



United Nations Environment Programme



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Global Trends in Green Energy 2009: New Power Capacity from Renewable Sources Tops Fossil Fuels Again in US, Europe

Global investments in renewables also top non-renewables for 2nd year

Pro-renewable policies critical to sector's continuing strength, growth

**Clean energy investments show resilience in recession;
Share of renewable energy continues to grow**

Growth of wind power in China a key feature of 2009

In 2009, for the second year in a row, both the US and Europe added more power capacity from renewable sources such as wind and solar than conventional sources like coal, gas and nuclear, according to twin reports launched today by the United Nations Environment Programme and the Renewable Energy Policy Network for the 21st Century (REN21).

Renewables accounted for 60 per cent of newly installed capacity in Europe and more than 50 per cent in the USA in 2009. This year or next, experts predict, the world as a whole will add more capacity to the electricity supply from renewable than non-renewable sources.

The reports detail trends in the global green energy sector, including which sources attracted the greatest attention from investors and governments in different world regions.

They say investment in core clean energy (new renewables, biofuels and energy efficiency) decreased by 7% in 2009, to \$162 billion. Many sub-sectors declined significantly in money invested, including large (utility) scale solar power and biofuels. However, there was record investment in wind power. If spending on solar water heaters, as well as total installation costs for rooftop solar PV, were included, total investment in 2009 actually increased in 2009, bucking the economic trend.

New private and public sector investments in core clean energy leapt 53 per cent in China in 2009. China added 37 gigawatts (GW) of renewable power capacity, more than any other country.

Globally, nearly 80 GW of renewable power capacity was added in 2009, including 31 GW of hydro and 48 GW of non-hydro capacity. This combined renewables figure is now closing in on the 83GW of fossil-fuel, thermal capacity installed in the same year. If the trend continues, then 2010 or 2011 could be the first year that new capacity added in low carbon power exceeds that in fossil-fuel stations.

Investment in renewable energy power capacity (excluding large hydro) in 2009 was comparable to that in fossil-fuel generation, at around \$100 billion each. If the estimated \$39 billion of investment in large hydro is included, then total investment in renewables exceeded that in fossil-fuel generation for the second successive year.

China surpassed the US in 2009 as the country with the greatest investment in clean energy. China's wind farm development was the strongest investment feature of the year by far, although there were other areas of strength worldwide in 2009, notably North Sea offshore wind investment and the financing of power storage and electric vehicle technology companies.

Wind power and solar PV additions reached a record high of 38 GW and 7 GW, respectively. Investment totals in utility-scale solar PV declined relative to 2008, partly a result of large drops in the costs of solar PV. However, this decline was offset by record investment in small-scale (rooftop) solar PV projects.

The reports also show that countries with policies encouraging renewable energy have roughly doubled from 55 in 2005 to more than 100 today – half of them in the developing world – and have played a critically important role in the sector's rapid growth.

The sister reports, UNEP's *Global Trends in Sustainable Energy Investment 2010* and the REN21's *Renewables 2010 Global Status Report*, were released by UN Under-Secretary-General Achim Steiner, UNEP's Executive Director, and Mohamed El-Ashry, Chair of REN21. The UNEP report was prepared by London-based Bloomberg New Energy Finance. The REN21 report was produced by a team of authors in collaboration with a global network of research partners.

The UNEP report focuses on the global trends in sustainable energy investment, covering both the renewable energy and energy efficiency sectors. The REN21 report offers a broad look at the status of renewable energy worldwide today, covering power regeneration, heating and cooling and transport fuels, and paints the landscape of policies and targets introduced around the world to promote renewable energy.

Says Mr. Steiner: "The sustainable energy investment story of 2009 was one of resilience, frustration and determination. Resilience to the financial downturn that was hitting all sectors of the global economy and frustration that, while the UN climate convention meeting in Copenhagen was not the big breakdown that might have occurred, neither was it the big

breakthrough so many had hoped for. Yet there was determination on the part of many industry actors and governments, especially in rapidly developing economies, to transform the financial and economic crisis into an opportunity for greener growth.

“There remains however a serious gap between the ambition and the science in terms of where the world needs to be in 2020 to avoid dangerous climate change. But what this five years of research underlines is that this gap is not unbridgeable. Indeed, renewable energy is consistently and persistently bucking the trends and can play its part in realizing a low carbon, resource efficient Green Economy if government policy sends ever harder market signals to investors,” he added.

Says Mr El-Ashry: “Favorable policies now in place in more than 100 countries have played a critical role in the strength of global renewable energy investments recently. For the upward trend of renewable energy growth to continue, policy efforts now need to be taken to the next level and encourage a massive scale up of renewable technologies.”

Says Michael Liebreich, chief executive of Bloomberg New Energy Finance: “The relatively resilient performance of the sector during the current economic downturn shows that clean energy was not a bubble created by the late stages of the credit boom, but is instead an investment theme that will remain important for the years ahead.”

By the numbers:

In 2009 renewable sources represented:

- * 25 per cent of global power (electricity) **capacity** (1,230 gigawatts (GW) out of 4,800 GW total all sources, including coal, gas, nuclear)
- * 18 per cent of global power **production**
- * 60 per cent of **newly installed power capacity** in Europe and more than 50 per cent in the US; the world as a whole should reach 50 per cent or more in newly-installed power capacity from renewables in 2010 or 2011

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Photos:

Horse Hollow Wind Farm, USA, credit: GWEC

<http://dl.dropbox.com/u/3960397/Photo2-wind%20farm.jpg>

Kutch Wind Farm, Gujarat / India, credit: GWEC

<http://dl.dropbox.com/u/3960397/Photo1-India.jpg>

Large parabolic solar dishes for community kitchens,

Muni Seva Ashrams, India, credit: GTZ/ Michael Netzhammer

<http://dl.dropbox.com/u/3960397/Photo3-India-solar.jpg>

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Contacts:

* **Nick Nuttall**, UNEP Spokesperson/Head of Media, Tel: + 254-2-07623084, Mobile + 254-733-632755 / +41-79-596-5737; nick.nuttall@unep.org

* **Moira O'Brien-Malone**, Head of Communications, UNEP Division of Trade, Industry and the Environment, Paris, Tel. +33-1-4437-7612; Mobile: +33-6-8226-9373; moira.obrien-malone@unep.org

* **Virginia Sonntag-O'Brien**, Executive Secretary, REN21, Paris, Tel. +33-1-4437-5092; Mobile: +49-151-1218-3865; virginia.sonntagob@ren21.org

* **Terry Collins**, Tel: +1-416-538-8712; Mobile: +1-416-878-8712, email: TerryCollins@rogers.com

* **Jim Sniffen**, UNEP Programme Officer, New York, Tel: +1-212-963-8094 or 8210; info@nyo.unep.org

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Appendix

Major highlights, UNEP Sustainable Energy Finance Initiative and REN21 reports

For the first time, private sector green energy investments in Asia and Oceania, some \$40.8 billion in 2009, exceeded that in the Americas, at \$32.3 billion.

Private sector investment in Europe was down 10 percent at \$43.7 billion.

Major economies in 2009 began to spend some of the estimated \$188 billion in global “green stimulus” programs announced in September 2008. However, at the end of 2009, only 9 percent of the money had been spent, with larger proportions expected to flow in 2010 and 2011.

After a weak first quarter attributed to the banking crisis, sustainable energy investments rebounded in the final three quarters of last year. The new investment total of \$162 billion in 2009 represented the second highest annual figure ever (after 2008) -- nearly quadruple the sum invested in 2004.

New investment of \$162 billion has added an estimated 50 gigawatts (GW) of renewable energy generation capacity worldwide (not including hydro-electric). This represents a sharp rise from the 40GW added in 2008. Fifty GW is roughly the output of 75 coal-fired power plants.

Looking forward

The green power sector survived the economic downturn better than many expected, with share prices rising almost 40% in 2009, reversing roughly one third of losses experienced in 2008.

Clean energy share prices under-performed wider stock markets by around 10 percent in the first four months of 2010. Although oil prices were buoyant, prices of electricity and natural gas stayed low, cramping returns for project developers.

Nevertheless, new clean energy investments in the first quarter of 2010 (often the most subdued quarter of the year) were up more than 50 percent on the same three months of 2009.

Sector Highlights

From 2005 to 2009 inclusive, the annual average rate of growth in wind power capacity was 27 percent; solar hot water 21 percent rate; ethanol production 20 percent and biodiesel production 51 percent. The use of biomass and geothermal for power and heat also grew strongly.

Wind

Wind was even more dominant as a destination for investment in 2009 than 2008. In 2008, it accounted for \$59 billion or 45 percent of all financial investment in sustainable energy; in 2009, it accounted for \$67 billion and its share rose to 56 percent.

Wind power additions reached a record high of 38 GW, 13.8 GW of which was installed in China, 10 GW in the US, and 2.5 GW in Spain.

Wind power existed in just a handful of countries in the 1990s, but now exists in over 82 countries.

Solar

Total global investment in solar PV reached a record \$40 billion in 2009.

Grid-connected solar power has grown by an average of 60 percent every year for the past decade, from 0.2 GW at the start of 2000 to 21 GW at the end of 2009.

The year 2009 was very different for large-scale (utility-scale) solar however, suffering a 27 percent fall in financial investment in the year, to \$24 billion.

The sharp decline links to several factors, including falling prices, a sudden over-supply of photo-voltaic products, new caution on the part of investors towards equity in young solar companies, a shortage of bank financing for projects in Europe and North America and a temporary freeze on permits for new capacity in Spain, the most active solar market in 2008.

Solar PV additions nevertheless reached a record high of 7 GW in 2009. Germany was the top market, with 3.8 GW added, or more than half the global market. Other large markets were Italy, Japan, the United States, the Czech Republic, and Belgium. Spain, the world leader in 2008, saw installations plunge to a low level in 2009 after a policy cap was exceeded.

In 2009, China produced 40 percent of the world's solar PV supply, 25 percent of the world's wind turbines (up from 10 percent in 2007), and 77 percent of the world's solar hot water collectors.

Power produced by solar PV dropped in price some 50 to 60 percent by some estimates – from highs of \$3.50 per watt in mid-2008, to lows approaching \$2 per watt.

An estimated 70 million households worldwide now employ solar hot water heating.

Biofuels

Biofuels, which ranked third after wind and solar in 2008 with \$18 billion of financial investment, ended up fourth last year with just \$7 billion. Biomass and waste-to-energy, which was fourth in 2008 with \$9 billion, moved up to third in 2009 with \$11 billion.

Biofuels displaced the energy equivalent of 8 percent of global gasoline consumption. Latin America is seeing many new biofuels producers in countries like Argentina, Brazil, Colombia, Ecuador, and Peru, as well as expansion in many other renewable technologies.

Investment in new biofuels plants also declined from 2008 rates, as corn ethanol production capacity was not fully utilized in the United States and several firms went bankrupt. The Brazilian sugar ethanol industry likewise faced economic troubles, with no growth despite ongoing expansion plans. Europe faced similar softening in biodiesel, with production capacity only half utilized.

Geothermal

Geothermal suffered a 29 percent drop in financial investment in 2009, to \$2 billion,

Energy efficiency

Energy-smart technologies such as power storage and efficiency saw a 34 percent rise in investment, to \$4 billion. For the first time, energy-smart technologies attracted more venture capital and private equity investment than any other clean energy sector.

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Regional highlights

* **Europe** maintained its position as the world region with the largest share of global financial investment in clean energy - but only just. Its total came in at \$43.7 billion, down from \$48.4 billion in 2008.

* **Asia and Oceania** produced a sharp increase in financial investment in 2009, to \$40.8 billion from \$31.3 billion.

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.

* **North America** suffered a fall in investment, to \$20.7 billion from \$33.3 billion

* **Middle East and Africa** enjoyed a modest increase to \$2.5 billion in 2009, from \$2.1 billion.

* **South America** saw investment slip to \$11.6 billion from \$14.6 billion.

Brazil produces virtually all of the world's sugar-derived ethanol and has been adding new biomass and wind power plants.

Public policy: fueling the rapid growth of renewables

A significant milestone was reached in early 2010 – more than 100 countries had enacted some type of policy target and/or promotion policy related to renewable energy, up from 55 countries in early 2005.

Many new targets enacted in the past three years call for shares of energy or electricity from renewables in the 15–25 percent range by 2020. Most countries have adopted more than one promotion policy, and there is a huge diversity of policies in place at national, state/provincial, and local levels.

Manufacturing leadership is shifting from Europe to Asia, as countries like China, India, and South Korea continue to increase their commitments to renewable energy.

As a group, developing countries have more than half of global renewable power capacity. Developing countries now make up nearly half of all countries with policy targets (38 out of 80 countries) and also make up half of all countries with some type of renewable energy promotion policy (41 out of 81 countries).

Markets for renewables are growing at rapid rates in countries such as Argentina, Costa Rica, Egypt, Indonesia, Kenya, Tanzania, Thailand, Tunisia, and Uruguay, to name a few.

At least 20 countries in the Middle East, North Africa, and sub-Saharan Africa have active renewable energy markets. Outside of Europe and the United States, other developed countries like Australia, Canada, and Japan are seeing recent gains and broader technology diversification.

Globally, renewable energy industries employ an estimated 3 million people directly, about half of them in the biofuel industry, with additional indirect jobs well beyond this figure.

Both within and outside of Europe, public-sector banks like the European Investment Bank and Germany's KfW have been taking an expanding role, including in many emerging markets like Brazil.

Another force propelling renewables in developing countries is the huge increase in development assistance flows. Such flows jumped to over \$5 billion in 2009, compared with some \$2 billion in 2008. The largest providers are the World Bank Group, Germany's KfW, the Inter-American Development Bank, and the Asian Development Bank. Dozens of other development agencies provide growing amounts of loans, grants, and technical assistance.

Public support for sustainable energy remained high in most countries but action to curb emissions dropped as a priority for some voters due to the recession, controversies over climate science last winter and cold winter weather that hit the most populated parts of the Northern Hemisphere.

By spring 2010, the sector was facing fresh challenges as a second phase of the economic downturn developed, with governments running into pressure to cut their deficits and volatility returning to markets.

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