

Consortium for Advanced Manufacturing of Alternative & Renewable Energy Technologies (CAMARET)

Western Michigan University, Michigan State University, Wayne State University,
University of Michigan, and Michigan Technological University

Michigan's research universities are establishing a Consortium for Advanced Manufacturing of Alternative & Renewable Energy Technologies (CAMARET) to address the needs of the developing alternative and renewable energy technology industries within the state. The Consortium will partner with companies and organizations engaged in the design and manufacture of alternative and renewable energy technologies (A&RET), such as wind turbines, solar collectors/photo voltaic cells, advanced batteries, and fuel cells, and alternative fuels (especially bio based sources) to improve their manufacturability, e.g., improve quality, reduce costs, and increase throughput/productivity, while providing environmental, energy, economic and societal benefits. The overarching goal of the Consortium is to assist with the development of an alternative and renewable energy industry in Michigan and to improve the competitiveness of businesses to ensure their long-term viability and sustainability. The Consortium's activities will insure that Michigan is a leader in the manufacturing of A&RET products and services.

The Consortium will promote environmentally benign design and manufacturing (EBDM) methods as a cornerstone of its effort to complement the positive benefits offered by alternative and renewable energy technologies deployment. The result will be an alternative and renewable energy industry underpinned by sustainable industrial practices. EBDM practices applied to the A&RET industry will serve as a model of standards and best practices for other states, national and international efforts in these emerging global markets.

Motivation

Michigan's growing Alternative & Renewable Energy Technology (A&RET) industry sector has been fueled by the entrepreneurial spirit of businesses, State funding, and passionate individuals who desire to reduce society's reliance on fossil fuels. Solar, wind, bio fuel, fuel cell, battery, and other related alternative and renewable energy technologies have the potential for wide applications in stationary and distributed power generation (utilities), mobile-transportation systems, residential/commercial, and industrial energy systems, and numerous portable power devices for electronic (laptops, cell phones, etc.) and thermal systems (heating and cooling). Attention is currently focused more on demonstrating the feasibility of A&RET systems than on the design and basic manufacturing of components and systems. The commercial potential of A&RETs is limited by the cost, quality, and production rate of existing product/process designs; improvement in these areas is needed to ensure the leadership of Michigan in A&RET. Furthermore, since A&RET companies are already in the sustainable energy business, they will naturally support sustainable principles as embodied in environmentally benign design and manufacturing (EBDM) practices. Doing it right the first time, with respect to EBDM of solar PV cells, wind turbines, fuel cells and batteries (materials, manufacturing processes, reclamation, etc.), will enhance the status of these technologies during the 21st century.

Mission and Scope

The Consortium for Advanced Manufacturing of Alternative & Renewable Energy Technologies (CAMARET) is being established to support companies and organizations engaged in A&RET within Michigan. CAMARET will provide the centralized expertise and resources necessary to insure that the job (design and manufacturing) is “done right” with respect to products and systems from cost, quality, throughput, and EBDM perspectives. While specific thrust areas within the Consortium will evolve based on the needs of the member companies (such as wind turbine, solar cells, fuel cells and advanced batteries), anticipated emphases include energy efficient and environmentally sustainable:

- **A&RET product designs and materials**
- **Manufacturing processes and facilities**
- **Business and supply chain** (issues of integration and participation in activity)
- **Usage and reuse of waste** (recycle/reuse of materials, energy and products) for other applications/companies.

These thrust areas will be targeted at reducing or eliminating the technical barriers to industry’s success, thus improving their overall performance. The proposed network of universities can help companies attain their goals for the design and production of A&RET, and at the same time pursue energy efficiency and environmentally sustainable goals. CAMARET will identify research issues related to A&RET design and manufacturing, and then implement a research agenda and plan to address issues of concern and interest to the consortium members.

In addition to the research focus associated with these thrust areas, CAMARET through its faculty members will offer a high level think-tank component as a complement activity. The center’s faculty will form flexible teams to provide consulting services (including brainstorming and eventual spin off projects) to companies and organizations as an up-front service. This activity would hopefully (if a company/organization adopts a suggestion/recommendation) result in future research projects for the consortium members (universities) and their students.

Organizations within the State, such as MEDC, DLEG, and NextEnergy., will promote and secure a commercially vibrant A&RET industry for Michigan. This effort will bring together A&RET providers within the state, act as a magnet to attract non-Michigan A&RET companies to participate in this initiative, and provide corporate members of the Consortium with the tools/knowledge (scientific, engineering, and technical) to overcome the barriers to realize a sustainable energy future. The focus of the center’s activity will be towards implementation of production ready scale, rather than creating prototypes.

Points of Contact

Western Michigan University	
John Patten (269) 276-3246	john.patten@wmich.edu
Michigan State University	
Al Loos (517) 432-0844	aloos@egr.msu.edu
Patrick Kwon (517) 355-0173	pkwon@egr.msu.edu
Wayne State University	
Yinlun Huang (313) 577-3771	yhuang@wayne.edu
University of Michigan	
Steve J. Skerlos (734) 615-5253	skerlos@umich.edu
Albert Shih (734) 647-1766	shiha@umich.edu
Michigan Technological University	
John Sutherland (906) 487-3395	jwsuther@mtu.edu
Jane Zhang (906) 487-3612	qiong@mtu.edu

Discrete Product based Production (focus of the consortium's efforts):

Energy Conversion: Wind Turbines, Solar Cells (PV), Solar Thermal (hot water, ovens, etc.)

Storage Devices: Batteries, Fuel Cells; Fuels (Bio mass and H₂): Bio materials

Partners: (Michigan based) Next Energy, MEDC, DLEG/DEQ, SME

Time Schedule:

Last meeting (conference call) with Next Energy and MEDC: Oct 12, 2007

Next meeting with industry at NextEnergy: Dec. 14, 2007 2-4 PM

Larger scale meeting with potential funding agencies: 2008

Other Activities: Service/outreach (training and assistance) – extension service program (see MTU's Sustainable Future Team). State's MEP/[MMTC](#) may already do this (so we need to be careful not to overlap too much). This may be the best resource for a start up company trying to access the supply chain network. Also, NCMS in Ann Arbor may be a strategic partner at some time in the future. Next Energy has a 21st century jobs grant to create a data base of university based expertise and promote this skill to industry. The CAMARET could contribute to this effort specifically in the manufacturing sector, with sustainable products and process research and development activities.

John Patten Dec 6, 2007