



Energy Efficiency in Industrial Technologies¹

National Renewable Energy Laboratory²

Industry consumes about 37% of the total energy used in the United States each year, at a cost of about \$115 billion--nearly as much as the 1993 annual sales of General Motors Incorporated, the largest U.S. company. Helping our nation's industries become more productive by using new technologies increases energy efficiency, minimizes or reuses wastes, improves profits, and reduces pollution. Additionally, energy efficiency improvements and pollution prevention measures often complement each other.

OPPORTUNITIES IN INDUSTRIAL TECHNOLOGIES

Cogeneration generates steam and electrical energy using 30% less fuel than if each is produced separately. Industrial cogenerators sell their excess power to local electric utilities, generating revenue for their plant.

Industrial electric motor systems--motors, speed drives, fans, compressors, and power distribution systems--account for more than 20% of all electricity used in the United States. That's more electricity than the entire South Atlantic region of the United States uses annually.

By 2010, using more efficient electric motor systems in the industrial sector could save 240 billion kilowatt hours of electricity annually (8.5% of total annual electricity production), provide an industrial energy cost savings of \$13 billion (nearly equal to the 1993 annual sales of the Coca-Cola Corporation), and reduce greenhouse gas emissions by 48.5 million tons.

More than a third of the energy consumed by U.S. industry is used to provide process heat, such as hot water and steam. This is about equal to the entire amount of energy used in Texas.

Energy use in intensive process industries such as metals, glass, paper, and chemicals, along with petroleum refining and food processing, can account for as much as one-fourth of their production costs. If the manufacturing processes used by these energy-intensive industries could be made more efficient, then these firms could be more competitive.

Direct steelmaking, which eliminates steps from the steel production process, could reduce energy use by 20%, while reducing air-polluting emissions.

Chemical feedstocks, the raw materials used to make other products such as drugs, plastics, or fertilizer, can be made with forestry and agricultural products instead of petroleum-based feedstocks. These biomass-based chemical feedstocks help create significant new markets for agricultural products.

OPPORTUNITIES IN WASTE REDUCTION TECHNOLOGIES

U.S. industry produces more than 14 billion tons of waste that cost more than \$45 billion to treat and

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dispose of properly in 1990--that's more than Chrysler Corporation's annual sales revenues for 1993. A program operated by the U.S. Department of Energy (DOE) has shown that an energy/waste assessment can save the average small- to medium-sized plant more than \$20,000 per year.

Solar energy can destroy hazardous wastes. Concentrated sunlight can be used to decontaminate and detoxify water and air.

Landfill gas, an environmental and safety problem, can and is being captured and converted to energy to produce electricity, heat, or steam. With minimal cleaning, it can be used directly in boilers to create steam for industrial uses. Using landfill gas does not require a large capital investment for equipment such as generators. Landfills for municipal solid waste are becoming scarce. Today we have about 6000 landfills, down from 30,000 in 1976. About 45% of these 6000 landfills are close to capacity and may close in the near future.

Each year, Americans discard more than 200 million tons of solid waste. At present, about 33% of

these wastes are used to generate energy or produce raw materials for recycling into new products. The remainder, about 135 million tons, is sent to landfills and represents a great potential for additional energy production or recycling.

Municipal solid waste can be converted to energy by (1) directly burning it to produce steam or electricity, or (2) converting municipal solid waste into fuel pellets and mixing it with coal. Both methods improve the environment by reducing the amount of solid wastes that must be landfilled.

REFERENCES

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