

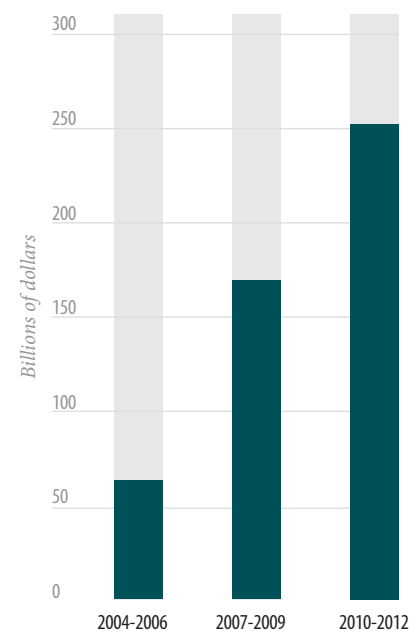
Overview

In less than a decade, clean energy transitioned from novelty products to the mainstream of world energy markets. The sector emerged not so much in a linear fashion as an episodic one—in fits and starts associated with the worldwide economic downturn, continent wide debt crises, national policy uncertainty, and intense industry competition. Through it all, however, the clean energy sector moved inexorably forward, with overall investment in 2012 five times greater than it was in 2004.

Although 2012 investment levels worldwide declined 11 percent, to \$269 billion, from 2011, the clean energy sector weathered the withdrawal of priority incentives and initiatives offered by governments in numerous key markets, demonstrating its resilience.¹ Reliable clean energy investment data have been collected for nine years now. Looking at the data in three-year increments, average clean energy investment increased by at least \$90 billion triennially—from an average of \$64 billion in the 2004-06 period to an average of \$156 billion in 2007-09 and \$245 billion in 2010-12 (see Figure 1).

Progress in Global Clean Energy Investments

Figure 1: Average worldwide clean energy investment*



*Does not include research and development investments.

Source: Bloomberg New Energy Finance

The clean energy sector continues to advance

Beyond its resilience, the clean energy sector also continues to demonstrate dynamism as the cost of wind, solar, and other sources declined in the global marketplace. Individuals, businesses, and countries seeking clean, secure, and affordable sources of power and fuel are finding clean energy an increasingly attractive alternative to conventional sources, which are unpredictable in price and generate local, regional, and global air pollutants. As a result, economic, environmental, and security imperatives are driving clean energy deployment forward.

Who's Winning the Clean Energy Race? 2012 Edition documents how the old order is changing technologically and geographically. Clean energy is gaining ground in the global energy mix. Even as several pioneering countries have stumbled, new markets have opened, and the center for clean energy investment has shifted from West to East.

Notable in 2012 was the growth of clean energy markets in smaller countries outside the Group of 20, or G-20. Investment there increased by 52 percent, to more than \$20 billion, while G-20 nations—the world's leading rich and developing countries—experienced a collective decline in private investment of 16 percent, attracting \$218 billion, exclusive of research and development spending.² Non-G-20 countries' share of total global investment reached 8.5 percent, its highest since reliable data collection began in 2004. This trend is likely to continue: Bloomberg New Energy Finance projects continued annual growth for clean energy of 10 to 18 percent in parts of Asia, Africa, the Middle East, and Latin America through 2020.



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Asia emerging as clean energy hub

Asia-Oceania experienced uninterrupted growth in clean energy investment in each of the past nine years. In 2012, Asia became the leading regional destination for clean energy investment for the first time. Investment in the region grew 16 percent, to \$101 billion, accounting for 42 percent of the global total. The region that encompasses Europe, the Middle East, and Africa recorded an investment decline of 22 percent, to \$87.6 billion. Investment fell in such leading markets as Germany, Italy, the United Kingdom, and Spain as governments curtailed incentive programs.

Investment fell most precipitously in the Americas, with clean energy financing down 31 percent in 2012, to \$50.3 billion. The sharp decline followed growth of more than 30 percent in 2011, reinforcing a pattern of investment volatility in the Americas and

driving financing in the region to the lowest level since 2009.

Solar energy's future looks bright

The clean energy sector's geographic transition is matched by a technological one. While wind energy remains the most cost-competitive technology, solar has displaced it as the leading recipient of investment dollars. For the second year in a row, solar technologies attracted more clean energy financing than any other technology by a wide margin. Solar accounted for \$126 billion worth of clean energy investment in 2012, or 58 percent of the G-20 total. China, Europe, and the United States were top markets for solar investment.

Wind energy investment was a substantial \$72.7 billion, enough to spur record levels of deployment. Among G-20 countries, wind energy investment was down 14 percent,

with declines logged in historically large markets including China, Germany, India, and Brazil. The United Kingdom and the United States saw gains in wind energy investment, with a substantial increase in the United States spurred by the potential expiration of the production tax credit that loomed throughout 2012. At year-end, this important tax incentive for the U.S. wind industry was renewed by Congress through 2013.

The remaining clean energy sectors also experienced declining investment totals in 2012. Investment in geothermal, marine, small hydro, and biomass/waste-to-energy technologies collectively fell 29 percent, to \$13.5 billion. The biofuels sector had the steepest investment decline, attracting just \$2.6 billion, 47 percent less than in 2011. Investment in energy-efficient and low-carbon technologies and services declined 27 percent in 2012, with investment shrinking to \$3.3 billion, from \$4.5 billion in 2011.

Clean energy capacity grows

Even though worldwide investment fell by 11 percent in 2012, significant and sustained price declines for leading technologies helped fuel a record 88 gigawatts, or GW, of new capacity around the world. By the end of 2012, 648 GW of clean energy generating capacity was in place globally. With a record 48.6 GW of new generating capacity installed in 2012, the wind sector led all others with 280 GW deployed worldwide.

Although solar investment fell 13 percent in 2012, lower prices made it possible for overall deployment to increase 6 percent, to 31 GW. With these additions, cumulative installed solar capacity eclipsed 100 GW, four times its level in 2009. As of the end of 2012, 104 GW of solar generating capacity was installed globally. Significant amounts of additional solar capacity were deployed in Germany, Italy, China, the United States, and Japan.

Clean energy continues to account for a significant share of new generating capacity

in key regions and around the world. In the United States, wind, solar, and other renewable energy sources accounted for 49 percent of the generating capacity added in 2012.³ In the European Union, 70 percent of new capacity was renewable for the second consecutive year.⁴

Innovative financing helps expand solar sector

An array of clean energy financing tools also reinforced momentum in the solar sector. Small-distributed capacity investment in residential solar photovoltaic projects held up best in 2012, decreasing only 1.6 percent, to \$72.8 billion. This category includes all money invested in residential-scale solar projects of less than 1 megawatt, or MW. Financial innovations helped spur small-distributed capacity investment in several key markets. In the United States, for example, this sector advanced through development of “third-party financing” mechanisms, which now account for more than 50 percent of the residential and commercial market for rooftop solar installations.⁵ In the clean energy sector, these arrangements allow consumers to obtain solar power at little or no upfront cost. A third-party installs and maintains the solar array in exchange for monthly payments from the consumer for the electricity generated by the system.

Still, asset finance remains the leading source of investment in clean energy, with \$136.5 billion worth of asset financing realized in 2012, or 62 percent of all G-20 clean energy investments. This category includes all money invested in renewable energy generation projects, whether from internal company balance sheets, debt finance, or equity finance, but it excludes refinancing and short-term construction loans. Asset financing typically is associated with installation of clean energy equipment and generating capacity. In 2012, G-20 asset financing dropped 20 percent from the year before.



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Venture capital and private equity investment declined by 34 percent in 2012, falling to \$5.6 billion. The United States, with \$4.3 billion attracted, continues to dominate this finance class, accounting for 78 percent of all venture capital/private equity investment. This category includes all money invested by venture capital and private equity funds in the equity of companies developing renewable energy technology.⁶ In general, venture capital and private equity financing occurs in the innovation stage, when companies are proving the market potential of goods and services.

Finally, the stock prices of clean energy companies remained depressed by product price declines, significant oversupply in the manufacturing sector, and persistent uncertainties over government policies. As a result, public market financing fell sharply to \$4.6 billion, 55 percent below 2011 levels.

The race clarifies with China in the lead

The competition among countries for clean energy leadership is resulting in a reshuffling of the old order. In 2012, China advanced its position as the epicenter of clean energy finance, attracting \$65.1 billion in investment, 20 percent more than in 2011 and an unsurpassed 30 percent of the G-20 total. It garnered 25 percent of all solar energy investment, setting a one-year record with \$31.2 billion invested. China also accounted for 37 percent of all wind energy investment (\$27.2 billion) and 47 percent of the investment in the “other renewable energy” category (\$6.3 billion) that includes small hydro, geothermal, marine, and biomass. All told, 23 GW of clean energy generating capacity was installed in China in 2012.

Although the United States invented many of the leading clean energy technologies, it

continues to underperform in investment and deployment relative to the size of its economy and its history in the field. In 2012, clean energy investment in the United States was down 37 percent, to \$35.6 billion, second-highest among G-20 nations. Record amounts of wind-generating capacity (13.6 GW) were installed, spurred in large part by the possibility that the production tax credit might expire at the end of 2012. Although the credit was extended for one year, ongoing uncertainty surrounding this and other policies is emblematic of the lack of a consensus among American policymakers, and it contributes to the halting, disappointing U.S. performance in the worldwide race for clean energy jobs, manufacturing, and market share.

The solar sector was something of a bright spot for the United States, with financial innovations such as private third-party financing leading to a 42 percent increase

in investment for residential photovoltaic installations. A record 3.2 GW of solar was installed in the United States last year. The United States took the No. 2 spot in clean energy investing in 2012.

In Germany, investments fell, but world-leading amounts of new solar generating capacity were still added. Clean energy investment in Germany was down 27 percent in 2012 from the year before. With Germany significantly curtailing incentives for clean energy, it was feared that the German market might collapse. But the country remained the G-20's third-leading destination for clean energy investment, with \$22.8 billion. This level of investment was sufficient to spur a record 7.5 GW of new solar photovoltaic capacity, as well as 2.4 GW of new wind capacity.

Japan reemerged as a top destination for clean energy investment as national efforts to develop alternatives to nuclear energy gained momentum after the Fukushima Dai-ichi nuclear disaster in 2011. In response, clean energy investment increased 75 percent in 2012, to \$16.3 billion. Almost all (97 percent, or \$15.7 billion) of clean energy financing in Japan was in the solar sector, which added more than 2 GW of generating capacity. These investments propelled Japan into the No. 5 spot in investment in 2012, with the 27 countries of the European Union that are not separate members of the G-20 at No. 4.

After lengthy delays in the initiation of national programs, South Africa finally emerged in 2012 as an important destination for clean energy investment, attracting \$5.5 billion and becoming the fastest-growing market in the G-20. The South African solar sector attracted \$4.3 billion in 2012, or 80 percent of the total. Another \$1.1 billion was invested in the nation's wind sector. All of the money invested in South Africa was in the form of asset financing for larger commercial and utility-scale projects, catapulting the country into the ninth-leading destination of clean energy investment behind Italy, the United Kingdom, and India. Brazil rounds out the top 10 countries.