

Energy Efficiency and Reliability Center

Energy is an essential part of our daily lives. Without reliable and economic sources of energy, much of our daily routine would come to a stand still. Every day we each purchase various forms of energy such as electricity, natural gas, and gasoline. If these energy resources are used in ways that are not efficient, a large part of our purchases are wasted. By increasing efficiency it is possible to reduce wastage, save money, and improve the environment.

The Energy Efficiency and Reliability Center, located on the campus of Purdue University Calumet in Hammond, is helping to enhance the benefits of energy and its use by conducting research, developmental, and educational activities that increase the value, reliability, and quality of energy resources and processes. It is also considering how to combine conventional energy sources with solar and other renewable energy sources to further increase value.

The three primary functions of the center are to: 1) develop advances in energy efficiency, reliability, utilization, processes, and technologies that improve the value and effectiveness of energy use; 2) reduce energy costs and thereby help enhance the economic and strategic viability of manufacturing as well as other industries and businesses and attract new businesses and jobs to Indiana; and 3) enhance economic development efforts by improving energy utilization effectiveness and reducing energy related environmental emissions and costs. It seeks to help communities, businesses, and individuals obtain the maximum benefit from the energy they purchase or produce. By improving energy efficiency you save money as well as reducing the dependence on foreign energy sources such as imported oil. You also reduce air emissions since less fuel is needed to produce the same amount of usable energy.

The Center develops a range of energy enhancement technologies rather than focusing on a single project so as to maximize economic and technological impact on business and industry in Indiana and the Greater Chicagoland area both now and in the future.

Principal goals include:

- ❖ To become a focal point for the continual development of techniques, expertise, and products that optimize the value and reliability of energy and energy using processes for businesses.
- ❖ To develop new energy options including methods to use Illinois Basin coal for the production of coke for the steel industry, liquid transportation fuels, fertilizer, and hydrogen; producing hydrogen biologically from waste; improving electric transmission system reliability; and optimize local energy production and use. Methods are also under development for the optimization of renewable energy sources in concert with new and innovative methods, controls, and products for energy saving building designs.
- ❖ To provide analytic tools and develop end use devices, methods, and processes that improves the efficiency of using energy and thereby reduces business operating costs and environmental emissions.
- ❖ To provide energy education and help create new high-tech jobs in energy for undergraduate and graduate students and facilitate the energy field as a career opportunity.
- ❖ Assure technology transfer and advocate commercialization of center developments.
- ❖ Assure timely, efficient, and effective completion of goals and pursue opportunities for collaboration to leverage the value of research and results.

Current participants in the center include: NiSource, Whiteco, Mittal Steel, City of Chicago, Advanced Power Technologies, Primary Energy, and the Steel Manufacturers Association. Collaborating organizations include University of Notre Dame, University of Denver, National Renewable Energy Laboratory, Argonne National Laboratory, and various Purdue campuses.

Personnel include: Robert Kramer (Director), Harvey Abramowitz, Gideon Falk, Anita Katti, Lash Mapa, George Nnanna, Libbie Pelter, Ed Pierson, Everet Ting, Roy Evans, Chen Zhou, graduate and undergraduate students.

The Center will assist in assuring business competitiveness and development by reducing the costs of a major business requirement, energy. The center provides a resource for new, as well as existing, businesses to assure that energy is used in an effective and economic manner thereby enhancing the probability of success and profitability. The Energy Efficiency and Reliability Center seeks to provide new energy related theory and technology that will assist in the growth of businesses in Indiana and the

Greater Chicagoland Area as well as serving as a catalyst for the formation of new high tech industries thereby enhancing economic development efforts.

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Energy Center Grants: 5/24//06

Grant	Status	Amount	Duration
Wireless Energy Monitoring, Control and Optimization: Installation of wireless monitoring and control equipment in cooperation with Profile Systems and associated research on building energy efficiency optimization. Funded by DOE	awarded	\$964,000	2 years
Highly Varying Load Coordination: Study to determine the value of coordinating the operation of large industrial loads such as arc furnaces and rolling mills so as to reduce transients on the electric transmission system and thereby improve electric system reliability. Funded by Mittal Steel.	awarded	\$50,000	1 year
Indiana Coal Coke/Gasification Appraisal: Study to determine the value and applicability of using Indiana coal for producing blast furnace coke and partial gasification of coal. Funded by Center for Coal Technology Research.	Completed 2/1/06	\$50,000	1 year
Coal Gasification/Liquification; Research and development of models for appraisal and design of processes for optimized production of coke, gas, and liquid transportation fuels from Indiana coal. Funded by Center for Coal Technology Research.	awarded	\$100,000	1 year
Biological Production of Hydrogen: Research and development of process to produce electricity from a fuel cell or reciprocating engine fueled with hydrogen produced biologically from food or other waste. Funded by DOE.	awarded	\$342,250	1 year
Electric System Reliability Scope: Study to determine concepts for improving electric transmission system reliability and operation through coordination of the capabilities of the Northwest Indiana Computational Grid and electric system modeling research efforts. Funded by DOE.	awarded	\$15,000	2 year
Electric System Reliability Scope: Study to determine concepts for improving electric transmission system reliability and operation through coordination of the capabilities of the Northwest Indiana Computational Grid and electric system modeling research efforts. Funded by DOE.	awarded	\$12,000	3 months
Energy Surveys: Conduct various energy surveys and make recommendations to improve energy value and efficiency. Funded on a contract basis.	ongoing		ongoing
Al H Production: Production of H from Al. Collaborative effort with Purdue Energy Center.	awarded	\$17,500	1 year
Illinois Coal Proposal: Use of Illinois coal for Mine mouth coking/gasification/liquid fuel production. Funding from Illinois Coal Center	Pending	\$40,000	1 year
Endowed Chair in Energy	Pending	\$500,000	ongoing
Grants under preparation		~\$5,000,000	