interstate Renewable Energy Council
- Midwest Renewable Energy Association
- NBB Biodiesel Board
- Renew Wisconsin

**Wisconsin**

# Clean Energy Wisconsin Plan

- 25 by 25. Generate 25% of electricity and 25% of transportation fuels from renewable fuels by 2025.
- Capture 10% of market share for production of renewable energy & bioproducts.
- Become national leader in research that will make alternative energies more affordable and available to all.

# Office of Energy Independence funds to grow these jobs

- Wisconsin Energy Independence Fund
- Energy Efficiency/Conservation Block Grants
- Emerging Industry Skills Partnership Grants
- Clean Energy Manufacturing
- Clean Cities Petroleum Reduction for Transportation Grant Program
- Energy Assurance/Smart Grid Program
- WisconSEN Program: Save Energy Now

# Office of Energy Independence funds to grow these jobs

- Only state to target ARRA State Energy Plan funds exclusively to manufacturing
- Larger % of employees in manufacturing than any other state
- Office of Energy Independence has many initiatives in place to develop State Energy Plan



## Wisconsin's Sector Alliance *for the Green Economy*

[Home](#)[Leadership](#)[Projects](#)[Meetings](#)[Resources](#)[Subscribe](#)

### SAGE

*SAGE is Wisconsin's Sector Alliance for the Green Economy grant, a three-year \$6 Million project funded by the US Dept. of Labor to build strong energy sector workforce training partnerships and immediately green up many of the state's apprenticeable occupations in construction and manufacturing.*

[Learn more about SAGE](#)



**In the Spotlight**



**Staff**



**ARRA**

[www.sagewi.gov](http://www.sagewi.gov)

# Wisconsin SAGE

- Energy Efficiency, \$2.7M
  - Two new apprenticeships
    - Weatherization technician
    - Energy auditor
  - Green/upgrade existing apprenticeships
  
- Renewables and manufacturing, \$2.5M
  - New apprenticeship: wastewater treatment
  - Green/upgrade existing apprenticeships
  
- Utilities & Smart Grid, \$600K
  - Expand electric line worker & meter tech
  - Upgrade substation apprenticeship

# SAGE Advisory Team

## ■ Required membership

- Representatives from Council on Workforce Investment
- State workforce agency
- State cabinet officials
- Energy efficiency & renewable energy businesses & industries
- Labor organizations
- Workforce Development Boards or regional consortia

## ■ Other members

- DWD's Bureau of Apprenticeship Standards
- Nonprofit organizations
- Education & training providers; technical colleges
- State & local veterans' agencies
- Economic development organizations

# My Take Aways

- Majority of these jobs will be technician-level
- Majority will be existing jobs with a layer of RE
- So it makes sense to get into a existing job category and add a specialty of green energy
- Then you can ride out the ups and downs of these emerging jobs
- Energy management is an old job category, but emerging in that new pathways into these jobs are being established and it will be important

## Existing programs that pair with the Renewable Energy Certificate

- Agriscience/business
- Architecture Tech
- Automotive
- Biotechnology
- Construction and Remodeling
- Civil Engineering Tech
- Diesel Equipment
- Electrical Engineering Tech
- Electrical Apprentice
- Electronics
- Industrial Maintenance



# CERET

Consortium for Education in Renewable Energy Technology



## Mission Statement—

Increasing the availability and use of renewable energy through a world-class Consortium for Education in Renewable Energy Technologies

## Certificate

= Online

Face-to-Face =

Course Number	Course Title	Credits	Hours / Week Lecture—Lab
---------------	--------------	---------	-----------------------------

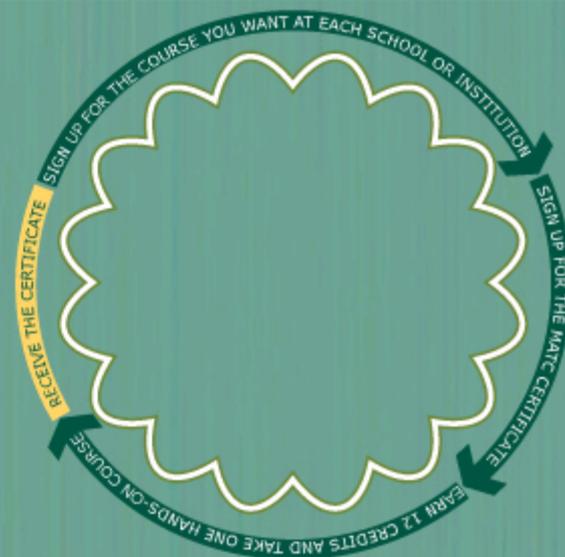
Choose at least one of the following classes

10-468-100	Solar & other Renewable Energy Systems	4	4-0
10-468-110	Energy Management	4	4-0

At  
Least 4  
credits

Plus at least 3 credits from among these classes

10-468-120	Alternative Fuel and Electric Vehicles	3	3-0
10-468-130	Photovoltaic Design	2	2-0
10-468-134	Advanced Photovoltaics	2	2-0
10-468-140	Sustainable Home Design	2	2-0



## Resources

▶ [CERET Resolution](#)

▶ [CERET Workshop](#)

*For More Information on the Consortium  
for Education in Renewable Energy  
Technology (CERET) :*

**www.ceret.us**

**Barb Anderegg**

**banderegg@matcmadison.edu**

**608-246-6812**