Sabbatical Leave Report
Fall 2009

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CC: The Improvement of Learning Committee
Summary

During my sabbatical work in fall 2009, my most important goal was to strengthen the Renewable Energy Minor by establishing ties with industry and investigating the partnership opportunities with the UW institutions that have some form of renewable energy programs. As a result, I have visited seven companies and three universities during last fall. In addition, I have contacted several more companies through phone and emails. As a result of this work,

- Most of the companies indicated that they want to have long term partnerships with the renewable energy programs at UWP.
- Several companies indicated that they will be willing to provide projects for ENERGY4920 or other classes.
- Several companies indicated that they are willing to support the renewable energy activities at UWP in a variety of ways, two of them financially.
- Most of the companies contacted indicated a strong desire to provide co-op summer internship opportunities for the students in the minor or future major.
- Most of the companies indicated strong desire to serve on the Renewable Energy Industrial Advisory Board.
- Two universities showed interest in collaborative faculty/student research in renewable area.
- All three universities indicated their willingness to collaborate in course sharing.

I believe that the outcome of these visits and contacts were extremely positive. I feel that, with some follow through, the Renewable Energy Minor and future major will have much stronger support form energy industry in the future.

Main Goals

The overarching goal of my sabbatical was to strengthen the renewable energy program at UWP by visiting industry and universities and strengthening ties with them.

The specific goals of visiting energy/renewable energy industry, as written in the sabbatical proposal, were:

1. To create a list of companies (with their contact information) willing to support our renewable energy program and start partnerships with such companies.

2. To create a list of industry sponsored projects that we can use in ENERGY4920. This will require talking to industry face to face and also visiting their facilities whenever appropriate.

Specific goals visiting universities, as written in the sabbatical proposal, were:
1. To identify what equipment or set up is needed in the “Renewable Energy Resource Center” to support the Minor effectively. Visiting universities and their laboratory facilities in energy area will be extremely helpful in this regard. This can only be achieved by visiting lab/research facilities of other institutions.

2. To identify opportunities for collaboration between UWP and other universities with regard to the possibility of offering courses through distance education technologies.

3. To identify opportunities for collaboration between UWP and other universities with regard to faculty and student research on renewable energy.

Expansion in the Scope of the Sabbatical Work

When I have submitted my sabbatical plans in September 2008, the Renewable Energy Minor was just established by the Renewable Energy Council (that I was chairing) and the UWP started offering the first course in renewable energy (ENERGY 2130) in fall 2008. During the 2008-2009 academic year, the Renewable Energy Council decided to start a new major called Sustainable and Renewable Energy Systems (SRES) at UWP. In spring 2009, the permission to plan for this major was submitted to the UW-System and approval for the permission to plan for SRES was received from the Board of Regents at the end the summer of 2009. Hence, in fall 2009, the Renewable Energy Council started working on the parts of the implementation plan for SRES. This required significant input from industry with regard to the type of the program UWP needs to establish, program goals and objectives, the skill set that the graduates must possess, and whether or not there will be employment opportunities for the graduates. As a result, it was clear that we had to have stronger ties with energy industry and form a Renewable Energy Industrial Advisory Board as soon as possible. Therefore, during my sabbatical leave in fall 2009, the scope of my sabbatical work naturally expanded into discussions of:

- The proposed SRES program goals.
- The skill set of graduates from SRES.
- The need for graduates from such a major.
- Possibilities for cooperative education or internship opportunities for the students in the major.
- Support for Renewable Energy Minor as well as SRES Major.
- Serving on the Renewable Energy Industrial Advisory Board.

The contacts with the universities also expanded into collaborative research and resource sharing as well as course development and delivery.

The following sections provide a brief description of the nature of my visit and the insights gained in each visit.
Companies Visited and Possible Support and Collaboration Areas

1. **Plexus**: Plexus, located in Neenah, WI, is an electronic manufacturing services company that provides unique set of value-added product realization solutions. These solutions include mechanical, electronic and software design, printed circuit board development, prototyping services, new product introduction, material procurement and supply chain management. I had a meeting with Dave Hahn, VP of Technology Group, and Joseph Hurst, Manager of Engineering Solutions. I also had a tour of Plexus’s facilities. Contact phone: (920) 751-3268.

   Observations:
   - Plexus is interested in engineering side of renewable energy. They are particularly interested in grid integration and inverter design issues. They may develop a business in display systems for renewable energy.
   - Plexus is interested in SRES graduates with strong math and science background; however, they indicated that graduates must understand the social, economic, and environmental effects of engineering solutions.
   - Plexus is interested in providing co-op or internship opportunities for students in the Renewable Energy Minor and SRES Major (particularly engineering students).
   - Plexus is also interested in projects that fit in renewable energy and electrical engineering programs.
   - Support of the renewable energy program seems likely.
   - Plexus has a strong interest in serving on the Renewable Energy Industrial Advisory Board.

2. **Alliant Energy**: Alliant Energy is an energy company that provides electric and gas services to its customers in Wisconsin and Iowa. I had a meeting with Linda Mattes, Director of Energy Efficiency Programs, and Kimberly King, Manager of Renewable Energy and Demand Response in Cedar Rapids IA. Contact Phone: (319) 786-8116.

   Observations:
   - Most of the Alliant Energy activities in renewable energy area seem to be a result of legislation by federal or state governments. There are no activities on PV or hydrogen. Alliant seems to be more focused on bio-energy component of renewable energy.
   - The company seems to be very interested in the developments on carbon credits/tax issues.
   - Alliant Energy is interested in developing various scenarios such as 10%, 20% …50% less coal in the generation mix and its impact on Alliant Energy. This can be a class project for ENERGY4920 or EE4450.
   - Alliant Energy already provides internships for students in engineering programs, and is willing to have interns in renewable energy as well.
- Alliant Energy is more interested in SRES graduates who can evaluate the value of renewable energy project alternatives. Strong math and science background is not viewed as a must.
- Ms. Mattes may be interested in the Renewable Energy Advisory Board membership.
- The company already provides financial support to the EE-energy program.

3. Franklin Energy: Franklin Energy, located in New Berlin WI, specializes in the implementation of energy efficiency and renewable energy programs for utilities and states. I have met with Fred Dreher, Vice president of Program Implementation, and Paul Van de Sand. Contact phone: (262) 284-3838.

Observations:
- Franklin Energy is a small company that does a lot of work in renewable energy.
- The company is very interested in academic programs in renewable energy area including the minor and SRES Major.
- Mr. Dreher is very involved in various renewable energy programs at the state and national level.
- Mr. Dreher is very interested in serving on the Renewable Energy Advisory Board.
- Franklin Energy would like to see SRES graduates with significant skills in project management, business and accounting and some background in engineering science.
- Interested in providing summer internships for students in the minor or major.
- Mr. Van de Sand is also the regional coordinator of some projects on energy/renewable energy (from other companies such as We Energies) as well. These are in general applied research projects that UWP faculty and students may be involved.
- Franklin Energy is clearly interested in establishing strong partnerships with UWP in energy area.
- There may be opportunities for projects for ENERGY 4920 students.
- Support for our renewable energy program is a strong possibility.

4. Unison Solutions Inc: Unison Solutions, located in Dubuque IA, is an industry leader in custom engineered biogas conditioning and distributed generation systems and provides all facets of a renewable energy project including engineering and design, equipment fabrication, installation and ongoing maintenance support. I have met Dave Broihahn, who is part owner of the company who also gave a tour of the facilities. Contact phone: (563) 585-0969.

Observations:
- Unison Solutions is very interested in the Renewable Energy program and SRES at UWP.
- Mr. Broihahn is interested in serving on the Advisory Board.
- He is interested in providing projects for EE4920 class. He believes that the projects will mostly be for engineering or science students.
- Unison Solutions would like to see strong math and science background in SRES graduates.
- The company is already providing support for the renewable energy program.
- The company is likely to provide internship opportunities for students in the minor or major.
- The company is interested in providing field trip opportunities for students and faculty.

5. Johnson Controls Inc: Johnson Controls is an industry leader in creating quality products, services and solutions to optimize energy and operational efficiencies of buildings; industrial/commercial facilities and automobiles. I have met with Don Albinger, VP of Renewable Energy Solutions and Building Efficiency, Judith Mouton, Program Manager – Renewable Energy Education, and William Guiney, Program Manager of Renewable Energy Solutions. Also, Johnson Controls gave us a tour of their facilities in Milwaukee. Contact phone: (414) 524-4449.

Observations:
- We had an excellent exchange about possible partnerships between UWP and Johnson Controls.
- The company has a renewable energy group who are primarily engineers.
- The company would like SRES graduates to have strong math and science background.
- Johnson Controls thinks there will be significant demand for graduates in renewable energy area.
- The company is interested in the educational and academic issues in renewable energy and definitely interested in the minor and future major.
- Johnson Controls was involved when “Sustainable Management” program that was established by UW-Extension.
- They are interested in providing speakers or specialist in renewable energy (for class or for community).
- They are very much interested in having field trips to their facilities.
- Financial support is a strong possibility.
- Projects for ENERGY4920 is a strong possibility but follow up will be necessary.
- Mr. Albinger is definitely interested in serving on the Advisory Board.

6. Midwest Renewable Energy Association: Located in Custer, WI, the Midwest Renewable Energy Association (MREA) is a non-profit organization with a mission of promoting renewable energy, energy efficiency, and sustainable living through education and demonstration. I had a meeting with Nick Hylla, Instructor Development, and discussed issues of collaboration. Contact Phone: (715) 592-6596

Observations:
- MREA is doing training on solar (water/space heating, as well as PV) and Wind instructor training Nationwide (particularly in Midwest).
- MREA is also running certification in some area.
- MREA is very much interested in running one of their training courses at UWP.
- MREA is interested in evaluating the efficiencies of flat-plate and evacuated-tube type solar-thermal converters in a laboratory environment.
- MREA is also interested in certificate programs developed by universities, particularly on hands on PV Systems including system integration.
- They would be willing to provide presenters on practical applications of wind and solar.
- MREA believes that SRES graduates must have significant projects management, business and accounting, and economics skills.

7. **Sustainable Neighborhood Builders Inc:** Located in Dubuque, IA, Sustainable Neighborhood Builders Inc., is a small company that is directly involved with Dubuque Millwork district project that aims to remodel the historic district and build high quality residential housing, retail/entertainment, and business space that provides a sustainable and vital urban lifestyle in Dubuque, IA. Contact Phone: (815) 990-3646.

I had a meeting with Bob Johnson, President and received updated information about the Dubuque-Millworks district and Smart Dubuque Project.

Observations:
- The company is a small company that is working with the city of Dubuque and IBM to be a part of Smart Dubuque Project. The company may need some help from Civil and Environmental Engineering Programs (I have provided contact information) at UWP.
- Discussed opportunities for co-op and internship for renewable energy students.
- Shows interest in becoming an Advisory Board member. Discussed issues related to smart metering and displays.
- Support of the renewable energy program does not seem likely.

**Universities Visited and Possible Support and Collaboration Areas**

1. **University of Wisconsin - Milwaukee:** I had a meeting with Dr. David You, Associate Dean of Graduate Programs in EMS; Dr. Adel Nasiri, Assistant Professor of Electrical Engineering; and Dr. Vishnu Nanduri, Assistant Professor of Industrial Engineering. I have also visited several laboratories in electrical and mechanical engineering departments. Contact phone: (414) 229-6885.

Observations:
- The labs designed for primarily for graduate students to do research on certain topics of renewable energy.
- Dr. Nasiri has several graduate students doing research in the area of energy storage and power electronics/electric drives area.
Dr. Nanduri’s lab is more in the area of automatic controls and mechatronics for ME courses and research areas.

- UW-Milwaukee does not seem have a coordinated effort in renewable energy in terms of academic programs or labs.
- Collaborative research and grantsmanship is a strong possibility. Common grants & summer research for faculty was emphasized.
- Research projects for our students in EE or Renewable Energy. UWM is interested in attracting good students for their graduate program. Projects for students can be a way to achieve that.
- Not much possibility for sharing courses at this point since UWM does not have on-line or streaming courses.

2. University of Wisconsin–Extension: I had a meeting with Dr. David Schejbal, Dean of Continuing Extension & Outreach and the Director or Sustainable Management Program discussing possible collaboration particularly on course sharing and delivery between their Sustainable Management Program and our SRES Major. Contact Phone: (608) 262-2478.

Observations:
- Dr. Schejbal coordinates the Sustainable Management Program offered by Superior, Parkside, River falls, and Stout collaboratively.
- The program is self sustaining and charges $350/credit. No other fees.
- The courses are completely on-line, no face to face instruction.
- The program has a total of 21 courses (63 credits).
- Each campus is responsible for 5 courses.
- UW-Extension pays $7,500 for course development, $5,000 for teaching a course.
- Each campus has a director (1/4th time) paid by the extension. (Extension pays $25,000 to each campus (that includes the director’s salary).
- Each campus also receives $5,000 for handling advising, financial aid and advising).
- The program is mainly on management with minimal technical content.
- They are ready to make some of their courses available for our students. Cost (tuition) needs to be negotiated.
- Dr. Schejbal is the contact person if more information is needed about each course.

3. University of Wisconsin - Stevens Point: I had a meeting with Dr. Gerry Ring, Chair of Paper Science and Engineering Department. Contact phone: (715) 346-3928.

Observations:
- At UW-Stevens Point has a” Wisconsin Institute of Sustainability”, received a substantial grant and also has 3 new positions.
- They are in the process of developing a minor (chemistry, paper science, and management areas are involved).
- At this point, the courses for the minor are not developed but they are very interested in distance education/streaming video use.
- Open to the idea that certain courses could be developed by one campus and delivered to multiple campuses.
- Developing something statewide is very appealing.
- Gerry is a resource person in regarding alternative energy policy issue (speaker)
- They do not have any laboratory facilities specific to renewable energy.
- They are interested in SRES Major and long term collaboration particularly on course sharing and delivery.

Other Contacts

During my sabbatical leave period, I have made many other contacts with energy companies through UWP career fair, phone conversations, and email. These companies include American Transmission Company, Integrys Energy (Wisconsin Public Service), Eco Energy, and Wind Capital, and PDM Solar. All these companies seems to have a strong interest in our renewable energy program. Three of them are interested in having a representative on the Industrial Advisory Board, and one of them has started to provide financial support. They also showed interest in providing internship opportunities for our graduates.

Summary of the Results from Visiting Companies and Recommendations

It is clear that there is a very strong interest in programs related to renewable energy and sustainability in industry. Most companies seem to be genuinely interested to be involved in the minor and SRES. All of them showed interest in having a representative on the Renewable Energy Industrial Advisory Board, and five out of seven of these companies are currently serving on the Board.

Companies visited are also interested in providing summer internships to the students in the minor or SRES Major (several of them indicated that they will be providing internships starting 2010 summer). However, company expectations with regard to what to expect from the students in the minor and future SRES major seem to vary significantly from company to company. I have observed the same thing when discussions concentrated around the skill set that SRES graduates must have in order to be successful in the workforce. While some companies prefer to see a strong engineering and science background (and some knowledge about social, economic, environmental impacts of renewable energy), about equal number of companies indicated that SRES graduates must be strong in evaluating renewable energy project alternatives, must understand energy business economics and markets, and be strong in communicating with diverse constituencies while having some background in technical details of renewable energy. It appears that this presents a challenge in putting together a curriculum that will serve energy industry. However, I recommend to the Renewable Energy Council that this issue be discussed thoroughly at the Industrial Advisory Board meeting and possibility of having two tracks, one technical and the other non-technical, must be considered.

It appears that there is also significant enthusiasm for supporting the SRES Major financially or otherwise. Two of the companies visited started providing some financial support already. However, many of the companies want to establish longer term partnerships and identify some specific projects before their financial support materializes. Hence, I recommend to the Council
that we continue establishing and strengthening the partnership with the energy industry with the ultimate goals of long term collaboration and support.

In the area of identifying and making a list of projects for ENERGY4920 class, most companies seem to be clearly interested in this. However, most of them do not have any experience with regard to “what will be a good project” for this course. Also, since ENERGY4920 is scheduled to be offered in fall semesters only, project solicitations for the course must be done just prior to the fall semester. In this area, I recommend that:

1. The Council to develop a standard “Project Form” to clarify what is expected of the company, students involved, and the faculty member teaching the course. This will help both companies and faculty member teaching the class.
2. The faculty member to contact the companies at the beginning of the summer before the fall semester that ENERGY4920 is to be taught. I believe that this approach will be more productive in securing specific projects for the course.

I believe that if these are done, there will be significant opportunities for projects from industry. Such projects will also help establish longer term relationships with the companies.

Summary of the Results from Visiting Universities and Recommendations

With regard to the renewable energy related laboratories and equipment, it was enlightening to see that there are no laboratories dedicated to renewable energy in any of the three UW institutions visited. UW-Milwaukee primarily has research equipment in the research space of a specific faculty member. UW-Stevens Point has laboratories in paper science and chemistry but none in renewable energy.

On the collaboration issues, all the institutions seem to be willing to share courses developed by their campus. However, none of the three institutions visited use streaming video capture capability that UWP uses in delivering its engineering courses. On the other hand, UW-Extension has developed many courses on sustainable management and is willing to have our students take some of these on-line. I recommend that, at the curriculum development stage of SRES Major, the Council consider making a couple of courses in sustainability area elective for the students in the major. This will require working out the details of tuition and fees etc.

Collaborative research by faculty at different institutions seems to be an item that all institutions showed interested. I believe that there is a strong possibility in this area, particularly with UW-Milwaukee, where faculty from UWP and UWM work on collaborative research and grantsmanship.

Conclusions

The sabbatical leave gave me the opportunity to establish new partnerships with many energy companies and a few universities with regard to our Renewable Energy minor and future SRES
Major. It was quite a rewarding experience to see how the companies and universities view the developments in renewable energy.

From the discussion, it is clear that energy companies are ready to support the minor and future major in terms of summer internships, providing projects for ENERGY4920, and serving on the Industrial Advisory Board. However, when it comes to financial support, it can only be obtained after establishing long term partnerships with companies. I strongly believe that UWP must put a sustained effort on industrial partnerships focused on mutually beneficial relationships. At this stage, I feel that it is extremely important that energy industry’s views on the new major be considered prior to developing the SRES Major.

**Dissemination**
As indicated in the proposal, in addition to sending this report to the Vice Chancellor’s Office and the Improvement of Learning Committee, I will be sharing the summary of this report with the Renewable Energy Council. In fact, some of the recommendations such as having two tracks in SRES major, and development of “Project Form” for the solicitation of projects from industry is already being shared and discussed at the Council.