OFFICE OF INDUSTRIAL TECHNOLOGIES

Travel forward in time and imagine what United States' industries could be like in the year 2020.

- Industries are competing more effectively in global markets.
- The rate of energy use has decreased due to increases in industrial efficiency.
- More industrial jobs have been created.
- Manufacturing plants have made significant strides toward reducing or eliminating their wastes.
- Greenhouse gas emissions have been reduced to 1990 levels.
- Research and development efforts have brought forth new technologies, resulting in an improved environment.

The future scenario is not wishful thinking. In fact, U.S. industries are making significant progress in turning this vision of the future into reality. And the U.S. Department of Energy's (DOE's) Office of Industrial Technologies (OIT) is helping. OIT is catalyzing and supporting industry progress in a multitude of ways.

OIT is part of DOE's Office of Energy Efficiency and Renewable Energy and works side by side with specific industries, trade associations, research organizations, universities, national laboratories, utilities, and State and Federal agencies to achieve both national and industrial goals. OIT's successful partnerships within both public and private sectors have helped find numerous opportunities for energy savings and pollution prevention.

OIT programs and activities for research, development, and deployment of advanced technologies are designed to increase energy efficiency, prevent pollution, and improve productivity. OIT's research focus is on energy supply technologies, industrial process improvements, and pollution prevention technologies.

Many OIT-funded processes and technologies are now commercialized and being used by industry. Not only are these technologies saving energy and reducing or utilizing wastes, they are also increasing industries' profitability and overall competitiveness.

The impacts of OIT's activities have been extensive and industry-wide. More than 65 OIT-supported research and development (R&D) projects have resulted in technologies and process improvements that industries are currently using; other projects

have contributed significantly to basic knowledge of industrial processes.

To date, OIT-developed technologies and processes have saved U.S. industry more than \$1.6 billion from reduced energy use. The net cumulative benefit of these technologies (industrial savings less Federal investment) was approximately \$478 million for fiscal year 1994.

In addition to researching technologies and forming partnerships, OIT is also pursuing other ways to help our Nation and industries achieve key goals through the adoption of innovative technologies. For instance, OIT is spearheading the Industries of the Future strategy, a joint Government/industry process designed to leverage the scarce resources available for technology research, development, and deployment for maximum results. OIT is also doing its part to reduce the threat of global climate change by directing several new programs under DOE's "Energy Partnerships for a Strong Economy."

Industries of the Future

OIT's Industries of the Future strategy is an innovative approach to help the materials and process industries address the broader goals of energy efficiency, competitiveness, environmental performance, jobs creation, and technology development. This strategy aligns Government research, development, and demonstration investments in new technologies with industry's needs and interests. Open communications facilitate teaming and interaction among all participants to shorten the cycle times of moving innovative technologies from concept to marketplace.

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MASTER

Information available through the Motor Challenge program helps industry participants save money, increase productivity, and improve environmental quality by using energy-efficient electric motor systems. (Photo by Jeff Uhrlaub)

Each industry participating in the Industries of the Future process (petroleum refining, forest products, chemicals, steel, aluminum, metal casting, and glass) creates a vision that reflects the dynamic impacts of market, business, social, and regulatory drivers specific to that industry. This vision is developed by industry, for industry, and provides a framework for shaping major advancements in technologies. Each industry then identifies its short-, medium-, and long-term R&D priorities. OIT facilitates the process and works with industry to create cost-shared solutions that address these needs.

OIT Actions Help Reduce the Threat of Global Climate Change

Several of OIT's activities are part of DOE's Energy Partnerships for a Strong Economy. This initiative was created in response to both the threat of global climate change and the international agreement signed at the Earth Summit in Rio de Janeiro to reduce harmful greenhouse gas emissions to 1990 levels by the year 2000. The initiative is leveraging Federal dollars through partnerships with private industry and will help the United States with these important commitments. The industrial sector, with the support of technology research, development, and deployment activities authorized by the Energy

Policy Act of 1992 and other legislation, is playing a central role in meeting the national goals for emissions reduction.

A key program aimed at the industrial sector is Climate Wise, sponsored by DOE and the U.S. Environmental Protection Agency. Climate Wise encourages industrial companies to voluntarily identify and pledge to implement cost-effective actions leading to reductions in harmful greenhouse gases. Companies can create their own reduction activities as well as participate in existing OIT-sponsored programs such as Motor Challenge, NICE³ (National Competitiveness through Energy, Environment, and Economics), and Industrial Assessment Centers (formerly Energy Analysis and Diagnostic Centers).

The Motor Challenge program helps industries to improve their profitability while reducing greenhouse gas emissions through the increased use of energy-efficient electric motor systems.

The NICE³ program provides grants to industry/State partnerships to demonstrate energy-efficient, waste-reducing technologies.

Small- and medium-size manufacturers across the nation are implementing recommendations from

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OIT's Industrial Assessment Centers to improve energy efficiency and minimize waste. These efforts can also be counted as actions taken to carry out a company's Climate Wise pledge. These centers offer manufacturers energy analysis and waste assessment services, utilizing university engineering students guided by faculty. This approach delivers the bonus of hands-on training that students will continue to apply in their work after graduation.

Energy Supply Technologies

Since industries will require increased energy for the future, technologies to improve industrial energy supply are important to long-term viability. OIT is supporting several activities in this area, including:

- Developing high-performance steam turbines and advanced gas turbine systems for industrial cogeneration applications
- Producing chemical-industry feedstock from cellulosic and starch resources including waste and biomass materials
- Accelerating the adoption of more efficient electric motor systems
- Developing solar thermal technologies for industrial applications.

Industrial Process Improvement Opportunities

Significant opportunities for energy efficiency, pollution prevention, and productivity improvements are found in the basic process industries, including those targeted in the Industries of the Future strategy. OIT's R&D focuses on processes in these industries ranging from input of raw material to end-use applications. Activities funded through OIT will yield technologies such as:

- Advanced water removal and drying systems for paper production
- Rapid glass refining
- Near net-shape casting of steel
- Use of membranes to replace or assist conventional distillation systems
- Improved electrode materials for alumina reduction cells
- Direct iron-making technology
- Advanced lost-foam casting technology.

Pollution Prevention Technologies

Because using energy more efficiently often results in reducing or preventing pollution as well, much of OIT's R&D involves technologies with the potential

*The Industrial Assessment Center program uses engineering faculty and students to perform energy and waste assessments at small- and medium-size manufacturing plants.
(Photo by Jeff Uhrlaub)*

to reduce pollution. OIT is pursuing a variety of waste-minimizing or waste-reducing technologies including:

- Recovery of energy from liquid waste streams
- Conversion of plastics to feedstock material
- Improved use of waste heat through process thermal integration
- Reduction of solvent use
- Reclamation of foundry sand
- Recycling of municipal solid waste.

Technology Transfer Brings New Technologies to Market

Legislation enacted during the 1980s and 1990s has made technology transfer a key element of both DOE's and OIT's missions. OIT's active technology transfer program links R&D programs and innovative technologies with the community of potential industrial users.

Key elements of the technology transfer program include: communicating to DOE's industrial constituencies; leveraging Federal, State, local, and industry resources; providing direct technical, informational, and educational support to the industrial sector; and designing each project to maximize the potential for commercial success. The program also measures OIT's progress toward accelerating the awareness, acceptance, and adoption of technologies that will improve the total performance of U.S. industry.

Productivity through Technology

OIT's partnerships with industry are resulting in improved competitiveness for U.S. industries, an increase in energy efficiency, and an improvement in environmental quality. OIT's motto, "Productivity through Technology," is a fitting phrase that applies to all its activities. The energy, economic, and environmental benefits from new industrial technologies translate to a cleaner, more productive world for everyone.

To receive information about OIT-sponsored technologies or participating in Climate Wise, Motor Challenge, NICE³, or Industrial Assessment Centers, contact the Energy Efficiency and Renewable Energy Clearinghouse: 800-DOE-EREC (800-DOE-3732).

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