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Renewable energy

Investing in energy and resource efficiency



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List of acronyms

AGECC	Advisory Group on Energy and Climate Change	NH ₃	Ammonia
BAU	Business-as-usual	NMVOCs	Non-Methane Volatile Organic Compounds
CCS	Carbon capture and storage	NO _x	Nitrogen oxides
CDM	Clean Development Mechanism	NRC	National Research Council
CENBIO	Brazilian Reference Center on Biomass	NREL	National Renewable Energy Laboratory
CO ₂	Carbon dioxide	OECD	Organisation for Economic Co-operation and Development
DEFRA	Department for Environment, Food and Rural Affairs (UK)	OPEC	Organization of the Petroleum Exporting Countries
ECN	Energy Research Centre of the Netherlands	PFM	Public Finance Mechanism
EEA	European Environment Agency	PM10	Particulate matter of 10 microns in diameter or smaller
EIA	Energy Information Administration	PV	Photovoltaic
ELI	Environmental Law Institute	R&D	Research and development
EREC	European Renewable Energy Council	REN	Renewable energy
ESMAP	Energy Sector Management Assistance Programme	RPS	Renewables portfolio standard
EU	European Union	SHSs	Solar household systems
EU ETS	European Union Emissions Trading Scheme	SO ₂	Sulfur dioxide
GDP	Gross domestic product	SRREN	Special Report on Renewable Energy Sources and Climate Change Mitigation (IPCC)
GER	Green Economy Report	T21	Threshold 21 model (Millennium Institute)
GHG	Greenhouse gas	UN DESA	United Nations Department of Economic and Social Affairs
GNESD	Global Network on Energy for Sustainable Development	UNCTAD	United Nations Conference on Trade and Development
GSI	Global Subsidies Initiative	UNDP	United Nations Development Programme
HRS	High Road Strategies	UNEP	United Nations Environment Programme
IEA	International Energy Agency	UNEP SEFI	United Nations Environment Programme Sustainable Energy Finance Initiative
IIASA	International Institute for Applied Systems Analysis	UNFCCC	United Nations Framework Convention on Climate Change
ILO	International Labour Organization	UNIDO	United Nations Industrial Development Organization
IOE	International Organisation of Employers	WEO	World Energy Outlook
IPCC	Intergovernmental Panel on Climate Change	WHO	World Health Organization
IQ	Intelligence quotient	WMO	World Meteorological Organization
IRENA	International Renewable Energy Agency	WTO	World Trade Organization
ITIF	The Information Technology and Innovation Foundation	WWEA	World Wind Energy Association
ITUC	International Trade Union Confederation		
LCOE	Levelised cost of energy		
MDGs	Millennium Development Goals		
MI	Millennium Institute		

Key messages

- 1. Investments in renewable energy have grown considerably with major emerging economies taking the lead.** For 2010, new investment in renewable energy is estimated to have reached a record high of US\$ 211 billion, up from US\$ 160 billion in 2009. The growth is increasingly taking place in non-OECD countries, especially the large emerging economies of Brazil, China and India.
- 2. Renewable energy can make a major contribution to the twin challenges of responding to a growing global demand for energy services, while reducing the negative impacts associated with current production and use.** Investments in renewable energy are making a growing contribution towards mitigating climate change, but to stay below a 2 degree Celsius increase in average global temperature, these developments need to be significantly enhanced. Renewable energy has other social and environmental benefits, including mitigating or avoiding many health problems and impacts on ecosystems caused by the extraction, transportation, processing and use of fossil fuels.
- 3. Renewable energy can help enhance energy security at global, national and local levels.** Most of the future growth in energy demand is expected to occur in developing countries, and against a background of rising fossil fuel prices and resource constraints; this raises serious concerns about energy security. In off-grid areas, renewable energy sources can ensure a more stable and reliable supply of energy. Examples include local mini-grids and household level PV or biogas systems.
- 4. Renewable energy can play an important role in a comprehensive global strategy to eliminate energy poverty.** In addition to being environmentally unsustainable, the current energy system is also highly inequitable, leaving 1.4 billion people without access to electricity and 2.7 billion dependent on traditional biomass for cooking. Many developing countries have a rich endowment of renewable energy that can help meet this need.
- 5. The cost of renewable energy is increasingly competitive with that derived from fossil fuels.** Improved cost-competitiveness is due to rapid R&D progress, economies of scale, learning effects through greater cumulative deployment and increased competition among suppliers. In the European context, for example, hydro and on-shore wind can already compete with fossil fuel and nuclear technologies, and off-shore wind will soon be competitive with natural gas technologies. Solar energy for water heating purposes (low temperature solar thermal) is commercially mature and commonly used in China and many other parts of the world.
- 6. Renewable energy services would be even more competitive if the negative externalities associated with fossil fuel technologies were taken into account.** These include both the current and future health impacts of various air pollutants, as well as the costs necessary to adapt to climate change and ocean acidification resulting from CO₂ emissions. The existing evidence clearly shows that the external costs from fossil fuel technologies are substantially higher than those of most renewable energy alternatives.

7. Substantially increasing investments in renewable energy can be part of an integrated strategy to green the path of global economic development. Modelling studies carried out for the Green Economy Report (GER) project that an average annual investment of approximately US\$ 650 billion over the next 40 years in power generation, using renewable energy sources and second-generation biofuels for transport, could raise the share of renewable energy sources in total energy supply to 27 per cent by 2050, compared with less than 15 per cent under a business-as-usual (BAU) scenario. Increased use of renewable energy sources could contribute more than one-third of the total reduction in greenhouse gas emissions (GHG) of 60 per cent achieved by 2050, relative to BAU.

8. A shift to renewable energy sources brings many new employment opportunities, but not without transitional challenges. Due to the higher labour intensity of various renewable energy technologies compared with conventional power generation, increased investment in renewable energy will add to employment, especially in the short-term, according to modelling conducted for the GER. Overall impacts on employment of investing in renewable energy, taking into account possible effects in fossil fuel-related sectors, will vary by national context, depending on supportive policies, available resources and national energy systems.

9. Policy support will need to be expanded considerably to promote accelerated investment in renewable energy. These investments carry enhanced risks, such as those typically associated with the development and diffusion of new technologies, exacerbated by high upfront capital costs. A range of public support mechanisms have been developed to mitigate risks and to enhance returns. The growing competitiveness of renewable energy has been achieved in part due to policy support to overcome barriers.

10. Government policy to support increased investment in renewable energy needs to be carefully designed in an integrated manner; there is no one-size-fits-all approach. The range of regulatory policies, fiscal incentives and public financing mechanisms to support renewable energy is broad and can be complemented with support to R&D as well as other measures, such as those to stimulate investments in adapting grid infrastructure. The diversity of circumstances among countries, including existing energy systems and potential renewable development, requires that policy frameworks be carefully designed and tailored to specific situations.

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