BOARD OF HIGHER EDUCATION

REQUEST FOR COMMITTEE AND BOARD ACTION

COMMITTEE: Assessment and Accountability **NO**.: AAC 10-05

COMMITTEE DATE: December 1, 2009

BOARD DATE: December 8, 2009

MOUNT WACHUSETT COMMUNITY COLLEGE
Associate in Science in Energy Management

MOVED: The Board of Higher Education hereby approves the application of **Mount Wachusett Community College** to award the **Associate in Science in Energy Management**.

Upon graduating the first class for this program, Mount Wachusett Community College shall submit to the Board a status report addressing its success in reaching program goals as stated in the application and in the areas of enrollment, curriculum, faculty resources and program effectiveness.

Authority: Massachusetts General Laws Chapter 15A, Section 9(b)

Contact: Dr. Francesca Purcell, Associate Commissioner for Academic and P-16 Policy

BOARD OF HIGHER EDUCATION

Mount Wachusett Community College

Associate in Science in Energy Management

INTENT and MISSION

In September 2009, Mount Wachusett Community College (MWCC) submitted an expedited proposal to offer an Associate in Science in Energy Management. The proposed Energy Management program is designed to expose students to a variety of theoretical and applied information specific to the energy industry. The proposed program's primary goal is for students to develop a fundamental knowledge of energy management concepts, emerging technologies and best practices that may be applied to the pursuit of additional academic credentials in pre-engineering, energy management and/or building technology related courses of study. The program also intends to provide real-world job experience and preparation for a variety of existing or emerging career paths that include work with energy management firms, utility providers, community development agencies, energy audit facilitators and energy service companies.

The College's mission is to provide academic preparation for transfer to four-year institutions, career preparation for entry into high-demand occupational fields, job retraining and lifelong learning opportunities. As a regional community college, MWCC also strives to assist in the economic development within north-central Massachusetts areas through the development of a skilled workforce for industries that continue to grow or are new to the communities served by the College's three campuses located in the cities of Gardner, Leominster and Devens.

As an original signatory to the American College and University President's Climate Commitment (ACUPCC), MWCC is also committed to pursuing climate neutrality in campus operations while helping to transform the educational experience so that all students will have the knowledge, skills and values to create a healthy, just and sustainable world now and in the future. MWCC notes that it is the only known institution of higher education in Massachusetts that has a complete array of renewable energy sources, including biomass heating, biomass gasification (combined heat and power), photovoltaics, solar thermal, geothermal and wind power located on campus. By utilizing the campus as a learning laboratory for energy management best practices, MWCC is uniquely positioned to integrate the practical application and theoretical discourse required for emerging professionals in a new, clean energy economy.

The proposed program builds on this history of green facilities management practices and also on courses previously developed with funding received from the National Science Foundation (NSF). These courses—*Renewable Energy Sources, Introduction to Energy Management Principles and Energy Efficiency and Conservation Methods*—will provide a solid foundation for the core requirements of the proposed program.

The MWCC Board of Trustees approved the Associate in Science in Energy Management on February 12, 2009.

NEED and DEMAND

In June 2009, The PEW Charitable Trusts released a report that included the first-ever count across all 50 states of the actual jobs, companies and venture capital investments that supply the growing market demand for environmentally friendly products and services. The Clean Energy Economy Report found that jobs in the clean energy economy grew at a national rate of 9.1 percent, while traditional jobs grew by only 3.7 percent between 1998 and 2007. The report summarized the status of Massachusetts in the clean energy economy as follows:

> Massachusetts has a large and growing piece of America's clean energy economy. The state had nearly 27,000 jobs in its clean energy economy in 2007. It is one of seven states, along with the District of Columbia, where total jobs fell, but jobs in the clean energy economy increased between 1998 and 2007. Massachusetts' job growth in the Clean Energy category was particularly strong, growing 30 percent between 1998 and 2007. That sector received an additional boost last year when the state launched Commonwealth Solar, a $68 million rebate program to help lower the cost of purchasing and installing solar electric power. Massachusetts remains a hub for innovation, ranking sixth among states in clean technology patents in the past 10 years; it trails only California in clean technology venture capital funding, attracting nearly $1.3 billion in private investment in the past three years.

Research conducted by the New England Clean Energy Council in spring 2009 indicates that most New England states are expected to have above-average job growth in both the renewable energy and energy efficiency categories relative to national averages. Furthermore, Massachusetts is expected to experience high job growth for renewable energy and above-average growth for energy efficiency categories. Collectively, the NECEC data project growth of between 53,000 to 80,000 jobs in the clean energy sector throughout New England by the year 2020.

During the last year, substantial workforce development funding has been allocated to Massachusetts to educate and train individuals who will be able to understand and manage a variety of energy related applications, such as solar energy systems, including energy efficiency retrofitting, solar photovoltaic and heating system installation, wind energy, green building and clean energy policy fields. The chart below provides an overview of these grants:

Source	Name of Grant Program	Due Date	Total Funding
U.S. Department of Labor	Pathways Out of Poverty	29-Sep-09	$150 million
U.S. Department of Labor	Energy Training Partnership Grant	4-Sep-09	$100 million
Commonwealth Corporation	Pathways Out of Poverty	15-Jan-09	$ 1 million
U.S. Department of Energy	Wind and Hydro Power Technologies Program	3-Mar-09	$ 1 million

MA Clean Energy Center	MA Clean Energy Center Energy Efficiency/Building Science Initiative	1-May-09	$1.875 million
U.S. Department of Labor	State Labor Market Information Improvement Grants	14-Aug-09	$50 million
U.S. Department of Labor	State Energy Sector Partnership (SESP) and Training Grants	20-Oct-09	$190 million
U.S. Department of Labor	Green Capacity Building Grants	5-Aug-09	$5 million
U.S. Department of Energy	Solar Market Transformation	3-Jul-09	$170 million
Commonwealth Corporation	Clean Energy Workforce Training Capacity Building	15-Jul-09	$950,000
TOTALS			$669.83 million

Source: New England Clean Energy Council

In the 2009 regional research study for Massachusetts and Rhode Island conducted by the Association of Energy Engineers (AEE), 73 percent of energy professionals indicate a heightened shortage of qualified professionals in the energy efficiency and renewable energy fields within the next five years. In addition, 70 percent of energy professionals indicate a need for national and state training for "green jobs" to address job shortages that are impairing growth in green industries, such as energy-efficient building and construction, renewables, electric power, smart grid, energy-efficient vehicles and biofuels development.

In addition to this data, MWCC conducted a survey of regional businesses in January 2009 and field research at the Green Jobs Conference, sponsored by the Massachusetts Clean Energy Center in October 2009 in Marlborough, to determine the employment needs in energy-related professions. Results from these efforts indicate that Massachusetts-based employers anticipate a need to hire employees for "green collar" jobs within the next three years and that there is an immediate need in the following professions: manufacturing, sales, installation, site evaluators, and solar consultants.

There is currently no known Associate in Science in Energy Management degree in Massachusetts or within the surrounding New England area. Certificate programs in related areas offered at regional community colleges report high enrollments with some programs resorting to waitlists. As a result, students have approached MWCC for enrollment in similar courses since they were denied enrollment at these colleges due to increasing demand. The growth at one nearby institution—Greenfield Community College—has been especially robust. There are over 100 enrolled students in the certificate in Renewable Energy and Energy Efficiency and the Associate in Arts with an Option of Renewable Energy. These programs did not exist three years ago. At Cape Cod Community College, there has also been a steady increase in graduates in their certificate and degree programs during the last three years.

Since August 1, 2009, MWCC reports having received several dozen inquiries via internet, phone and in-person visits regarding a program in energy management.

ADMISSION and ENROLLMENT
The targeted student market would be composed primarily of individuals seeking to pursue new career paths in the energy efficiency and clean energy areas. Within this group, MWCC would target individuals seeking retraining/retooling of existing skills, such as previously trained plumbers, electricians, CAD operators, information technology employees, HVAC system installers, carpenters and others in the construction trades. However, the program is also designed for students graduating from the region's vocational technical schools who could transfer credits from their "trade" education through developed articulation agreements and other students interested in energy-related topics.

PROGRAM ENROLLMENT PROJECTION

	# of Students Year 1 (Fall 2010)	# of Students Year 2 (Fall 2011)	# of Students Year 3 (Fall 2012)	# of Students Year 4 (Fall 2013)
New Full Time	20	25	30	30
Continuing Full Time	-	19	23	20
New Part Time	10	12	15	15
Continuing Part Time	-	8	7	7
Totals	30	64	75	72

CURRICULUM (Attachment A)
The proposed Energy Management Program consists of 13 core classes that represent 44 credits of college-level instruction. There are an additional 20 credits of general education requirements. To complete requirements of the degree, students must successfully complete a total of 64 credits.

In addition to the acquisition of knowledge of energy management concepts, emerging technologies and best practices, students will also have the opportunity to explore focused energy industry internships and/or personal areas of interest through independent study research involving topics such as emerging solar manufacturing processes, smart grid and fuel cell technologies.

Upon completion of the proposed energy management program, students will have acquired the following knowledge and skills:

- Be familiar with the basic concepts of energy and energy usage as applied to the built environment.
- Demonstrate an understanding of fundamental control systems for commercial and residential energy applications.
- Evaluate energy use patterns for residential and commercial buildings and recommend energy efficiency and alternative energy solutions for high-energy consuming buildings.
- Demonstrate skill sets required for energy audits and weatherization of residential and commercial buildings.

- Understand the range and scope of renewable energy sources and their applications for residential or commercial construction.
- Collect and display data as lists, tables and plots using appropriate technology (e.g., field equipment, such as duct blasters, blower doors, infrared cameras and tools, such as AUTOCAD, ECOTECT, REM Rate and eQUEST).
- Construct energy evaluation technical reports and make presentations for potential project implementation.
- Interpret and analyze applicable codes and guidelines by agencies, such as the Environmental Protection Agency (EPA), the American Society of Heating and Air Conditioning Engineers (ASHAE) and the Association of Energy Engineers (AEE).
- Access library, computing and communications services. Obtain information and data from regional, national and international networks.
- Demonstrate the ability to conduct academic-level research on energy efficiency and sustainability related topics.

Advisory Board
The College has established an advisory board for the program from a dozen organizations that consists of a variety of individuals, including building-trades-related faculty, distinguished female professionals, representatives from community development agencies, regional and national utility providers, solar panel manufacturers, real estate developers and regional workforce development organizations. These individuals have agreed to participate in quarterly meetings and provide ongoing feedback in an effort to calibrate the program with industry trends, current research and emerging technological developments.

RESOURCES AND BUDGET (Attachment B)

Faculty and Administration
The College has hired a new Director of Sustainability and Energy Management to plan courses, participate in recruitment, develop plans for potential equipment purchases as needed and author grants through the office of Institutional Advancement and Planning. MWCC will also hire an additional full-time faculty member, who will be responsible for teaching the majority of courses offered. In addition, instructors from the Leominster Center for Technical Education may also participate as adjunct faculty.

Library
The Library is a fully staffed division of the College supported by a head librarian, two reference librarians and additional clerical support. Faculty and students will have full access to a variety of data bases at the Devens, Leominster, and Gardner campuses, including those associated with energy, conservation, alternative energies and sustainability related topics. The College Information Technology Department is fully functional and supports classroom instruction through multimedia equipment and training. They also make available Blackboard, a course management software program for web-based and web-enhanced learning activities. The Gardner campus exhibits campus-wide WIFI student access, as well as multimedia technology in essentially all classrooms and laboratories.

Physical Resources
MWCC anticipates that the majority of the courses in the program will be taught at the MWCC campus located in Devens, Massachusetts. This recently renovated facility has numerous open-plan classroom spaces that allow for flexible configuration and use hands-on demonstration models or other portable field equipment. The College has also signed an agreement with the Leominster Center for Technical Education for shared use of full-service electrical, graphics and HVAC laboratories, associated classroom spaces and demonstration equipment that may be used as needed for planned courses in the proposed energy management program.

For several core courses, MWCC will utilize specialized software such as ECOTECT, eQUEST and Energy Pro that will expose students to a variety of state-of-the-art industry tools. In support of the internships involving real world building projects, MWCC also plans to obtain a variety of building diagnostic equipment, including blower doors, infrared cameras, duct blasters, manometers and customized workstations designed to provide hands-on training for students in the areas of energy auditing, weatherization and renewable energy systems management.

Budget (Attachment B)
Anticipated costs include one full-time faculty member and additional adjunct faculty, general administrative costs, library acquisitions, the lease agreement with the Leominster CTE, development of hands-on educational tools and demonstrations, equipment, procurement of educational software licensing for programs, and marketing resources. Twenty to 30 students per year will generate revenue, as indicated in the budget. The MWCC Foundation has allocated $83,000 in funding to be used for sustainability and renewable energy initiatives during the next several years. Additional potential revenue sources include funding from the federal stimulus package and over $200,000 available from the Mayor of Gardner's office, which may be used for weatherization, education and energy-related initiatives.

PROGRAM EFFECTIVENESS
Mount Wachusett Community College submitted the following goals and objectives for the proposed Associate in Science in Energy Management:

Goals	Date to be Completed	Individuals Responsible	Assessment
Submit Energy Management Program Proposal (EGM)	April 15, 2009	Melissa Fama	Board Approval
Appoint Director/Instructor	September 2009	Melissa Fama	Appointment Completed
Develop Recruitment Plan for Non-Technical Courses	October – November 2009	Director/Instructor	Recruitment Plan Developed, Newspaper, Website
Resubmit Revised Energy Management Proposal	November 2009	Director/Instructor	Review by VP of Academic Affairs, Outside Evaluators
Author Grants for EGM-Related Equipment and Support	November 2009 – June 2010	Director/Instructor Dept. of Institutional Planning and Development.	Grant Submitted
Continue Discussions with Vocational High Schools re: Articulation Agreements	December 2009	Director/Instructor VP of Finance	Lease Agreements Finalized

Convene Advisory Board for EGM	January 2009	Director/Instructor	Minutes Published
Develop Comprehensive Marketing Strategy for Program	Winter 2009	Director/Instructor/VP of Communications	Create Strategic Plan
Recruit Students for Credit Courses (program and non-program)	Winter 2009	Director/Instructor	Outreach to Community Organizations and Previous Lifelong Learning Participants
Follow-up with all Student Inquiries for Enrollment in Spring Courses	Winter 2009	Director/Instructor	Contact all Recorded Inquiries for Energy Management Program
Advisory Board Quarterly Meeting	February 2010	Director/Instructor	Solicit Feedback on Program Facilitation
Schedule Fall 2010 Technical Core Courses	February 2010	Director/Instructor	Enrollment in Higher-Level Courses
Recruit Students for Credit Courses (program and non-program)	Spring 2010	Director/Instructor	Outreach to Community Organizations and Previous Lifelong Learning Participants
Conduct Focus Groups, Surveys/Follow-up of Clean Energy Business Needs	Spring 2010	Director/Instructor	Maintain Industry Connections to Closely Calibrate Program Content
Recruit New Students for Fall 2010 Entrance (Pending Approval of Proposal)	Summer 2010	Director/Instructor Admissions Office	Enrollments for New Freshmen
MWCC Annual Fall Recruitment Event	Fall 2010	Director/Instructor	Define Quality Leads
Provide Quality Student Instruction	Fall 2010 and on-going	Division Dean	Analyze Instructor and Student Evaluations and Require Improvement if Necessary
Advisory Board Quarterly Meeting	Spring 2011	Director/Instructor	Solicit Feedback on Program Facilitation
85% of Graduating Students Placed Into Jobs Related to Curriculum or Transfer to Bachelors Programs	June 2011; June 2012	Director of Placement Director/Instructor	Placement Data Reviewed
Post-Graduate Satisfaction is High (over 90%)	Fall 2012 and Continuing	Director/Instructor Division Dean	Graduate Surveys Reviewed

EXTERNAL REVIEW AND INSTITUITONAL RESPONSE

Roger Ebbage, Director of the Northwest Energy Education Institute at Lane Community College, located in Eugene, Oregon; and Joe Sarubbi, Executive Director of TEC-SMART at the Hudson Valley Community College, located in Troy, New York, reviewed the proposed program.

The external reviewers commended MWCC for doing a great job encapsulating the demand for new jobs in the emerging energy industry and concluded that the proposal offers a full, fundamental set of theory and skills. The reviewers found that the technical coursework, as well as the equipment to support the program, are appropriate. The reviewers noted that MWCC has much experience in energy-related topics and has

been a leader in biomass energy generation, photovoltaic generation for electricity and soon-to-be-installed wind turbine.

The external reviewers made several recommendations related to the curriculum, including splitting the energy auditing class into residential and commercial auditing, adding a capstone course, and including internships or cooperative experiences. The reviewers also recommended the establishment of an industry advisory board.

The College, through the appointment of the Director of Sustainability and Energy Management, further developed the Energy Management Program curriculum in response to the external reviewers. These amendments include revisions to the core curriculum, the addition of targeted internship experiences, a new partnership with Leominster Center for Technical Education (CTE) for additional facility space and equipment, and the development of an Advisory Board for Energy Management and Clean Energy Training comprising professionals from private and public industries, workforce development agencies, and community development corporations, as well as technical education experts.

STAFF ANALYSIS AND RECOMMENDATION

Board staff thoroughly reviewed all documentation submitted by Mount Wachusett Community College and external reviewers. Staff recommendation is for approval of the Associate in Science in Energy Management.

Upon graduating the first class for this program, MWCC shall submit to the Board a status report addressing its success in reaching program goals as stated in the application and in the areas of enrollment, curriculum, faculty resources and program effectiveness.

ATTACHMENT A: Curriculum Outline

Course Number	***Course Title***	***Credit Hours***
Required (Core) Courses in the Major (Total # courses required = 13)		
EET 103	Circuit Analysis I	4
NRD 104	Renewable Energy Sources	4
NRD 105	Introduction to Energy Management Principles	3
NRD 106	Energy Efficiency and Conservation Methods	3
EGM 100	Engineering and Architectural Graphics	3
EGM 110	Electric Lighting and Motors	3
EGM 115	Sustainability in the Built Environment	3
EGM 125	Energy Analysis and Auditing	4
EGM 130	Energy Control Strategies	4
EGM 140	Energy Project Costs and Funding Solutions	3
EGM 220	Heating and Cooling Systems	3
EGM 280	Sustainable Building Operation and Maintenance	4
EGM 290	Industry Internship/Independent Study	3
Subtotal Required Credits		**44**
General Education Requirements (Total # courses required = 7)		
CIS 127	Computer Technologies	3
ENG 101	English Composition I	3
ENG 102	English Composition II	3
MAT 126/143	Topics in Mathematics/Statistics	3
PER 126	Fitness and Wellness	2
	**Social Science Elective	3
	**Humanities Elective	3
Subtotal General Education Credits		**20**
Total Number of Credits Required for Degree		**64**

ATTACHMENT B: Budget

Anticipated Annual Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Full-Time Faculty *(Salary and Fringe)*	65,000	65,000	65,650	66,963
Part-Time/Adjunct Faculty *(Salary and Fringe)*	0	9,000	9,270	9,549
General Administrative Costs	3,500	3,500	4,000	6,000
Instructional Materials, Library Acquisitions	1,200	1,800	2,400	3,000
Facilities Rental Leominster CTE YR 1: 3 classes, YR 2 and 3: 4 classes, YR 4: 6 classes	10,125	13,500	13,500	20,250
Field Equipment (Blower Door, Infrared Camera, Duct Blaster, Manometer, Trailer, etc.)	21,749	16,449	37,924	44,524
Marketing	10,000	12,500	7,500	5,000
Educational Software AUTOCAD, REM Rate, ECOTECT, Rhino, In Design, etc.	36,133	2,640	1,140	1,140
Hands-On Demonstration Equipment and Ongoing Consumables	2,000	6,000	7,500	3,500
TOTALS	147,707	119,889	143,884	158,426

Anticipated Annual Revenue	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Grants				
Tuition ($25/credit) (FT Student)** (PT Student)***	(16,000) (5,000)	(20,000) (6,000)	(24,000) (7,500)	(24,000) (7,500)
Fees ($140 College Fee/credit) FT PT	(89,600) (28,000)	(112,000) (33,600)	(134,400) (42,000)	(134,400) (42,000)
MWCC Marketing and Public Relations	8,000	6,000	6,000	3,000
MWCC Foundation	60,000			
Subtotal Revenues				
NET PROFIT	58,893	57,711	70,016	52,474