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### RENEWABLE ENERGY BECOMING COST-COMPETITIVE WITH FOSSIL FUELS IN THE U.S.

On September 18, 2006, the Worldwatch Institute and the Center for American Progress released a 40-page study "American Energy: The Renewable Path to Energy Security."

The report notes that renewable energy resources provide just over six percent of total U.S. energy today, but that figure could increase rapidly in the years ahead.

Many of the new technologies that harness renewables — including wind, solar, geothermal, and bio-power — are, or soon will be, economically competitive with the fossil fuels that meet 85 percent of U.S. energy needs. Dynamic growth rates are driving down costs and spurring rapid advances in technologies.

#### SOME GENERAL FINDINGS:

Since 2000, solar cell production has risen six-fold; biodiesel production has expanded nearly four-fold; global wind energy generation has more than tripled; and production of fuel ethanol from crops have more than doubled. Annual global investment in "new" renewable energy has risen almost six-fold since 1995, with cumulative investment over this period nearly US\$180 billion.

The United States boasts some of the best renewable energy resources in the world, which have the potential to meet a rising and significant share of the nation's energy demand. A quarter of the U.S. land area has winds strong enough to generate electricity at the same price as natural gas and coal, and seven states in the Southwest alone have the potential to provide 10 times the current electric generating capacity through solar power.

All but four U.S. states now have incentives in place to promote renewable energy, while more than a dozen have enacted new renewable energy laws in the past few years, and four states strengthened their targets in 2005.

California gets 31 percent of its electricity from renewable resources; 12 percent of this comes from non-hydro sources such as wind and geothermal energy.

#### BIOFUELS/BIOMASS:

Production of fuel ethanol from crops more than doubled between 2000 and 2005, reaching nearly four billion gallons annually while biodiesel from vegetable oil and waste expanded nearly four-fold over this period.

Iowa produces enough ethanol that, if consumed in-state, would meet half the state's gasoline requirements.

Biodiesel has recently become the country's fastest growing fuel: in 2005, the United States produced about 75 million gallons, up from 500,000 in 1999.

More than 100 U.S. coal-fired power plants are now burning biomass together with coal. Experience has shown that biomass can be substituted for up to 2-5 percent of coal at very low incremental cost; higher rates - up to 15 percent biomass -- are possible with moderate plant upgrades.

According to the Washington Department of Ecology, the state produces enough biomass to generate over 15.5 billion kWh of electricity, or almost half of Washington's residential power consumption.

## GEOTHERMAL ENERGY:

More than 600,000 geothermal heat pumps are operating today, and the market is growing at an annual rate of 15 percent. The city of Boise, Idaho, developed four direct-use district systems that together heat 366 buildings, including the state capitol.

The United States leads the world in geothermal electric and thermal heat installed capacity, with more than 2,828 MW of power capacity operating in four states: California, Hawaii, Nevada, and Utah. Each year, U.S. geothermal energy displaces the energy equivalent of more than 60 million barrels of oil, prevents the emission of 22 million tons of CO<sub>2</sub>, and produces \$1.5 billion worth of electricity -- enough to meet the power needs of about four million people.

Projects now planned or under development in nine western U.S. states could nearly double current capacity. The Geothermal Energy Association estimates that by 2025, U.S. geothermal resources could provide more than 30,000 MW of power, enough to meet six percent of today's electricity demand. New development could create 130,000 new jobs and add more than \$70 billion of investment to the economy.

## SOLAR ENERGY:

According to an IEA study, very large-scale PV systems installed on just four percent of the world's deserts could generate enough electricity annually to meet world power demand. Moreover, the solar resources of just seven southwest states could provide 10 times the current electric generating capacity.

Production of electricity-generating solar cells is one of the world's fastest growing industries, up 45 percent in 2005 to six times the level in 2000, exceeding 1,700 MW in 2005, and the industry plans to continue its dramatic expansion. Global grid-connected PV capacity increased 55 percent in 2005, to 3.1 gigawatts, making it the world's fastest growing source of power.

In early 2006, California state regulators approved \$3.2 billion in customer rebates with the goal of installing 3,000 MW of PV on the rooftops of one million California homes, businesses, and public buildings by 2017, up from about 100 MW today. New Jersey, which offers a rebate and sales tax exemption for solar PV, has the second largest U.S. market after California.

According to the National Renewable Energy Laboratory, a solar plant covering 10 square miles of desert would produce as much power as the Hoover Dam. Desert-based power plants could well provide a large share of the nation's commercial energy.

Furthermore, a report by the Solar Task Force of the Western Governors' Association found that, within the next decade, 4,000 MW of central solar plants could be installed in the United States, generating thousands of new jobs.

Worldwide, solar heating is booming: the global market doubled between 2000 and 2005, with the greatest increases in China and Europe. For example, as Germany attempts to achieve energy independence, that nation's photovoltaics industry has grown by over 67 percent in the last five years, and has contributed to the creation of 20,000 jobs in the last three.

A U.S. Department of Energy study projects that half of residential space heating and 65-75 percent of water heating needs could be met with solar.

## WATER POWER:

In principle, U.S. hydropower generation could be increased significantly.

The U.S. Department of Energy reports that hydropower could double its current contribution of more than 78,000 MW. According to DOE, 21,000 MW of capacity could be added simply by improving existing projects and installing generators at dams that do not have them. Of the 80,000 dams in the United States, only three percent are used to generate electricity.

The Electric Power Research Institute estimates that U.S. near-shore wave resources alone could generate some 2.3 trillion kWh of electricity annually, or more than eight times the yearly output from U.S. hydropower dams.

## WIND ENERGY:

Global wind energy generation has more than tripled since 2000, providing enough electricity to power the homes of about 30 million Americans.

About one-fourth of the total land area of the United States has winds powerful enough to generate electricity as cheaply as natural gas or coal at today's prices. According to government-sponsored studies, the wind resources of Kansas, North Dakota, and Texas alone are, in principle, sufficient to provide all the electricity the nation currently uses.

The United States led the world in wind energy installations in 2005. In fact, wind farms were the country's second largest source of new generating capacity built in 2005, after natural-gas fired plants. By the end of that year, the nation had enough cumulative wind capacity to meet the needs of 2.3 million U.S. households, and trailed only Germany and Spain in total installations. Texas now has the country's largest collection of wind generators. The industry expects more record-setting years in 2006 and 2007.

The U.S. Department of Energy estimates that the offshore wind resource within 5-50 nautical miles of the U.S. coastline could support about 900,000 MW of wind generating capacity - an amount approaching total current U.S. electric capacity.

In June 2006, the U.S. Department of Energy committed to developing an action plan with the goal of providing up to 20 percent of U.S. electricity with wind power.

#### ENERGY EFFICIENCY:

The time is ripe for another great leap in vehicle efficiency. New technologies such as hybrid drive trains, clean-burning diesel engines, continuously variable transmissions, and lightweight materials could allow vehicle fuel economy to double over the next two decades.

Technologies available today could increase appliance efficiency by at least an additional 33 percent over the next decade, and further improvements in dryers, televisions, lighting, and standby power consumption could avoid more than half of the projected growth in demand in the industrial world by 2030.

#### JOBS:

Renewable energy creates more jobs per unit of energy produced and per dollar spent than fossil fuel technologies do. For example, a 2004 analysis by the Union of Concerned Scientists found that increasing the share of renewable energy in the U.S. electricity system to 20 percent -- adding more than 160,000 megawatts (MW) of new renewable energy facilities by 2020 -- would create more than 355,000 new U.S. jobs.

Similarly, a 2004 Renewable Energy Policy Project study determined that increasing U.S. wind capacity to 50,000 MW -- about five times today's level -- would create 150,000 manufacturing jobs, while pumping \$20 billion in investment into the national economy.

Renewable heating and biofuels also offer significant employment opportunities. The U.S. ethanol industry created nearly 154,000 jobs throughout the nation's economy in 2005 alone, boosting household income by \$5.7 billion.

#### CONCLUSIONS:

Despite strong public support and rapidly rising interest in renewable technologies, the U.S. has not kept up with the rapid growth in the sector globally over the past decade. Rising oil prices, security risks associated with petroleum dependency, and the increasing environmental costs of conventional fuels provide growing incentive for the United States to expand its renewables use. However, if the U.S. is to join the world leaders in renewable energy — among them Germany, Spain, and Japan — it will need world-class energy policies based on a sustained and consistent policy framework at the local, state, and national levels.

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The full report may be downloaded at:

<<http://images1.americanprogress.org/il80web20037/americanenergynow/AmericanEnergy.pdf>>

News releases and summaries of the report may be found at:

<<http://www.worldwatch.org/node/4526>>

<<http://www.worldwatch.org/node/4530>>

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