

# Renewable and Efficient Energy Exports

An Assessment through 2012

by the Energy Division, Trade Development

During the next 10 years, worldwide trade in renewable energy equipment and services, and in energy efficiency products and services, will continue the very rapid growth experienced during the previous decade. High growth in market demand and supply, as measured by total sales as well as systems and megawatts of power installed, is being driven by three main factors:

- increased awareness of and concern for ecological balance and environmental protection by populations around the globe;
- the impact of sustainable economic development and energy policies being carried out by many major developed and developing countries around the world, as a response to national environmental sensitivities and the need to increase economic efficiency; and
- expanded efforts to bring energy, communications, education, and health services to the 40 percent of the world's population living in rural areas of many developing countries.

Led by a group of key geographic regions and specific countries, worldwide

trade in several different renewable energy technologies grew at very high rates. For example, in the 1991–2000 decade, U.S. export sales of solar photo voltaic (PV) cells, modules, and panels grew by an average of 25 percent yearly. In 2001, solar PV export sales grew even more dramatically, increasing by almost 34 percent over 2000 levels. If solar PV export sales continue to increase at double-digit levels, the value of all U.S. solar PV exports will exceed \$1 billion in 2002, and \$5 billion by the end of the decade. Since U.S. market share of the total global solar PV market has remained within a fairly constant range of 23 to 24 percent, worldwide trade in solar PV systems and equipment may total \$20 billion by 2010.

## SOLAR PV TECHNOLOGY

Two trends are driving this demand for solar PV technology. One is the rapid evolution of distributed power generation in urbanized developed countries through the use of building integrated solar photo voltaic (BIPV) technology. BIPV technology allows on-site electricity generation while a building is still connected to a utility power grid. Japan, Australia, New Zealand, Canada, and several countries of the European Union lead the world in BIPV applications for both commercial and residential locations. This trend has also begun within the United States on a limited basis in some sun-belt states.

The second trend affecting solar PV demand is the equally rapid increase in on-site solar power generation in rural villages and households, and in water pumping for agricultural or livestock watering in many large developing countries. South Africa and other countries in southern Africa, Morocco, Egypt, Mexico, Brazil, the Andean countries, countries of Central America, India, Pakistan, China, and Southeast Asia lead the world in rural, on-site solar PV development.

## WIND POWER

Worldwide wind turbine sales and installations as well as regional utility-scale wind power projects have expanded at even faster rates than solar PV technology. During the 1985–1992 period, installed wind power worldwide plateaued under 4,000 megawatts (MW). At the end of 1993, the European Union had slightly more than 1,000 MW of wind power installed.

However, by 2001, worldwide wind power had dramatically grown to a level of 24,000 MW installed, with 17,000 of that in the European Union. The European Union has a target of an additional 39,000 MW of wind turbines to be installed during the 2002–2010 period. Meanwhile, India and China each expect to install over 10,000 MW of wind turbines, and plans exist in Brazil, the United States, and Mexico to install a cumulative

total of several thousand megawatts of wind turbines during that same period. Small-scale wind turbines are used for rural household and village power generation in developing countries, as well as for on-site power needs of communication relay systems. The total value of global wind power markets may exceed \$200 billion by the end of the first decade of this century.

#### HYDROPOWER, GEOTHERMAL, AND BIO-ENERGY TRENDS

While the development of geothermal, bio-energy, and small hydropower projects has been much slower than that of solar PV and wind power, the use of these technologies nonetheless has increased as well. During the past decade, more than 2,000 additional megawatts of geothermal power have been developed in the Philippines, Indonesia, Mexico, and several Central American countries. The value of the equipment and services associated with geothermal energy development totals several billion U.S. dollars. If the countries of eastern Africa, where large geothermal resources exist but little has been developed, are included with those of Central America and Southeast Asia, a startling 95 percent of potential geothermal energy remains to be accessed and developed.

Similar circumstances surround small hydropower development and bio-energy development. In both cases, the potential of these renewable energy resources in many developing countries dwarfs that of what has been developed in projects during the past 15 years. Of particular note has been the use of agricultural wastes to produce utility-scale power while processing cash crops, such as sugar, coffee, and rice. Brazil, the countries of Central America, Turkey, Nepal, India, China, and the countries of Southeast Asia and sub-Saharan Africa are major potential markets for expanded small hydropower and bio-energy power project development. The total value of equipment and services associated with such projects is in the same range

as that which has been projected for geothermal power development.

#### ENERGY EFFICIENCY

Finally, the market for the broad range of energy efficiency products, including building insulation, motors, engines, lighting, and industrial heat recapture, has rapidly increased in both developed and developing countries around the world. This has been driven as much by concern over improving economic efficiency as it has been by energy conservation.

The markets for renewable energy and efficiency equipment and services are expected to continue their rapid growth as a result of implementation of the Kyoto Protocol, once it is fully ratified. The creation of "green energy credit" programs in Australia, New Zealand, Canada, and the European Union, and the worldwide implementation of the "greenhouse gas emissions reduction credit trading" provisions of the Kyoto Protocol are expected to foster market demand through the impact these credits have in reducing the costs of renewable energy and efficiency technologies. ■

## U.S. GOVERNMENT

### Energy Division

International Trade Administration  
U.S. Department of Commerce  
[www.trade.gov/td/energy](http://www.trade.gov/td/energy)

### Office of Environmental Technologies Industries

International Trade Administration  
U.S. Department of Commerce  
<http://environment.ita.doc.gov>

### U.S. Commercial Service

*Industry e-Alerts*  
[www.export.gov/e-newsletters](http://www.export.gov/e-newsletters)

### U.S. Department of Energy

[www.energy.gov](http://www.energy.gov)

### U.S. Environmental Protection Agency

[www.epa.gov](http://www.epa.gov)

## EVENTS AND ASSOCIATIONS

The U.S. Commerce Department offers numerous trade events around the world for small and medium-sized exporters. At the back of each issue, *Export America* lists events in several industries.

For more information and additional environmental trade events, visit [www.export.gov](http://www.export.gov) and select the "Trade Events" link. From there, search under "International Trade Events" by specific environmental sectors, such as pollution control equipment, renewable energy equipment, and water resources equipment and services.

The Commerce Department's Office of Environmental Technologies Industries (ETI) also compiles seminars, exhibitions, conferences, and other events. Visit the ETI Web site at <http://environment.ita.doc.gov> and select the "Calendar of Events" link. The site also includes a handy list of environmental organizations under the "Trade Associations" link. ■