

# Sustainable Energy

Clean, Safe Energy That's Renewable and Efficient

## in Pennsylvania

***Did you know ... that the price of photovoltaic electricity has dropped dramatically from \$15 per kilowatt-hour in 1975 to less than 25¢ per kilowatt-hour today; the cost of wind energy has dropped over 50%?***

***And... that Pennsylvania depends on coal to provide more than a third of its total energy and over half of its electricity production—indeed, it spends more on coal than any other state?***

### Jobs in Sustainable Energy

The U.S. Department of Energy's (DOE's) National Renewable Energy Laboratory (NREL) leads the nation in research and development and lab-scale demonstration of sustainable energy technologies. In FY 1997, a total of \$2,548,749 in research contracts, service subcontracts, and procurements was awarded to Pennsylvania organizations by NREL.

NREL's many programs help facilitate technology development with interested consumers and potential partners from industry, business, academia, and the global community. NREL's technologies, which are clean and green, include:

- Photovoltaics
- Wind
- Biofuels
- Biomass power
- Hydrogen
- Superconductivity
- Solar thermal
- Geothermal
- Hybrid vehicles
- Building energy systems
- Industrial applications of solar power.

DOE's Federal Energy Management Program (FEMP) activities could add 352 jobs each year and save people in Pennsylvania \$18.4 million in annual energy costs.

NREL has cooperative research and development agreements (CRADAs) with the following organizations in Pennsylvania (total dollar value shown; some partnership work has been completed):

- Ebara Solar - \$65,266
- Mineral Technologies Inc. - \$430,000

### Clean Energy = Clean Environment

The clean electricity generated from renewable energy sources in Pennsylvania from both utility and nonutility generators displaces about 711 tons of carbon dioxide per year (measured in carbon units) that would be emitted by coal-fired power plants.

Between March 1996 and March 1997, the U.S. Environmental Protection Agency's Green Lights and Energy Star programs helped save 475 million kilowatt-hours of energy in Pennsylvania. This saved consumers in the state at least \$40 million in energy bills and prevented more than 750 million pounds of carbon dioxide from entering the atmosphere. Projected savings through the year 2000 resulting from energy investments already made is \$127.6 million.

### Economic Benefits

In FY 1996, DOE's Office of Energy Efficiency and Renewable Energy (EE) invested \$21.9 million in Pennsylvania. Pennsylvania's consumer energy cost savings from EE research and development products are estimated to be more than \$1.2 billion.<sup>1</sup>

- Twenty-five businesses in Pennsylvania specialize in renewable energy-related products and services.
- State weatherization programs, aided by federal funding from DOE, helped at least 4,044 low-income and other disadvantaged Pennsylvania families last year.
- Through a cooperative agreement with EE, Air Products and Chemicals, Inc., in Allentown, is developing a novel process for the production of hydrogen by steam-methane reforming. This process could markedly reduce the cost of hydrogen

**Did you know... that 53.7% of Pennsylvania's electricity is generated from coal, 3.5% from petroleum, 41% from nuclear, and 1.8% from other sources, including hydropower?**

**And... that Pennsylvania is a net energy exporter, meaning that more electricity goes out of the state than comes in?**

production by lowering the operating temperatures necessary for high conversion efficiencies. The purity of the hydrogen produced by this process eliminates the need for downstream purification. This process should accelerate interest in near- and mid-term energy applications for hydrogen, particularly in transportation.

- EE will invest up to \$2.3 million in a project coordinated between the American Refining Group of Indianola, the Renewable Energy Development Corp. of Conshohocken, and the State of Pennsylvania, to develop, construct, and operate the Pittsburgh BioRefinery. The refinery will convert biomass feedstocks such as wastepaper, wood wastes, and yard wastes into fuel-grade ethanol and other valuable ethanol by-products.
- Renewable Energy Production Incentive: In September 1997, the U.S. Department of Energy awarded \$2.5 million in incentive payments to renewable energy generation facilities sponsored by municipal utilities or local governments that produced electricity from solar, wind, and biomass sources during the previous year. For the first time in the program's history, payment requests exceeded available funds.
- NREL has a cooperative research and development agreement (CRADA) with Mineral Technologies, Inc., of Bethlehem—major manufacturer of mineral fillers for the pulp, paper, and plastics industries—to conduct research to improve the quality of paper derived from thermomechanical pulp. The cost-shared research agreement is designed to provide Mineral Technologies

access to NREL's research expertise in forest products and chemicals technologies and state-of-the-art facilities.

- With technical support from FEMP, the Willow Grove Naval Air Station completed a new technology demonstration of gas-driven, rooftop chillers, which were installed at no cost to the government. Metering results indicate that installation of the technology resulted in an energy cost savings of \$121,381.

## **Want More Information?**

**Office of Energy Conservation  
Consumer Hotline**  
800-OEC-6662

**Energy Efficiency and Renewable  
Energy Clearinghouse (EREC)**  
800-363-3732  
<http://www.eren.doe.gov>

**National Renewable Energy  
Laboratory (NREL)**  
800-644-NREL  
<http://www.nrel.gov>

**Federal Energy Management  
Program (FEMP)**  
<http://www.eren.doe.gov/femp/>

**National Association of State  
Energy Officials**  
<http://www.naseo.org/>

**EU.S. Environmental Protection Agency's  
(EPA) Green Lights and Energy Star**  
<http://www.epa.gov/energystar.html>

<sup>1</sup>Based on a GAO review and validation of the energy savings of EE research and development success stories.

### **Questions?**

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### **National Renewable Energy Laboratory**

NREL is a national laboratory of the U.S. Department of Energy (DOE), managed for DOE by Midwest Research Institute