A Cooperative Energy Management Program

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Abstract- *During the oil crisis of the 1970's a lot of attention was given to the term "energy conservation". Prior to the crisis, the average end-user had minimal concern in realizing the internal synergy or cause and effect of energy costs within their business. Accordingly, simple shortcuts to energy conservation methods resulted in complaints such as discomfort, inconvenience and, unrecognizable savings from their time and investment. As the energy situation improved, the users fell back into the old ways of doing business. Now that links between energy & environment and energy & the economy are re-emerging, attention is being re-focused on energy efficient processes and operations. Additionally, electric utilities deregulation is also causing energy users to consider the energy mix and efficiencies. In June 1996, a cooperative energy management program, "Creating Energy Management Opportunities in Illinois (CEMOI)" was established at the Southern Illinois University in Carbondale. The program is co-funded by the Illinois Department of Commerce and Community Affairs (ILDCCA) in cooperation with the Ameren Corporation.*

The project had multiple objectives, such as creation of an infrastructure for carrying out energy projects having wider impact, graduating trained energy engineers, increasing energy awareness in the region, and emphasizing the new paradigm on energy management (as opposed to conservation). Activities were carried out in area businesses to identify low cost / no cost energy management opportunities with attractive and acceptable payback periods. Details of the CEMOI program and its compatibility with the mission of the college to increase student retention through employment opportunities, to be of service to the region and to engage in potential energy research or demonstration projects are presented in this paper. The program is also consistent with the mission of ILDCCA, since energy is linked with the economy & environment and that of the Ameren Corporation, a major energy provider in a competitive marketplace.

Executive summary

One of the most dramatic changes in Illinois industries over the past two decades is the increased use of technology. The small and medium-sized industries face a narrowing window of opportunity. Further, the knowledge-based resources are surpassing natural resources as the key to industrial success. The knowledge-based resources are *created* and not endowed. One of the key endowed natural resources is energy and the identification of ENERGY MANAGEMENT opportunities has become of paramount importance. The producers of energy have realized that and so have the brokers (utilities) of energy. Completing the energy triangle we have the user who has kept up with the energy management developments only in a limited fashion and many times his actions have been *reactive* rather than proactive. Through proper energy management it is possible, without sacrificing comfort or operability, to reduce energy bill and the consumption as well. With limited funds available, improving profitability through energy management ranks high for the economic viability of our industries.

The CEMOI (a pilot program) was established to coordinate the energy knowledge, assets and talents of Illinois Department of Commerce and Community Affairs-Business Energy Program (ILDCCA-BEP), Ameren Corporation, commercial & industrial business development associations and Southern Illinois University's Mechanical Engineering & Energy Processes Department. The cooperating entities developed, marketed and administered an energy

analysis program for creating energy management opportunities for industrial and commercial end users. Goals of this pilot program were:

A. Establish energy technology transfer as a vested economic development tool.
   1. Improve profits to industrial and commercial end users.
   2. Enhance regional energy awareness.
   3. Generate market pull for energy management products & services via technology transfer.
   4. Improve environmental impact through proper energy management.
B. Document and record data, procedures, results, successes and failures.
C. Document and publicize the findings on weaknesses & strengths of our industries in the energy management area and also the strategies for improving profitability.
D. Provide hands-on energy analysis and project management experience to SIU students majoring in energy engineering.

Operational Requirement

A fully functional and separate CEMOI office was set up at SIUC's Office of Economic and Regional Development center (OERD). This is a modern professional facility with ample parking and easy access. The CEMOI office has a separate phone number. It also has a facsimile (fax) line and equipment.

The tentative office hours were 8:00 am to Noon Monday through Friday. These were the hours during which there was CEMOI Graduate Assistant (GA) present. Additionally, other meeting times and consultations, either with the GA or Project Director (PD), were arranged by appointments. Further through an appropriate telephone answering machine phone coverage was provided 24 hours a day, 365 days a year. Between the GA and the PD all the calls were answered within one business day.

For the effective and smooth execution of this project, the project director had the final fiscal authority and the project responsibility. He coordinated, planned and monitored the project activities. He stipulated the staffing requirements and job descriptions for all the personnel receiving funds from the project. Reporting to the director was a graduate assistant, who was dedicated to this project. The assistant's responsibilities were to work with the director in hiring and supervision of senior engineering students as needed and to carry out the specific project activities. Additionally the assistant maintained and documented all the data gathering and the project reporting.

Success of the CEMOI project was evaluated via both tangible and non-tangible means. The tangible means included the total number of industries analyzed, the different categories of industries, the amount of projected dollar savings ($), the amount of projected peak or demand savings (kW, MCF), the amount of projected energy savings (kWh, Btu) and development of the Energy Resources Directory. There were also the reports and the findings specific to industries in our region. The non-tangible means included increased energy *management* awareness, knowledgeable engineering seniors interested in energy management careers, demand for energy management products & services.

In order to maximize achievements in all of the above a good marketing plan was critical. The CEMOI was publicized via various approaches including: development of a promotional brochure and mailing of cover letters to selected industries, getting the program discussed in the media including regional newspapers (SIUC's Daily Egyptian and Southern Illinoisan), the television and radio stations. Assistance was also sought from Ameren corporation and the Association of Energy Professionals (APEC) to promote this program. The technical and policy findings were presented at appropriate regional meetings. From time to time surveys were conducted to demonstrate and document the impact of the marketing strategies mentioned.

An Energy Resources Directory was initiated, developed and maintained. The directory includes all the private sector energy service providers in the region as well as governmental and educational resources available to assist the marketplace end-user. The end-users were referred only to the Energy Resources Directory as cataloged without any particular product or service endorsement. This form of referral was there to prevent over-reliance on any one private consultant or professional organization. As a requirement for inclusion in the directory, a standard application package was prepared for execution. These forms with the authorized signatures are kept on file at the CEMOI office. Since promotion of energy management was also a key element of this project, all the regional energy service providers which were listed by such category in the Yellow Pages were contacted for potential inclusion in the Energy Resources Directory. Additionally, an advertisement was run in newspaper(s) asking such organizations to clip, sign and mail an authorization form for inclusion. That saved time, money for correspondence and also publicized the program and its' objectives.

On a bimonthly basis, a written summary memorandum was mailed to ILDCCA-BEP program coordinator. Quarterly meetings were arranged to discuss progress, results and planned work. These meetings were either at the CEMOI location or at the ILDCCA headquarters. Working in close coordination with the BEP program coordinator, all the records including client contacts and follow up was maintained at the CEMOI location. A back up copy was also maintained on the project director's computer.

Performance Objectives

The availability and cost of energy have become dominant factors in society today. Many schemes have been proposed for developing new energy sources and for conserving present ones [1]. It is always possible to use less energy in any process [2-4]. The first goal of the engineer is to determine the methods by which energy utilization is reduced while sustaining or increasing productivity. The second goal is to determine which energy management methods are cost effective [5-6]. As discussed earlier in the executive summary, for most effective energy management it is important and imperative to coordinate various parties including utilities, professional energy societies, business development associations, universities and the government energy programs. There are numerous information resources available which should were brought to bear [7-10].

Initially a particular emphasis of the CEMOI project was on creating energy management opportunities that have no or very low first costs. Such an approach is feasible and applicable even in industry [11]. In addition to making energy management an attractive alternative, this aspect would appeal to the small and medium sized businesses of our region.

The specific performance objectives were:

1) Establish an effective linkage and support with utilities, public and private businesses.
2) Through an emphasis on low first cost energy management opportunities, facilitate increased energy management awareness. Once this was accomplished attention was focused on other energy management opportunities. This should facilitate generation of market pull for energy management services and products.
3) The CEMOI office is located in SIUC's Office of Economic and Regional Development (OERD). This is a modern facility which is affiliated with SIUC but is off-campus. The off-campus location makes the facility easily accessible with ample parking. The engineering seniors thus get an experience working in a business like setting.
4) Working in close cooperation with AMEREN Corporation various regional industries were contacted and energy management opportunities were identified for them.
5) A parallel yet independent activity involved development of Energy Resources Directory. This activity was carried out in close consultation with ILDCCA-BEP project coordinator.
6) The engineering seniors would obtain a unique hands-on research experience through the data gathering and energy analysis. The people interaction, exposure to various industries & utilities alike would go a long ways in making energy management as viable and attractive career options.

Student Retention

At many universities in the United States, including ours, student retention has been given a top priority [12]. The availability of on-campus professional employment opportunities for the students helps not only our student recruitment but it also aids in retaining those who are contemplating departure due to economic reasons. At SIUC all the campus employers are encouraged to post job openings with the financial aid office at least two weeks prior to the first day of classes for the semester. Many students visit this office during the breaks prior to the semester startups and look at the job board for employment opportunities [13].

Conclusions

The Cooperative Energy Management Program (CEMOI) has been a successful program of the Energy Management Center at SIUC. The training provided by personnel from both ILDCCA and Ameren Corporation has been well received by both undergraduate and graduate student employees of CEMOI. Three of our graduates have been placed with a utility company, the Illinois Commerce Commission and a HVAC contractor. A second CEMOI program has been established at our sister campus in Edwardsville. Planning is underway to expand the activities on the center and to secure funding from the private sources, especially in the light of the upcoming electric deregulation.

Thus far we have assisted over 30 businesses in the region. During the first year we performed 12 energy analyses and detailed reporting. The Table below provides a summary of the savings for the twelve facilities.

SIC Code	Savings (MBTU/yr)	($/yr)	% Energy Savings	% Dollar Savings
5942	380	8900	21	28
5942	71	1724	21	18
6021	189	920	40	10

6021	10	3532	0.26	6.5
5511	109	5467	4.3	19
5511	28	5576	1.4	12.5
5411	234	3355	3.3	2.3
5411	86	1097	6	3.7
8041	49	3306	12	38
8661	50	238	13.7	6.4
8661	225	2164	22	24
5812	34	3291	10.6	56

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