

# National Policies to Promote Renewable Energy

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*Abstract: The world is entering a new energy era marked by concerns over energy security, climate change, and access by the poor to modern energy services. Yet the current energy path is not compatible with sustainable development objectives. Global demand for energy will continue to grow; so will CO<sub>2</sub> emissions. Achieving a low-carbon energy world will require an unprecedented technological transformation in the way energy is produced and used. That transformation has begun, as renewables capacity continues to grow, prices continue to fall, and shares of global energy from renewables continue to increase. Government policies are the main driver behind renewable energy's meteoric growth. Still, the world is tapping only a small amount of the vast supply of renewable energy resources. There is broad consensus that the role of these resources should be expanded significantly in order to meaningfully address energy security, energy access, and climate change.*

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The main driver of sustainable economic development is sustainable energy. Yet there is broad consensus that the current path of global energy development is not sustainable in economic, environmental, or social terms. Moving to a more sustainable development path is the central global challenge for energy policy. The world's energy needs will be almost 60 percent higher in 2030 than they are now, and CO<sub>2</sub> emissions will increase at about the same rate.<sup>1</sup> In 2009, fossil fuels accounted for 81 percent of total global primary energy supply, which doubled between 1971 and 2009. Rising global demand for fossil fuels plays a key role in the continued growth of CO<sub>2</sub> emissions. In fact, CO<sub>2</sub> from energy production and use represents about 65 percent of global emissions. In 2009, the BRICS countries (Brazil, Russia, India, China, South Africa) accounted for 33 percent of global energy use and 37 percent of CO<sub>2</sub> emissions from fossil fuels; and energy consumption in these countries is expected to grow in coming years as a result of their strong economic performance.<sup>2</sup> According to McKinsey &

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Company, more than 75 percent of the world's energy infrastructure needed by 2030 has not yet been constructed, and most of it will be built in developing countries.

To meet this infrastructure goal in the context of heightened concern over energy security and climate change, greater global attention is being given to clean and renewable sources of energy. Recognizing "with a sense of urgency" that decisions taken now will be decisive for a transition toward a sustainable energy future, world leaders gathered in Johannesburg, South Africa, at the World Summit on Sustainable Development (WSSD) in 2002 to call for a substantial increase in the global share of renewable energy.

In Copenhagen in 2009 and Cancun in 2010, the international community agreed to limit the rise in worldwide temperatures to no more than 2 degrees Celsius above preindustrial levels, which scientists regard as the threshold for avoiding the most serious effects of global warming. Given that global demand for energy could more than double by 2050, reducing global emissions by at least 50 percent from 1990 levels will require an unprecedented technological transformation of how energy is produced and used. Widespread deployment of currently available clean-energy technologies and development of new, cheaper, and more efficient technologies are needed to achieve this goal.

Continuing along the current path of energy development is not only incompatible with sustainable development objectives, it also makes the world more vulnerable to supply disruptions and price shocks as international trade and economic growth expand, especially in developing countries. The continued rise in oil prices reflects concerns about meeting the fast-growing demand for energy and the risks

of dependency on fossil fuels. The high price of oil is taking its toll on the economies of less developed countries. In little more than a decade, the cost of these countries' oil imports has quadrupled to an estimated \$100 billion in 2011, or 5.5 percent of their GDP.<sup>3</sup>

In a 1931 meeting with Henry Ford, Thomas Edison told the inventor of the gasoline-powered car: "I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait until oil runs out before we tackle that." Eighty years later, in 2010, global investment in renewable energy grew 32 percent to a record \$211 billion.<sup>4</sup> Renewable energy supplied an estimated 16 percent of global final energy consumption and delivered close to 20 percent of global electricity production. Including hydropower (about 30 GW added in 2010), renewable energy accounted for approximately 50 percent of total added power generation capacity in 2010.<sup>5</sup> Table 1 and Figure 1 show, respectively, regional and worldwide trends in the consumption of new renewable energy from 2000 to 2010.

Wind power grew by 23.6 percent in 2010 and, at \$95 billion, continued to be the favored technology for investors. Asia deployed the largest share of new wind installations – 54.6 percent – with China ranking number one in total installed capacity, accounting for 50 percent of the world market for new wind turbines. The solar sector experienced the strongest growth, with investments climbing 53 percent to a record \$79 billion, helped by declining prices and key government support. In 2010, 18 GW of photovoltaic (PV) power were installed globally – the first time more than 10 GW were installed and connected to electric grids in a single year. Today, more people than ever before derive energy from renewables.

Table 1

Consumption of New Renewable Energy by Region, in Million Tonnes of Oil Equivalent (Mtoe)

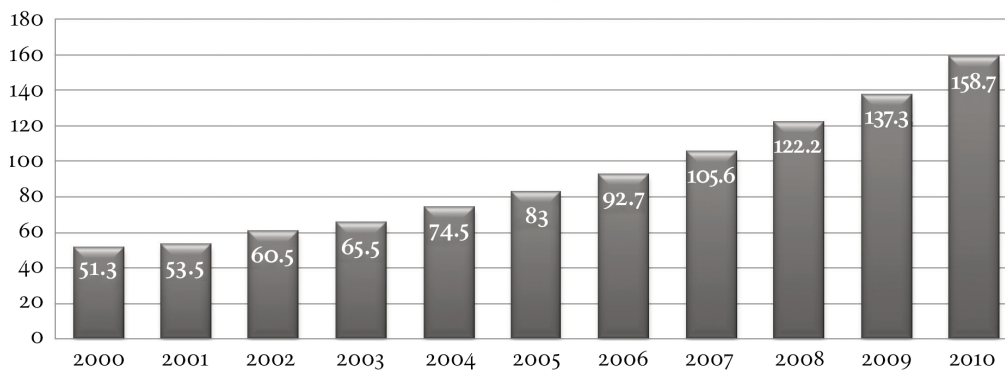
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	North America	Central & South America	Europe & Eurasia	Middle East	Africa	Asia Pacific	Total
2000	21.1	3.9	14.8	0.0	0.3	11.2	51.3
2001	20.2	4.5	16.8	0.0	0.3	11.7	53.5
2002	22.2	5.0	20.5	0.0	0.4	12.4	60.5
2003	22.6	5.4	24.0	0.0	0.4	13.1	65.5
2004	23.5	5.7	30.1	0.0	0.6	14.6	74.5
2005	24.9	6.2	35.3	0.0	0.6	16.0	83.0
2006	27.0	6.4	40.9	0.0	0.6	17.8	92.7
2007	29.3	7.6	48.4	0.0	0.6	19.7	105.6
2008	34.1	8.5	56.0	0.0	0.7	22.9	122.2
2009	38.7	9.3	61.6	0.1	0.9	26.7	137.3
2010	44.2	11.1	69.6	0.1	1.1	32.6	158.7

New renewables include wind, geothermal, solar, biomass, and waste. Source: REN21, *Renewables Global Status Report 2011*.

Figure 1

Worldwide Consumption of New Renewable Energy, in Million Tonnes of Oil Equivalent (Mtoe)



New renewables include wind, geothermal, solar, biomass, and waste. Source: BP Renewable Statistical Review 2011.

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**R**enewable energy policies and capacity targets are the main drivers of renewable energy growth. By early 2011, at least 118 countries had some type of policy target or renewables-support policy at the national level, compared to 55 countries in early 2005. Public policies have had a major impact on driving renewable energy markets, investments, industry development, and social benefits. In developing countries, such policies have caused a remarkable change in the geographic spread of renewable energy as of 2010. Adoption of renewable energy technologies is no longer confined to the industrialized world. More than half of the existing renewable power capacity is in the developing world, especially in Asia. Significant advances have also occurred in many Latin American countries, and at least twenty countries in the Middle East, North Africa, and sub-Saharan Africa have active renewable energy markets.

Thanks to its pioneering Renewable Energy Law, China now leads in several indicators of market growth. In 2010, China was the top installer of wind turbines and solar thermal systems and the leading hydropower producer. India is fifth worldwide in total existing wind power capacity and is rapidly expanding many forms of rural renewables, such as biogas and solar PV. Brazil produces virtually all of the world's sugar-derived ethanol and has been adding new hydropower, biomass, and wind power plants, as well as solar heating systems.

One force propelling renewable energy policies and development is the potential to create new industries and generate new jobs. Jobs from renewables number in the hundreds of thousands in several countries. Globally, there are more than 3.5 million direct jobs in renewable energy industries, about half of them in the biofuels industry, with additional indirect jobs well beyond this figure.

Momentum is building. But business, investors, activists, and scientists alone cannot change the way we produce and use energy. These groups can anticipate change, facilitate it, and profit from it, but they cannot drive it. Public policies that create markets, remove barriers, level the playing field, and establish clear objectives and targets for renewable energy and energy efficiency help shape the future. Energy policies affect the price, availability, and advancement of new technology; therefore, they determine how quickly we reach the point at which consumers can choose electricity generated by wind and sun or purchase more efficient lighting, appliances, and cars.

Policies to support renewable energy investments vary from country to country. Experience shows that no one policy or instrument has been the sole driving force in the growth of renewable energy investments. Countries choose a combination of policies and regulations that fit their circumstances. Key among the successful policies and regulations adopted by many countries are: (1) clear goals and targets as well as strategies and implementation plans; (2) a level playing field and fiscal incentives to reduce up-front costs, including tax credits, loans, and guarantees; (3) regulatory instruments such as portfolio standards or quota systems, feed-in laws and tariffs, and green certificates; (4) rural energy provisions and electrification policies; (5) capacity development to ensure the necessary capabilities and skills; and (6) strong public institutions at the national level for setting priorities and establishing policy and regulatory agendas. These policies and regulatory frameworks must be stable and long lasting to ensure investor confidence.

At least ninety-six countries, more than half of which are developing countries, have established national targets for expanding renewable energy use. These tar-

gets represent commitments to shares of electricity production (typically 10 to 30 percent from renewables), total primary or final energy, heat supply, installed capacities of specific technologies, and shares of biofuels in road transport fuels. Many targets also exist at the state, provincial, and local levels. Although some were not met or were scaled back, many countries achieved or exceeded their targets set for 2010; Sweden has already surpassed its goal for 2020. Existing targets were raised in a number of countries, including Finland, Germany, Spain, and Taiwan, and entirely new targets were adopted in South Africa, Guatemala, and India, among others.

Ninety-six countries have implemented renewable power generation policies. The feed-in tariff (FIT) remains the most widely employed policy, in place in at least sixty-one countries and twenty-six states or provinces worldwide. FIT schemes have effectively promoted renewable power generation with long-term fixed-price premium payments, network connections, and guaranteed purchase of all generated electricity. Most FIT-related activity in 2010 focused on revisions to existing policies in response to strong markets that exceeded expectations, particularly in the case of PV. Several developing and transition countries introduced new FIT policies in 2010 and early 2011. In addition, ten countries have enacted renewable portfolio standards (RPS) or quota policies at the national level. At least fifty other jurisdictions have such policies, including thirty U.S. states (plus Washington, D.C.) and the Canadian province British Columbia, which requires that 93 percent of new power capacity be renewable. Quota policies have been effective when designed to reduce risk, for example, in case of long-term contracts.

Many additional types of policies are being implemented to support renewable

power generation, including direct capital investment subsidies, grants, or rebates; tax incentives; energy production payments or credits; and public financing. Net metering, or net billing, policies exist in at least fourteen countries, including Italy, Japan, Jordan, and Mexico, and in almost all U.S. states. Green energy purchasing and labeling programs are growing, with more than six million green power consumers in Europe, the United States, Australia, Japan, and Canada.

Mandates for blending biofuels exist in thirty-one countries at the national level and in twenty-nine states or provinces. Subsidies and tax exemptions are also used to promote biofuels. Finland, Ethiopia, Thailand, and Spain all revised existing biofuels policy legislation in 2010, and South Korea and Jamaica implemented new blending mandates.

City and local governments continue to become increasingly important players in promoting the local generation and use of renewable energy. Local support policies include renewable energy targets; urban planning that incorporates renewable energy; building codes that mandate or promote renewable energy; tax credits and exemptions; investment in renewable energy for municipal buildings and transit; subsidies, grants, or loans; and a variety of informal, voluntary actions to promote renewable energy at the community level.

Even with this progress, new renewable energy (excluding traditional biomass) accounted for just 7 percent of total primary energy demand in 2010.<sup>6</sup> Absent further progress, it will expand to only 14 percent by 2035, according to International Energy Agency projections. The world is tapping only a small amount of the vast supply of renewable energy resources worldwide, with the technical potential of renewable energy several times greater

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than global energy demand. This is particularly true for electricity generation. Solar energy, for example, can be harnessed almost everywhere, and its potential alone is many times higher than global electricity consumption. A new report released by the Intergovernmental Panel on Climate Change notes that renewable energy could provide as much as 77 percent of the world's energy needs by 2050.<sup>7</sup>

Critical to securing a sustainable, affordable, and climate-friendly future for this generation and many to come is the ability of individuals and institutions to effect change in the way we generate and use energy. Only by significant scaling-up of renewable energy will we enter the virtuous cycle of cost-reductions followed by more significant scaling-up. To accomplish that goal, we must:

- Connect the dots, bringing knowledge and experience together in partnerships – at all levels – so that cleaner, more efficient energy systems are available at scale;
- Establish renewable energy targets for individual energy markets as shares of

projected demand in the electricity, heat, and transport sectors;

- Phase out fossil fuel subsidies and use taxes and regulations to promote market conditions in which renewable energy can compete – but without shifting a disproportionate share of additional burden to the poor;
- Encourage the expansion of renewable energy technologies for decentralized applications that are already cost-competitive with conventional fuels, such as diesel generators, once the up-front costs are brought down for low-income users;
- Utilize public funds to leverage and incentivize large-scale private investment in developing countries; and
- Invest in research, development, and deployment of cheaper and more efficient clean-energy technologies and adapt them for use in developing countries.

And most important, with the planet's population heading for nine billion within our children's lifetime, we need to act fast.

#### ENDNOTES

<sup>1</sup> *Energy & Sustainable Development* (Paris: International Energy Agency, 2007).

<sup>2</sup> *CO<sub>2</sub> Emissions from Fuel Combustion* (Paris: International Energy Agency, 2011).

<sup>3</sup> *World Energy Outlook 2011* (Paris: International Energy Agency, 2011).

<sup>4</sup> Bloomberg New Energy Finance and United Nations Environment Programme, *Global Trends in Renewable Energy Investment 2011: Analysis of Trends and Issues in the Financing of Renewable Energy*, July 2011.

<sup>5</sup> REN21, *Renewables Global Status Report 2011*, <http://www.ren21.net>. GSR 2011 provides a comprehensive view of the global renewable energy policy landscape, including country-by-country listings of renewable energy targets and renewable energy promotional policies. The bulk of my discussion of specific countries' government policies is based on information and analysis from GSR 2011.

<sup>6</sup> Including traditional biomass, renewable energy supplied 16 percent of world energy consumption in 2010.

<sup>7</sup> *Special Report on Renewable Energy Sources and Climate Change Mitigation* (Geneva, Switzerland: Intergovernmental Panel on Climate Change, 2011).