Final Report

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Technical Support for Innovative Energy Systems
the U.S. Chemical Industry

Innovative Energy Systems Pilot Project – Chemicals Project Integrator

Awarded To:
Energy Resources Center
University of Illinois at Chicago
1309 So. Halsted Street
Chicago, Illinois 60607
Principal Investigator: Mr. John Cuttica
312/996-4382
Cuttica@uic.edu
Lead Engineer: Dr Steffen Mueller
312/355 – 3982
Muellers@uic.edu

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Background:
The University of Illinois at Chicago Energy Resources Center (UIC/ERC) was originally selected to carry out the role of project integrator for a planned solicitation calling for proposals for innovative concepts for energy efficient systems in the chemical industry. The selection was made as a result of a DOE Announcement of Funding Opportunity issued by the DOE Golden Field Office.

The U.S. DOE, due to funding constraints, decided to change the role of project integrator into one of technical support to DOE and the Vision 2020 Steering Committee in carrying out the oversight and management of the projects selected from the planned innovative concepts solicitation. This project, initiated in April, 2005, was established to provide that technical support to the U.S. DOE Innovative Energy Systems Pilot Project for the US Chemical Industry. The DOE pilot project seeks to accelerate innovation and technology development by stimulating R&D that will enhance the productivity of energy systems throughout the chemical industry. The project specifically targets an often overlooked area of R&D: systems that are integrated with the chemical processing and energy supply systems within plant boundaries. A key feature of the project is the participation of an industry partnership which leverages government funds with financial and technical resources of industry.

This project, contracted with UIC/ERC, was established to assist in the development of specifications for technologies that were solicited, develop metrics for evaluating the projects, assist in organizing and running innovative energy systems portfolio reviews, and develop guidelines for commercialization plans for the innovative energy systems projects.

In the late summer of 2006, as a result of the work conducted in this contract, selections were made under the innovative concepts solicitation. Due to funding restrictions, the number of projects selected for DOE funding were constrained and considerably less than originally planned. As a result, the technical support effort originally perceived under this contract was modified. As a continuation of the baseline technology analysis conducted by UIC/ERC under this project, DOE requested that UIC/ERC assist in the development of “technology briefs” in support of the DOE Save Energy Now program. Over the years, DOE has funded the development of a multitude of energy saving technologies across a wide spectrum of industry sectors. To assure that the plant managers/contacts consider these DOE developed technologies as part of their Save Energy Now assessments, the UIC/ERC was directed to prepare supporting material in the form of plant-specific technology briefs. These technology briefs were to be utilized by the Energy Experts as part of their Energy Saving Assessments (ESA).

This final report provides the work performed and accomplishments / deliverables realized under the entire project:

- Technology support under the Innovative Energy Systems Pilot Project for the Chemical Industry (April, 2005 thru September, 2006
- Development of the Technology Briefs in support of the Save Energy Now Program (Oct, 2006 thru April, 2008).

Technical Support - U.S. DOE Innovative Energy Systems Pilot Project for the US Chemical Industry: (April, 2005 thru September, 2006)

Tasks:

Phase One

1. Assist in the development of specifications for the type of technologies to be sought in a solicitation to be issued by DOE. These technologies have been identified as offering major energy savings opportunities, and include power and steam generation, heat integration and energy management, and heat transfer and energy recovery. The UIC project team will develop the technical specifications being called for in the planned solicitation, including technical approaches to be considered, concept/product definition, methods of integration into chemical plant operations, economic analysis required (both at the early stages of market penetration as well as for a mature market), commercialization plan structure, and approaches used to estimate energy savings and other benefits.

2. Develop metrics for evaluating technologies. In this task, UIC will develop a methodology to review potential R&D projects as well as develop specific criteria that could be used to evaluate projects. This methodology will include specific evaluation criteria that are robust enough to allow straightforward comparison of technologies that address different aspects of non-process energy systems used in the chemical industry. UIC will also define criteria for comparing the commercialization plans, likelihood for technical and commercial success, adequacy of the project management approach, and appropriateness of the project budget.

3. Development of baseline metrics to measure progress of a R&D project. The output of this task will be a well defined methodology that can be applied consistently across the specific projects related to new energy-system technologies. The actual implementation of the methodology / metrics is not covered by this task. In this task, UIC will identify targets for project performance with respect to energy efficiency, and likelihood for technical and commercial success with respect to the overall goals of the planned solicitation. These measures will need to be sufficiently robust to allow comparison of technologies that address different aspects of non-process energy systems.

4. Develop potential forums and approaches to ensure that the progress and results of R&D projects are widely disseminated. This task will engage the industry in establishing the most effective methods of both informing the industry of the status and results of R&D projects and of including the industry in the implementation of the technologies and concepts resulting from the R&D efforts.

Phase Two

5. The UIC project team will evaluate the effectiveness of the projects meeting their stated goals (technical, financial, and marketing / communication). Implementation of annual reviews or other mechanisms defined in Task 4 will be implemented to ensure the technology advancements are documented, verified, and broadly disseminated throughout the industry. UIC will act the facilitator at these industry forums.

6. Explore the potential issues dealing with intellectual property management of R&D projects. Develop solutions these issues to ensure that the R&D results can be widely disseminated throughout the industry and implemented to maximize energy savings. In this task, UIC will define, evaluate, and recommend solutions to potential intellectual property management issues resulting from the heavily cost shared R&D efforts. Since this is an industry wide program, these potential issues must be identified and resolved early in the program to allow successful implementation of the program results industry wide.

7. In this Task, UIC will address the field verification tests required to ensure wide spread implementation throughout the industry. A well thought out plan (with input from the industry) will be developed that maximizes the implementation of the technologies and concepts. The plan must include methods of tracking the field verification tests, documenting the performance against well defined metrics, and disseminating the results in a timely manner.

Milestones and Accomplishments:

- Participated in two Vision 2020 Steering Committee Meetings, supporting the DOE project manager in developing agendas, preparing presentation material, and presenting at the meetings. These efforts were aimed at securing the Steering Committee support of the Innovative Energy Systems Pilot Project. Their support included industry participation in funding the industry challenge (recognition of the projects that were most successful in meeting the energy saving goals of their individual projects).

- Organized and implemented several meetings of the Vision 2020 Technology Subcommittee, a committee that had gone dormant and was needed to approve the technical specification for the solicitation, and provide positive recommendations back to the Steering Committee on the value and potential success of an industry supported innovative energy concepts solicitation.

- Developed the technical specification sections of the planned solicitation to be issued by DOE. The specifications were developed with the input of the Vision 2020 Technology Subcommittee. The UIC/ERC worked closely with the subcommittee, providing outlines of the specification, seeking their comments and inputs, revising the specifications and securing their unanimous approval. This was an essential part of the process to ensure that the industry would be supportive and participate in the innovative energy concepts solicitation.

- Once industry approval for support of the innovative energy concepts program was obtained, we assisted DOE Headquarters in the development of the DOE Procurement Requirements Document. The UIC/ERC provided the technical input and support for DOE to complete the document.

- Assisted in the development of the metrics that would be utilized in the evaluation of the proposals submitted under the innovative energy concepts solicitation. This included a baseline analysis of the state of the art of current technologies in the field and an analysis of the commercial success that these technologies have achieved.

- Reviewed and provided comments/input to DOE on the computer tool being developed (under a separate contract with another firm) to estimate the energy savings potential of the proposed technologies/systems. This tool was to be incorporated into the innovative energy concepts solicitation, therefore it was essential that UIC/ERC fully understand the tool and provide input and review of its effectiveness.

- Developed and implemented the communication plan for widely disseminating the solicitation document.

- Provided technical assistance to DOE Headquarters and the Golden Field Office as required to complete the pre-solicitation process, allowing DOE to issue the innovative energy concepts solicitation in Mid October, 2005.

- Provided technical support for DOE and the Golden Field Office in answering industry questions regarding the solicitation. The technical support included review of the letters of intent to propose, and the information necessary for DOE to make the decision to modify the Funding Opportunity Description and extend the due date for the proposals.

- Provided assistance to DOE and the Golden Field Office in identifying the technical requirements in selecting reviewers for the merit review process. This included close coordination with the Vision 2020 Technology Subcommittee.

- UIC/ERC participated on the merit review committee (Dr Steffen Mueller was one of the expert reviewers).

As a result of the above activities and accomplishments, the selection process went smoothly and DOE was able to negotiate two contracts. Unfortunately, with very tight budgets, the number of contracts negotiated was considerably less than the eight to ten projects originally intended. With this cut back in the program, it became questionable as to whether the UIC/ERC support in assisting the DOE in implementing and monitoring the two contracts was the best expenditure of the DOE funds under this contract. As a result, the DOE and the Golden Field Office requested that UIC/ERC, based on our efforts in developing the baseline analysis of the state of the art of current technologies in the field and an analysis of the commercial success of these technologies, apply the results of these efforts to a new deliverable (forgoing the requirement to meet the remaining deliverables under the contract). The new deliverable was the development of technology briefs.

Technical Support: Development of the Technology Briefs in support of the Save Energy Now Program: (Oct, 2006 thru April, 2008).

Task:

1) The UIC/ERC will develop Technology Briefs in support of the DOE Save Energy Now Program. Over the years, DOE has funded development of a multitude of energy saving technologies across a wide variety of industry sectors. To assure that the plant managers/contacts also consider the wide range of ITP funded technologies when considering energy-savings opportunities identified during Save Energy Now assessments, UIC/ERC will prepare supporting material in the form of plant specific technology briefings. These briefing sheets will be provided to the Energy Expert, prior to performing an ESA, for distribution and discussion with the plant manager/contact.

Milestones and Accomplishments:

- Developed the format/template for the Technology Briefing Sheets in coordination with DOE

- Developed an approach that required all information assembled on any specific plant to come from public sources (internet sites) and not include any phone calls or contact with the plant site personnel. The DOE did not want to burden the ESA sites with another caller requesting information. As a result, UIC/ERC researched all 100 sites completed on the internet with no confidential material utilized and no contact with company personnel.

- Developed contact with the R&D developers and commercializing firms for all DOE previously developed ITP technologies. This effort resulted in a great understanding of the stage of commercialization of these technologies, where and in what applications they have been successfully commercialized, and how they could be applied into the ESA efforts.

- The Save Energy Now ESA schedule drove the development of the briefs. It was a challenge to stay ahead of the scheduled ESAs so the Energy Experts had the site specific technology briefs when they visited the plants. UIC/ERC (Steffen Mueller) was very successful in meeting this challenge.

- Attended the weekly DOE Save Energy Now Team Meetings (teleconference) and provided input on the tech brief activities.

- Responded to one company's concern that the use of internet data across their multiple sites could result in competitors learning more than they were willing to allow. As a result, we modified the tech briefing format to satisfy that request. An interesting side note, the company that complained has since (as a result of the CHP systems recommended in the briefs as potential technologies of importance to them) contracted separately with UIC/ERC to conduct detailed CHP analyses of their food processing plants and are now moving forward with detailed engineering proposals for the installation of an anaerobic digester/CHP system to

handle their organic wastes and improve the energy efficiency of their overall process.

- 100 separate technology briefs were researched and developed by the UIC/ERC under this project. In September, 2007 UIC/ERC notified DOE Headquarters (Jim Quinn) and the DOE Golden Field Office (Bill Prymack) that all funds had been utilized in developing the 100 briefs and that additional funds would be required to continue the effort. Although UIC/ERC was told that the effort was successful, budget limitations did not allow further funding at that time. We were requested to keep open the possibility for future funding (thru the end of the contract – April, 2008) to be allocated and additional briefs to be developed. The contract expired without any additional funds added or any more tech briefs developed.

- A complete set of the 100 tech briefs were provided to DOE headquarters in November, 2007.

Budget Report:

The original contract was for $250,000 of DOE dollars. This was allocated in two parts, $150,000 was authorized for expenditure when the contract was let. Amendment 1 authorized expenditures of the additional $100,000.

In March, 2007, an additional $50,000 was added to the contract. In July, 2007 an additional $30,107 was added to the contract.

The total amount of funds authorized under this contract was $330,107. To accommodate the added requirements, the end date of the contract was extended to April, 2008.

The University of Illinois at Chicago will submit the final closeout forms showing the exact expenditures of funds. However, as reported in the quarterly project status reports the following chart provides project spending:

Quarter	From	To	Expenditure
2Q,05	4/14/05	6/30/05	$5,816
3Q,05	7/01/05	9/30/05	$87,829
4Q,05	10/01/05	12/31/05	$26,233
1Q,06	1/01/06	3/31/06	$30,123
2Q,06	4/01/06	6/30/06	$20,000
3Q,06	7/01/06	9/30/06	$10,000
4Q,06	10/01/06	12/31/06	$10,000
1Q,07	1/01/07	3/31/07	$60,000
2Q,07	4/01/07	6/30/07	$35,396
3Q,07	7/01/07	9/30/07	$9,006
4Q,07	10/01/07	12/31/07	$35,705
1Q,08	1/01/08	3/31/08	$0
2Q,08	4/01/08	4/13/08	$0
Totals			$330,107

Appendices and Final Comments:

Appendix A attached provides the quarterly reports submitted during the contract period. A complete set of the 100 ITP Custom Generated Technology Briefings is being submitted electronically separately (due to size of the document).

UIC/ERC would like to thank DOE Headquarters and the Golden Field Office for their support during the course of this effort