

Energy for State's Industry: When Less is More

There is an enormous potential to improve energy efficiency of U.S. industry, in fact, waste energy has been termed the nation's largest source of available energy.

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Corporations have recognized it. ABB's two-page ad in a recent issue of Atlantic Monthly says,

"We help customers use Less energy to be More productive!"

U.S. Department of Energy sources say that approximately 60 percent of U.S. primary energy (i.e., the BTU content of coal, natural gas, oil and other primary fuels) is lost to waste or rejected heat. In particular, U.S. electricity generation uses about 40 percent of primary energy, of which 70 percent is wasted through thermal losses, transmission and distribution line losses and inefficient end uses including manufacturing processes that throw away 20 percent to 50 percent of energy purchased or self-generated.

Using less energy to be more productive while diversifying energy sources increases industrial competitiveness and energy security without sending production offshore and risking the loss of proprietary technologies. However, export of energy efficiency expertise and equipment to rapidly developing countries, such as China and India, provides business development opportunities for U.S. companies, helps reduce pressure on the world's energy resources and improves the global environment.

In 1997, West Virginia University partnered with the **West Virginia Development Office (WVDO)** and the **U.S. Department of Energy (DOE)** to spearhead the nation's first state-level

Industries of the Future program, called IOF-WV. The goal of this program is to help increase energy efficiency of West Virginia companies through industrial energy assessments, university/industry research projects, training programs and implementation of energy efficiency innovations.

During the past five years, energy assessments at small and medium-size companies have resulted in average energy savings per company of 700,000 kilowatt hours, 5,000 million BTU of natural gas and about \$75,000 in annual energy costs. In-depth assessments at large companies result in energy cost savings ranging from \$2.5 million to \$5 million per year.

The IOF-WV team includes industrial energy assessment experts, faculty researchers in specialty fields such as super alloys and corrosion mechanisms, polymer composites, nanotechnologies, optical coatings, industrial applications of plasma technologies and software development. IOF-WV has good working relations with U.S. DOE program offices and national laboratories.

The following are examples of ongoing initiatives that support industrial energy efficiency, fuel and feedstock flexibility, energy security and environmental sustainability:

- Design of expert systems that couple advanced sensor and control technologies with data mining techniques and industrial best practices — minimizes energy consumption per unit of final products produced, providing significant energy savings and productivity improvements for manufacturing companies.

- Recovery and reuse of waste energy (heat, pressure drops, flared gas, etc.) in manufacturing processes — for pre-heating intake air, producing steam or generating electricity that can be used in-house or sold to a utility. Recycled energy is completely clean — the environmental price has already been paid!

- Assessment of economic and technical feasibility of co-locating multi-product power plants near clusters of energy-intensive industries to supply electricity, heat, steam, syngas and chemical feedstocks to industrial users. Co-location of multi-product power plants with industrial users is a winning strategy for minimizing production costs and energy losses due to long-distance transmission of electricity, heat, steam and chemical feedstocks.

- Development of alternatives to natural gas for industrial fuels and chemical feedstocks, e.g., syngas from co-gasification of coal, biomass and agricultural waste materials. Syn gas can be upgraded for use in high-temperature processes, such as melting glass or metals, and in smelting or calcining operations.

- Development of new super alloys and barrier coatings with predictable fabrication and design properties that resist corrosion and wear in high temperature, harsh environments present in energy and industrial systems.

- Development of new insulation materials incorporating nano-porous sol-gel materials to produce high-performance insulators for fuel and heat transfer pipelines.

- Development of biopolymer composites with increased strength and improved durability for use in production of high-value end products, e.g., wood-polymer composites present excellent business development opportunities for West Virginia.

These are technical approaches. Now is the perfect time for West Virginia to complement its role as an energy resource state and take a lead with legislative and policy approaches to creating energy and efficiency advantages for West Virginia companies, for example:

- Smart tax policies and loan guarantee programs that encourage and enable companies to make the investments needed to be more energy efficient.

- Reduced or level rates for in-state companies using in-state gas or electricity that help retain businesses in times of energy price spikes.

- A prominent "Declaration of Industrial Energy Efficiency" that could help make West Virginia attractive as a home for what many say is the next big thing in energy-hungry businesses — data centers, Internet service providers and other IT sectors.

Less can be a lot More!

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