

RENEWABLES 2007

GLOBAL STATUS REPORT

EXECUTIVE SUMMARY

In 2007, more than \$100 billion was invested in new renewable energy capacity, manufacturing plants, and research and development—a true global milestone. Yet perceptions lag behind the reality of renewable energy because change has been so rapid in recent years. This report captures that reality and provides an overview of the status of renewable energy worldwide in 2007. The report covers trends in markets, investments, industries, policies, and rural (off-grid) renewable energy. (By design, the report does not provide analysis, discuss current issues, or forecast the future.) Many of the trends reflect increasing significance relative to conventional energy.

- ▶ **Renewable electricity generation capacity** reached an estimated 240 gigawatts (GW) worldwide in 2007, an increase of 50 percent over 2004. Renewables represent 5 percent of global power capacity and 3.4 percent of global power generation. (Figures exclude large hydropower, which itself was 15 percent of global power generation.)
- ▶ Renewable energy generated as much **electric power** worldwide in 2006 as one-quarter of the world's nuclear power plants, not counting large hydropower. (And more than nuclear counting large hydropower.)
- ▶ The largest component of renewables generation capacity is **wind power**, which grew by 28 percent worldwide in 2007 to reach an estimated 95 GW. Annual capacity additions increased even more: 40 percent higher in 2007 compared to 2006.
- ▶ The fastest growing energy technology in the world is **grid-connected solar photovoltaics** (PV), with 50 percent annual increases in cumulative installed capacity in both 2006 and 2007, to an estimated 7.7 GW. This translates into 1.5 million homes with rooftop solar PV feeding into the grid worldwide.
- ▶ Rooftop **solar heat collectors** provide hot water to nearly 50 million households worldwide, and space heating to a growing number of homes. Existing solar hot water/heating capacity increased by 19 percent in 2006 to reach 105 gigawatts-thermal

(GWth) globally.

- ▶ **Biomass and geothermal energy** are commonly employed for both power and heating, with recent increases in a number of countries, including uses for district heating. More than 2 million ground-source heat pumps are used in 30 countries for building heating and cooling.
- ▶ Production of **biofuels** (ethanol and biodiesel) exceeded an estimated 53 billion liters in 2007, up 43 percent from 2005. Ethanol production in 2007 represented about 4 percent of the 1,300 billion liters of gasoline consumed globally. Annual biodiesel production increased by more than 50 percent in 2006.
- ▶ **Renewable energy**, especially small hydropower, biomass, and solar PV, provides electricity, heat, motive power, and water pumping for tens of millions of people in rural areas of developing countries, serving agriculture, small industry, homes, schools, and community needs. Twenty-five million households cook and light their homes with biogas, and 2.5 million households use solar lighting systems.
- ▶ **Developing countries** as a group have more than 40 percent of existing renewable power capacity, more than 70 percent of existing solar hot water capacity, and 45 percent of biofuels production.

Including all these markets, an estimated \$71 billion was invested in new renewable power and heating capacity worldwide in 2007 (excluding large hydropower), of which 47 percent was for wind power and 30 percent was for solar PV. Investment in large hydropower was an additional \$15–20 billion. Investment flows became more diversified and mainstreamed during 2006/2007, including those from major commercial and investment banks, venture capital and private equity investors, multilateral and bilateral development organizations, and smaller local financiers.

The renewable energy industry saw many new companies, huge increases in company valuations, and many initial public offerings. Just counting the 140 highest-valued publicly traded renewable energy com-

panies yields a combined market capitalization of over \$100 billion. Companies also broadened expansion into emerging markets. Major industry growth is occurring in a number of emerging commercial technologies, including thin-film solar PV, concentrating solar thermal power generation, and advanced/second-generation biofuels (with first-ever commercial plants completed in 2007 or under construction). Jobs worldwide from renewable energy manufacturing, operations, and maintenance exceeded 2.4 million in 2006, including some 1.1 million for biofuels production.

Policy targets for renewable energy exist in at least 66 countries worldwide, including all 27 European Union countries, 29 U.S. states (and D.C.), and 9 Canadian provinces. Most targets are for shares of electricity production, primary energy, and/or final energy by a future year. Most targets aim for the 2010–2012 timeframe, although an increasing number of targets aim for 2020. There is now an EU-wide target of 20 percent of final energy by 2020, and a Chinese target of 15 percent of primary energy by 2020. Besides China, several other developing countries adopted or upgraded targets during 2006/2007. In addition, targets for biofuels as future shares of transport energy now exist in several countries, including an EU-wide target of 10 percent by 2020.

Policies to promote renewables have mushroomed in recent years. At least 60 countries—37 developed and transition countries and 23 developing countries—have some type of policy to promote renewable power generation. The most common policy is the feed-in law. By 2007, at least 37 countries and 9 states/provinces had adopted feed-in policies, more than half of which have been enacted since 2002. Strong momentum for feed-in tariffs continues around the world as countries enact new feed-in policies or revise existing ones. At least 44 states, provinces, and countries have enacted renewable portfolio standards (RPS), also called renewable obligations or quota policies.

There are many other forms of policy support for renewable power generation, including capital investment subsidies or rebates, tax incentives and credits,

sales tax and value-added tax exemptions, energy production payments or tax credits, net metering, public investment or financing, and public competitive bidding. And many developing countries have greatly accelerated their renewable electricity promotion policies in recent years, enacting, strengthening, or considering a wide array of policies and programs.

Policies for solar hot water and biofuels have grown substantially in recent years. Mandates for incorporating solar hot water into new construction represent a strong and growing trend at both national and local levels. Many jurisdictions also offer capital subsidies and/or conduct solar hot water promotion programs.

Mandates for blending biofuels into vehicle fuels have been enacted in at least 36 states/provinces and 17 countries at the national level. Most mandates require blending 10–15 percent ethanol with gasoline or blending 2–5 percent biodiesel with diesel fuel. Fuel tax exemptions and/or production subsidies have become important biofuels policies in more than a dozen countries.

Below the national and state/provincial level, municipalities around the world are setting targets for future shares of renewable energy for government consumption or total city consumption, typically in the 10–20 percent range. Some cities have established carbon dioxide reduction targets. Many cities are enacting policies to promote solar hot water and solar PV, and are conducting urban planning that incorporates renewable energy.

Market facilitation organizations (MFOs) are also supporting the growth of renewable energy markets, investments, industries, and policies through networking, market research, training, project facilitation, consulting, financing, policy advice, and other technical assistance. There are now hundreds of such organizations around the world, including industry associations, nongovernmental organizations, multilateral and bilateral development agencies, international partnerships and networks, and government agencies.

SELECTED INDICATORS AND TOP FIVE COUNTRIES

Selected Indicators	2005	↕ 2006	↕ 2007 (estimated)
Investment in new renewable capacity (annual)	\$40	↕ 55	↕ 71 billion
Renewables power capacity (existing, excl. large hydro)	182	↕ 207	↕ 240 GW
Renewables power capacity (existing, incl. large hydro)	930	↕ 970	↕ 1,010 GW
Wind power capacity (existing)	59	↕ 74	↕ 95 GW
Grid-connected solar PV capacity (existing)	3.5	↕ 5.1	↕ 7.8 GW
Solar PV production (annual)	1.8	↕ 2.5	↕ 3.8 GW
Solar hot water capacity (existing)	88	↕ 105	↕ 128 GWth
Ethanol production (annual)	33	↕ 39	↕ 46 billion liters
Biodiesel production (annual)	3.9	↕ 6	↕ 8 billion liters
Countries with policy targets	52	↕	66
States/provinces/countries with feed-in policies	41	↕	46
States/provinces/countries with RPS policies	38	↕	44
States/provinces/countries with biofuels mandates	38	↕	53

Top Five Countries	#1	#2	#3	#4	#5
Annual amounts for 2006					
New capacity investment	Germany	China	United States	Spain	Japan
Wind power added	United States	Germany	India	Spain	China
Solar PV added (grid-tied)	Germany	Japan	United States	Spain	South Korea
Solar hot water added	China	Germany	Turkey	India	Austria
Ethanol production	United States	Brazil	China	Germany	Spain
Biodiesel production	Germany	United States	France	Italy	Czech Republic
Existing capacity as of 2006					
Renewables power capacity	China	Germany	United States	Spain	India
Small hydro	China	Japan	United States	Italy	Brazil
Wind power	Germany	Spain/United States		India	Denmark
Biomass power	United States	Brazil	Philippines	Germany/Sweden/Finland	
Geothermal power	United States	Philippines	Mexico	Indonesia/Italy	
Solar PV (grid-connected)	Germany	Japan	United States	Spain	Netherlands/Italy
Solar hot water	China	Turkey	Germany	Japan	Israel