

## —Worldwatch Climate Issue Brief—

### A Guide to the Issues Facing Decision Makers in Bali and Beyond

As the critical second week of negotiations in Bali, Indonesia, gets under way, delegates from more than 180 countries are struggling to hash out a post-2012 international climate pact consistent with the Parties' shared commitment to prevent dangerous interference with the world's climate system. The anticipated outcome of the meeting is a roadmap for producing a new international climate framework by 2009 that includes next steps on mitigation, adaptation, finance, and technology. The 2009 end-date is important both because of the urgency of mitigating future climate impacts and because moving forward with a framework will send a clear message to markets that carbon prices will endure beyond the Kyoto Protocol's first commitment period, which ends in 2012.

Converting to low-carbon energy sources while meeting continued growth in world demand for energy services will be central to any climate stabilization scenario. Renewable energy offers tremendous potential and, combined with improvements in energy efficiency, could fuel the economy of the future. **Renewables and efficiency are available now and are ready for rapid scale-up; they are the only technologies that can achieve the emissions reductions required over the next decade to help stabilize the global climate.** In addition, a new wealth of experience indicates that, with some refinement, carbon markets will channel a tremendous flux of global investment toward zero- and low-carbon sources of energy. Certainty about a global framework beyond 2012 will help clear the road for this cleaner energy future.

#### How can energy efficiency help address climate change?

Today, energy efficiency represents the cheapest and cleanest way to meet rising demand for energy services and reduce greenhouse gas emissions. Energy efficiency improvements can stabilize energy prices by reducing demand while also delivering the same services we value—whether hot water or cold drinks—at lower cost and with fewer emissions from fossil fuels.

- World energy productivity has improved steadily over the past two decades. Yet a May 2007 study by the [McKinsey Global Institute](#) shows that the rate of improvement could be *profitably* increased, from 1 percent to 2 percent per year, and that doing so would cut anticipated growth in energy demand by 50 percent.
- A January 2007 report by the [American Solar Energy Society](#) concludes that energy efficiency improvements and renewable energy have the potential to put the United States on track to achieve carbon reductions of 60–80 percent by 2050. The report finds that renewable energy, combined with energy efficiency improvements, could provide up to 50 percent of U.S. electricity needs by 2030. Energy efficiency would account for about 57 percent of national emissions reductions required by 2030 (renewables would provide the rest), with 40 percent of the efficiency-related reductions coming from buildings, and 30 percent from both the industry and transportation sectors.

- Thanks to strong state policies and standards, California has the lowest per capita energy consumption of any U.S. state, without sacrificing comfort or valued services.

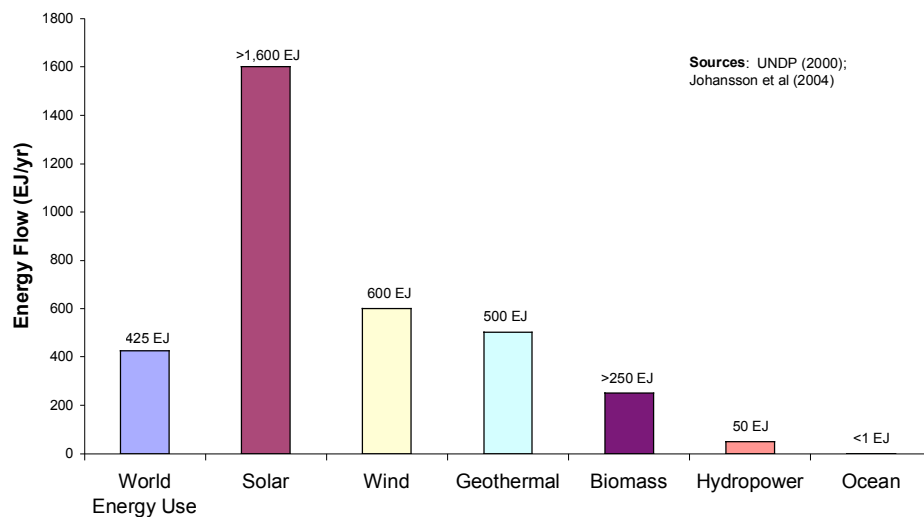
### What policies can help to advance energy efficiency?

- Strengthened efficiency mandates for buildings, appliances, and vehicles are powerful tools. At today's oil prices, raising U.S. vehicle efficiency by 10 mpg would avoid \$100 billion in annual oil imports. Buildings account for about 40 percent of global energy use, but currently available technologies and design principles could dramatically reduce their energy demands.
- "De-coupling" profits of electric utilities from sales, as California has done, motivates well-financed and knowledgeable utility companies to search for efficiency opportunities.

### Can renewable energy really meet a large share of our energy needs?

Wind, solar, and other renewables, in combination with energy efficiency improvements, have enormous potential for meeting rising global demand for energy services and reducing carbon emissions. As Figure 1 illustrates, the technical potential of renewable energy is enormous—many times current global energy demand.

**Figure 1. Current Technical Potential of Renewable Resources Relative to World Energy Consumption**



- Including large-scale hydropower, renewable energy already accounts for 16.5 percent of world primary energy and 19 percent of electricity production.
- “New” renewables (excluding large-scale hydropower and traditional biomass) now represent about 6 percent of global installed electric capacity, and that share is rising.
- A report produced by [REN21](#) (the Renewable Energy Policy Network for the 21st Century) for the G8 Gleneagles summit in September 2007 concludes that by 2050, renewable energy could contribute from up to 50 percent (in China, for example) to more

than 90 percent (Australia) of national electricity demand, and in the range of 40 percent (Germany) to 80 percent (Indonesia) of national heating supply.

### **When will renewables be ready to provide a significant share of world energy supply?**

Renewable energy is ready *now* to be scaled up quickly and dramatically to meet global energy needs. Renewables are growing rapidly, with annual growth rates of wind power, solar photovoltaics (PV), and biofuels in the double-digits. They already account for large shares of energy supply in many nations, and offer developing countries the opportunity to bypass the dirty development path taken by today's industrial countries.

- The [solar photovoltaic industry](#) has rapidly become one of the world's fastest growing industries, with average annual growth rates exceeding 36 percent over the past five years; grid-connected PV is increasing far faster.
- The [wind power industry](#) will add about 18 gigawatts (GW) of new capacity in 2007, compared to 1 GW of new nuclear power capacity that came online worldwide in 2006. Total global wind capacity now exceeds 93 GW, up from 7.5 GW a decade ago.
- The share of electricity from [renewable sources in Germany](#) increased from 6.3 percent in 2000 to an expected 14 percent by the end of this year. As a result of this success, the German government recently increased its targets for renewable electricity; Germany now aims to produce 27 percent of its electricity with renewable sources by 2020, and at least 45 percent by 2030.
- The [German government](#) estimates that renewable energy avoided the release of more than 100 million tons of carbon dioxide in Germany last year—equivalent to taking more than 18 million U.S. cars off of the road.
- [Wind power capacity additions](#) have been second only to new natural gas-fired capacity for several years running in the United States and the European Union.
- [Global investment](#) in new renewable energy capacity will likely exceed \$66 billion in 2007. Total global investment flows in 2006—including investments in new capacity and capital investments in new plants and equipment—exceeded \$100 billion.

### **What policies are needed to advance renewable energy?**

Strong, consistent, and long-term policies to create and expand markets for renewable energy and invest in technology development are critical, along with steps to reduce subsidies for conventional energy and incorporate external costs (thereby leveling the playing field). Today, at least 58 countries have national targets for renewable energy and at least 56 have policies in place to promote renewables. Political will and the right policies can propel renewable energy into the mainstream of the global energy economy. Policy options that can advance renewable energy include:

- [Renewable Portfolio Standards and Feed-in Tariffs](#) are widely used around the world for increasing the share of electricity from renewable sources. To date, feed-in laws, which offer

guaranteed access to the market and long-term guaranteed payments, have been found to be the most successful and cost-effective option for advancing renewable electricity.

- High-performance building codes can improve energy efficiency and increase the share of energy provided from decentralized renewable sources for electricity, heating, and cooling. A policy enacted in Barcelona, Spain, now requires that all new or refurbished buildings above a certain size produce at least a portion of their hot water with solar thermal systems.
- Large-scale government purchases of renewable technologies or energy can help to build large, aggregated markets that can drive down costs through economies of scale.
- Research and development (R&D) underpins the advance of renewable energy technologies. However, U.S. government support of renewable energy R&D in 2007 totaled little more than \$600 million—about what the government spent in Iraq in a single day.
- Putting a price on carbon can help level the playing field. In the United States, wind power would be competitive with coal power if coal faced the recent European Union Emissions Trading Scheme (EU-ETS) carbon dioxide price of \$32 per ton.

### What role do carbon markets play?

Emerging carbon markets put a price on each ton of carbon dioxide (CO<sub>2</sub>) emitted, raising the price of fossil fuel use and making alternative low-carbon solutions, including renewable energy and energy efficiency improvements, even more attractive. Carbon markets also open new channels for investment in carbon-reducing projects.

- Carbon trading reached an estimated \$30.1 billion in 2006—an increase of nearly 180 percent over the 2005 level. (See Table 1.)

**Table 1. 2006 Trading on World Carbon Markets**

<b>Market</b>	<b>Volume</b> (million tons of CO <sub>2</sub> -equivalent)	<b>Value</b> (million U.S. dollars)
<b>Allocations Trading</b>		
<i>Compliance Markets</i>		
EU-ETS	1,101	24,357
New South Wales	20	225
Other	17	79
<i>Voluntary Markets</i>		
Chicago Climate Exchange	10	38
Other	13	55
<b>Project-Based Trading</b>		
Clean Development Mechanism	475	4,257
Joint Implementation	16	141
<b>Total</b>		
	1,652	30,153

Sources: [World Bank and K. Hamilton](#)

- The EU-ETS, designed to facilitate cost-effective emissions reductions for compliance with Kyoto Protocol caps, is today's largest carbon market. Recent carbon prices in the EU-ETS have commonly exceeded \$30 per ton of CO<sub>2</sub>-equivalent, enough to increase the cost of coal power by more than 50 percent.
- The Kyoto Protocol's Clean Development Mechanism (CDM), which promotes emissions reductions in developing countries that do not yet have emissions caps under the Protocol, is the world's second largest source of carbon trades. In one CDM project in Bogotá, Colombia, nearly 250,000 tons of CO<sub>2</sub>-equivalent will be eliminated annually by improving [transportation efficiency](#); in another in Brazil, almost 150,000 tons of CO<sub>2</sub>-equivalent emissions will be avoided each year by a 150-megawatt [wind power project](#).
- About 48 percent of the U.S. population is now represented in some form of regional emissions reduction program: the [Regional Greenhouse Gas Initiative](#) involves 10 northeastern states, six states are covered under the [Western Climate Initiative](#), and, most recently, eight states signed onto the [Midwestern Greenhouse Gas Reduction Program](#).

### **What lessons can we learn from existing carbon markets?**

Carbon markets are in their infancy, and the strengths and weaknesses of the early models offer important lessons. Future models will no doubt benefit from the improved measurement and certification of project benefits offered by new tools, such as the WBCSD/WRI Greenhouse Gas Protocol and the Climate, Community, and Biodiversity Standards.

- Some new cap-and-trade schemes are now choosing to auction, rather than gift, allowances to avoid the windfall corporate profits, earned at great expense to consumers, seen under the EU-ETS.
- All new carbon markets are struggling with the question of how to incorporate flexibility mechanisms like the Clean Development Mechanism, which has proven to be a powerful but often controversial tool.

Today, climate stabilization is more than just a possibility—it is an increasingly attractive economic opportunity. Since the historic gathering a decade ago in Kyoto, research and development and forward-thinking policies have driven down the costs of renewable energy technologies, which now capture a growing share of the energy market. Meanwhile, carbon markets are emerging as a powerful tool for encouraging an efficient transition to a low-carbon economy. A Bali roadmap should acknowledge these advances, and the accompanying sea change of public opinion should provide a green light for investment in a low-carbon future.

### **For further reading:**

- Christopher Flavin, "Building a Low-Carbon Economy," in Worldwatch Institute, [State of the World 2008](#), upcoming January 2008.
- Zoe Chafe and Hilary French, "Improving Carbon Markets," in Worldwatch Institute, [State of the World 2008](#), upcoming January 2008.
- Worldwatch Institute and Center for American Progress, [American Energy: The Renewable Path to Energy Security](#), 2006.