WHO'S WINNING THE CLEAN ENERGY RACE?

2011 EDITION

G-20 INVESTMENT POWERING FORWARD

the CleanEnergy Economy
Repowering Jobs, Businesses and Investments Across America

THE PEW CHARITABLE TRUSTS

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THE PEW ENVIRONMENT GROUP

We work globally to establish pragmatic, science-based policies that protect our oceans, preserve our wildlands and promote the clean energy economy

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ABOUT THE REPORT

Who's Winning the Clean Energy Race? 2011 Edition was developed for public informational and educational purposes. It is an update of The Pew Charitable Trusts' earlier reports tracking 2009 and 2010 clean energy investments in the countries that make up the Group of Twenty (G-20).[1] Pew's international investment research complements ongoing efforts by the Pew Environment Group and the Pew Center on the States to chronicle the extent of jobs, businesses, and investments in America's clean energy economy.

Underlying data for this report were compiled for the Pew Environment Group by Bloomberg New Energy Finance, the world's leading provider of news, data, and analysis on clean energy and carbon market finance and investment. Bloomberg New Energy Finance's global network of 200 staff located across Europe, the Americas, Asia, and Africa continuously monitor market changes, deal flow, and financial activity, allowing instantaneous transparency into the clean energy and carbon markets.

A full description of the methodology and parameters employed for this report can be found in Appendix II.

ACKNOWLEDGMENTS

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Cover photo credits
1 - Left: Apostrophe Productions / Getty Images
2 - Right: Pedro Castellano / Getty Images

[1] The Group of Twenty was established in 1999 to bring together leading industrialized and developing economies to discuss key global economic issues. The G-20 is made up of the finance ministers and central bank governors representing the European Union and 19 countries: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom, and the United States. No data are provided for Russia and Saudi Arabia because clean energy investment there is negligible.

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EXECUTIVE SUMMARY

Companies and countries have experienced ups and downs in the world-wide clean energy race in recent years, and 2011 was no exception. For consumers, however, the clean energy race has been consistently positive, driving down prices and interjecting new renewable energy choices into a marketplace dominated by century-old technologies. Price competition is the defining characteristic of the clean energy race in 2011, spurring investment and deployment, increasing global clean energy capacity, and creating opportunities for innovators, entrepreneurs, and workers.

This report examines key financial, investment, and technological trends in 2011 related to the clean energy economy of G-20 members. Our primary focus is on investment, which drives innovation, commercialization, manufacturing, and installation of clean energy technologies. The data have been compiled and reviewed by Pew's research partner, Bloomberg New Energy Finance, a market research firm focused on renewable energy.

Our research demonstrates that clean energy investment continued a near-decade-long rally in 2011, rising 6.5 percent to a record $263 billion.[2] Excluding research and development, investment in the sector is more than 600 percent higher than in 2004. The G-20 member countries continue to dominate the sector, accounting for 95 percent of all global investments in clean energy. Future growth is anticipated in the emerging markets of developing nations, however. Annual investment growth rates of 10 to 18 percent are projected for parts of Asia, Africa, the Middle East, and Latin America in the next 10 years.

Although prices declined and overall investment increased, 2011 was a year of mixed results across the G-20, with as many countries experiencing losses as gains. Investment increases of 42 percent in the United States and 15 percent in Brazil offset declines in Mexico and Argentina and enabled the Americas region to grow by more than 21 percent to $63.1 billion—the fastest rate of growth in any region of the world. Investment growth in Italy, Spain, and the United Kingdom offset declines in other parts of the European Union,

2 All monetary values are 2011 United States dollars (USD) unless otherwise noted. This figure includes all investment, public and private (including research and development), in G-20 and non-G-20 countries.

Photo courtesy of whitehouse.gov

G-20 Summit in Cannes.

helping to maintain the Europe, Middle East, and Africa region as the aggregate leader in clean energy investment, with $99.3 billion recorded in 2011. Similarly, investment growth in India, Australia, and Japan offset a flat year in China and declining investments in South Korea's market. Overall, the Asia/Oceania region held second place for clean energy investments at $75 billion in 2011.

G-20 investments in the solar sector continued to soar in 2011, increasing 44 percent to $128 billion and accounting for more than half of all clean energy technology investments in the G-20. Solar gains offset a 15 percent decline in both wind and energy efficiency investments in 2011 compared with the previous year.

Asset finance and small distributed capacity investments accounted for $212 billion of the $225 billion worth of nongovernmental, non-research clean energy investments in 2011, signaling the priority that investors have placed on deploying existing technologies over developing or scaling up new technologies and companies in the G-20. Asset finance increased by 12 percent to $141 billion, while investments in small distributed photovoltaic projects grew 25 percent to $71.5 billion. Venture capital and private equity investments were up 8.6 percent in 2011 to $8.6 billion, while public and private research and development investments fell 18 percent to $26 billion. The United States continues to lead the world in both venture capital and research and development investments.

A series of wind turbines off the shore of Great Yarmouth in the United Kingdom.

The combination of falling prices and growing investments in asset finance and small distributed clean energy projects fueled worldwide installation of a record 83.5 gigawatts (GW) of clean energy generating capacity in 2011, including 78 GW in the G-20 countries. Solar module prices fell 50 percent in the past year, spurring deployment of an unprecedented 29.7 GW of new capacity—10 times the level recorded in 2007. Although wind energy investment levels declined to $72 billion, more than 43 GW of new wind energy capacity was deployed in 2011, surpassing 2010 installation levels. At the end of 2011, more than 565 GW of clean energy generating capacity was in place globally, 50 percent more than installed nuclear generating capacity.

In response to the global economic crisis in 2008-09, government stimulus plans allocated more than $194 billion for clean energy efforts. By the end of 2011, almost three-fourths of those funds ($142 billion) had reached the sector. More than $46 billion in stimulus funding for clean energy was spent in 2011, more than half of that by the United States and China together. Of the $53 million that remains, 67 percent ($35.7 billion) is expected to be spent in 2012.

After slipping to second place in Pew's 2009 report on the G-20 clean energy race and to third place the next year, the United States reclaimed its leadership position in the G-20 in 2011 with $48.1 billion worth of clean energy investments,

A worker with a solar panel.

© Pedro Castellano | iStockphoto.com

Two workers install a solar panel at a photovoltaic farm.

a 42 percent increase. With investors taking advantage of key policies that were about to expire, the United States led all nations in financing for solar, energy efficiency, and biofuel technologies. In addition, the United States led in venture capital/private equity and research and development investments. In five-year rate of investment growth, however, the United States is not even in the top 10, and it lags other nations in deployment of clean energy assets. The contrast between venture capital investments and capacity additions in the United States highlights a persistent phenomenon in which the country fails to deploy into the marketplace the clean energy innovations it creates in the laboratory.

Meanwhile, China has adopted clean energy policies that encourage manufacturing and deployment. Those trends continued in 2011, although overall investment levels grew by only 1 percent, to $45.5 billion, far from the rapid growth rates of recent years. Nonetheless, China remains a dynamic hub of clean energy activity, leading the world in wind energy investment and deployment and in wind and solar manufacturing.

The third clean energy powerhouse is Germany, where a 5 percent drop in investment did not deter record levels of solar energy deployment. Germany now obtains more energy from renewable sources than it does from nuclear power, coal, or natural gas. Elsewhere in Europe, Italy surpassed Germany's deployment of 7.4 GW of solar, installing 8 GW as investments grew 38 percent to $28 billion and largely offset declines in other parts of the region.

India continues to emerge as a premier clean energy market, with investments growing 54 percent in 2011 to $10.2 billion, vaulting that country from 10th to sixth place among the G-20 leaders. Indonesia recorded the fastest rate of growth of any G-20 nation—520 percent—as investments in clean energy eclipsed $1 billion for the first time.

© Darren Baker | Dreamstime.com

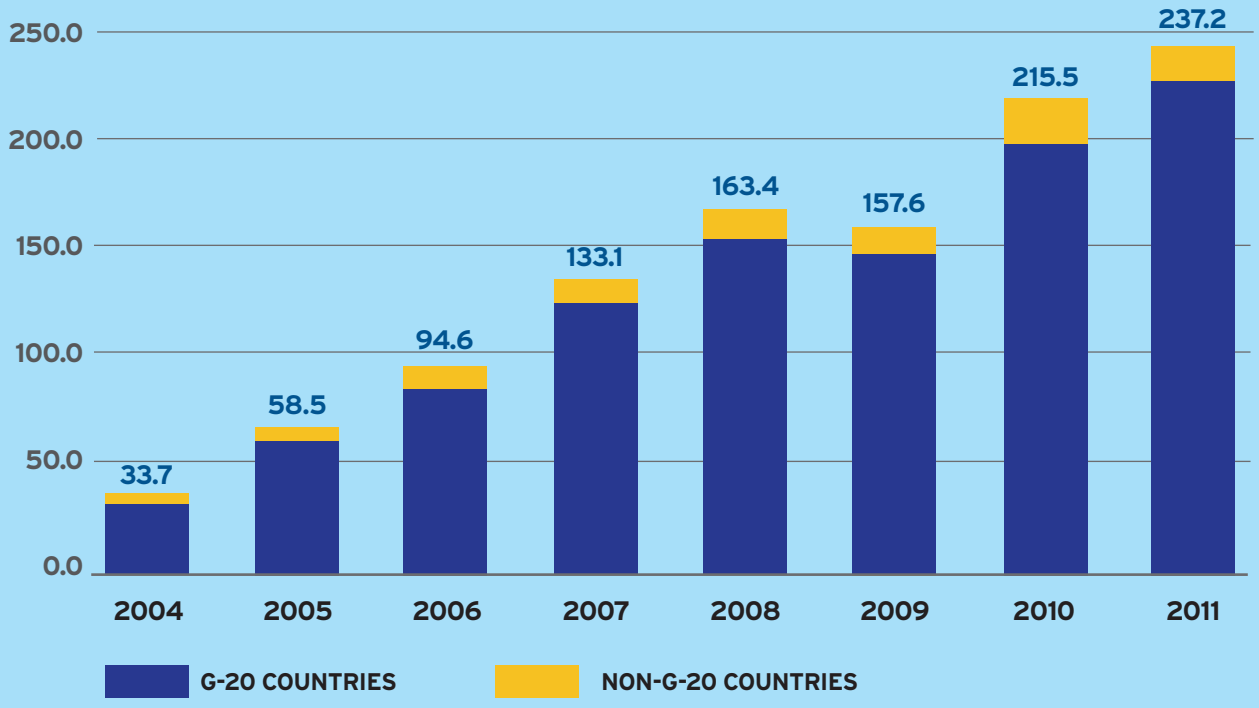
Geothermal power station in Iceland.

KEY FINDINGS

GLOBAL INVESTMENT GROWS TO RECORD $263 BILLION

The clean energy sector continued its decade-long rally by attracting $263 billion worth of investment in 2011. Excluding research and development spending, investment in the sector is now more than 600 percent higher than in 2004, when reliable data collection commenced (see Figure 1). As a result of this rapid growth, the clean energy sector recorded its trillionth dollar invested in 2011.

FIGURE 1: GLOBAL AND G-20 CLEAN ENERGY INVESTMENT, 2004-11 (BILLIONS OF $)*



* Does not include research and development investments

Worldwide clean energy investment grew in 2011 by a modest 6.5 percent, outpacing growth in the overall economy. But modest investment growth masks dramatic expansion of clean energy deployments in 2011 and recent years. The cost of wind and solar generating capacity is declining rapidly, with solar photovoltaic module prices dropping 50 percent in 2011 alone. The combination of significantly lower prices and modest gains in investment has accelerated deployment of clean energy generating capacity in recent years. In 2011, a record 83.5 GW of new renewable energy technology was deployed around the world, including 43 GW of wind and a record 29.7 GW of solar generating capacity. By comparison, there was less than 30 GW of solar generating capacity on the planet in 2009.

The G-20 member countries continue to attract the lion's share of clean energy investment—about $225 billion, or 95 percent of the global total. But results were uneven in 2011 across the G-20, with nearly as many countries experiencing investment losses as experienced gains compared with 2010. Budget and policy uncertainty in the world's leading economies has stemmed investor interest in certain markets. Conversely, interest is growing in a number of the world's developing countries, where clean power is increasingly cost-competitive with conventional sources of electricity. Bloomberg New Energy Finance projects annual investment growth rates of 10 percent to 18 percent in parts of Asia, Africa, the Middle East, and Latin America in the next 10 years.

THE UNITED STATES PROPELS REGIONAL GROWTH IN THE AMERICAS

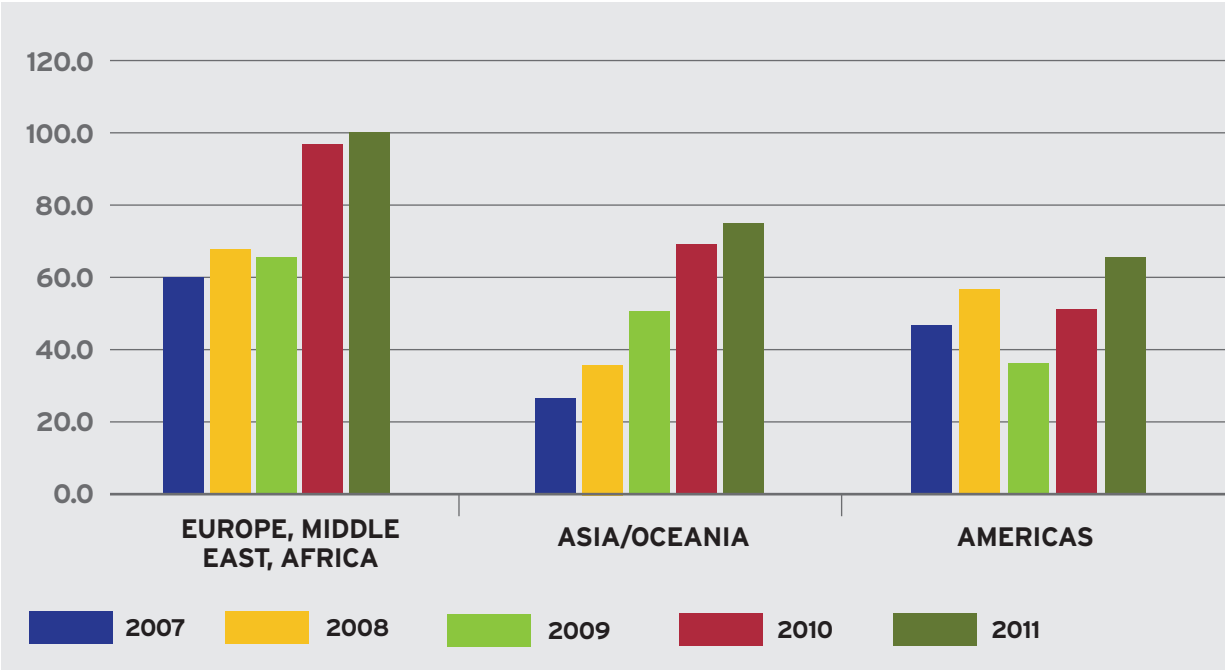
Whereas investment growth in Asia/Oceania led all other regions in the previous two years, the Americas region experienced the fastest rate of investment growth in 2011. Led by 42 percent growth in the United States and 15 percent growth in Brazil, investment in the Americas region grew by more than 21 percent to $63.1 billion.

The Asia/Oceania region continues to be the second-leading destination for clean energy investments at $75 billion, growing more than 10 percent in 2011. Relatively flat growth in China (up 1 percent) was mitigated by sharp investment gains in India, Japan, and Indonesia, which were among the fastest-growing clean energy markets in the world.

The European region maintained its regional leadership position for clean energy investment, growing by a modest 4 percent to $99.3 billion. Significant investment growth in Italy, the United Kingdom, and Spain helped to offset declines in other EU member states. Germany and Italy continue to lead the world in deployment of small distributed solar photovoltaic power installations, accounting for more than 50 percent of worldwide solar capacity additions and 38 percent of G-20 solar technology investments in 2011.

Wind turbines in Southern California near Palm Springs.

FIGURE 2: TOTAL INVESTMENT IN CLEAN ENERGY BY REGION, 2007-11 (BILLIONS OF $)



SOLAR INVESTMENT SOARS TO RECORD LEVELS

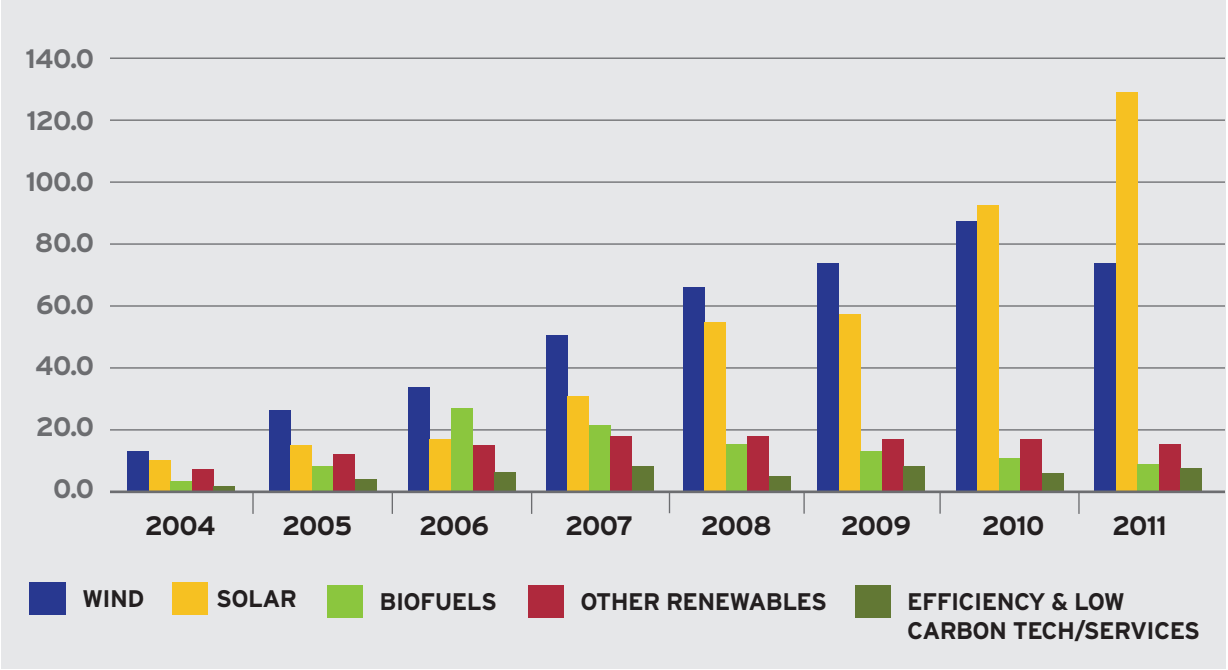
Solar energy technologies were the leading recipients of clean energy finance and investment in 2011, attracting $128 billion, more than half of all clean energy investments in the G-20 countries. Solar investments increased by 44 percent in 2011, helping to offset 15 percent drop-offs in both wind and energy efficiency investments.

Sharp drops in solar module prices helped spur record levels of deployments, which increased 54 percent to 29.7 GW in 2011—10 times the level of 2007. Two countries, Germany and Italy, led the way, with Germany adding 7.4 GW and Italy adding 8 GW of distributed photovoltaic capacity, together accounting for more than half of all global additions. These large-capacity additions were stimulated by

"Policy certainty and a fair price for solar generated and fed into the grid are essential for the future of this clean sustainable energy industry. Now is the time for Australian governments to match that expertise and capability with policies that provide certainty and promote the growth of solar energy as part of Australia's clean energy future."

John Grimes, CEO of the Australian Solar Energy Society (AuSES)

FIGURE 3: G-20 INVESTMENT BY TECHNOLOGY 2004-11 (BILLIONS OF $)



clean energy incentives that will be reduced in 2012 and beyond. Similarly, investors rushed to take advantage of expiring clean energy policies in the United States, allocating $30 billion to the American solar sector, much of it to initiate large, utility-scale projects that will come online from 2012 to 2013. In the wake of the Fukushima nuclear disaster, Japan's solar investments surged to more than $8 billion.

Although solar energy investments across the G-20 outpaced wind for the second straight year, the emerging cost-competitiveness of onshore wind energy drove $72.1 billion into the sector in 2011, down 15 percent from 2010. In view of recent price declines, this level of investment helped spur deployment of more than 43 GW of new wind energy, more than was deployed a year earlier. Half of 2011 wind energy capacity additions occurred in China, which attracted $29 billion worth of wind energy investment.

DEPLOYMENT DOMINATES INVESTMENT PRIORITIES

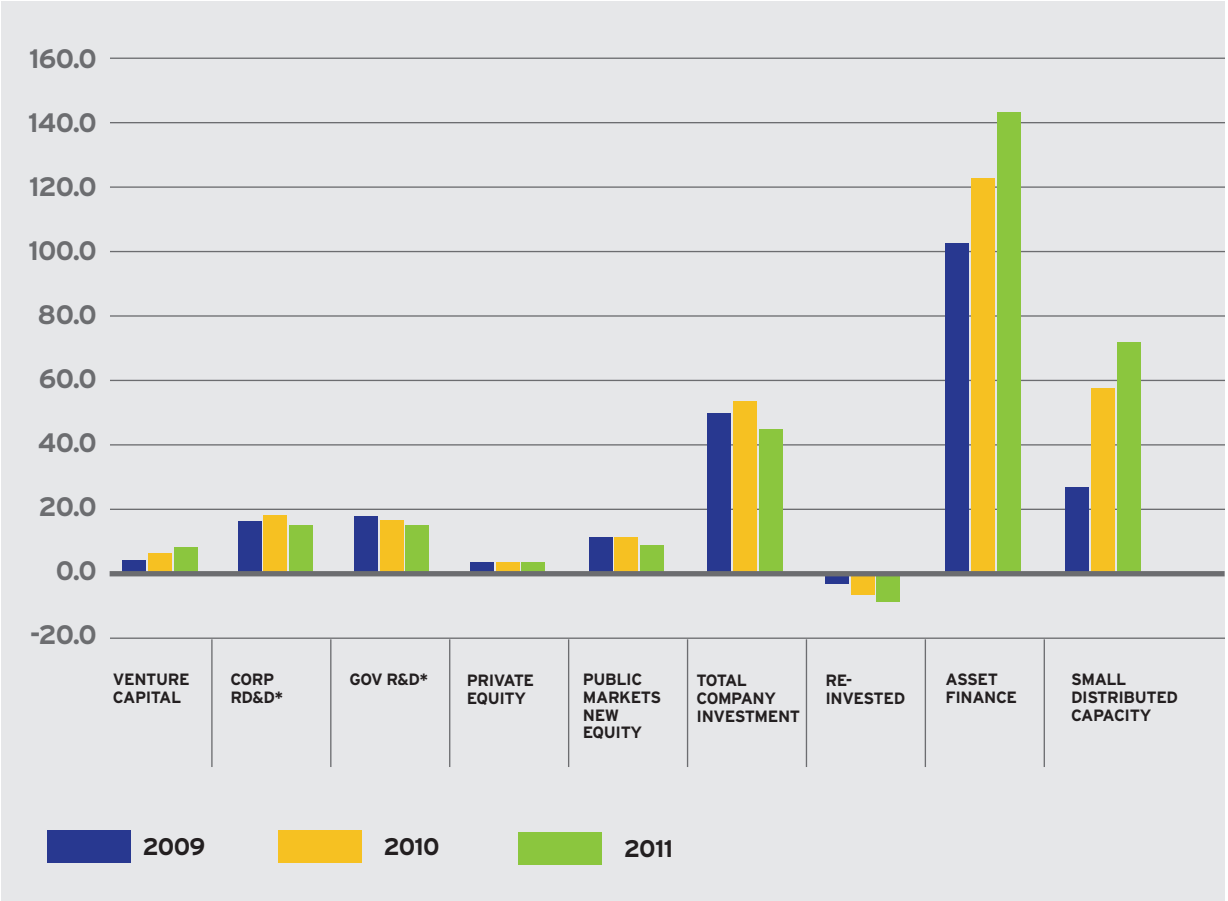
Asset finance and small distributed capacity investments accounted for $212 billion of the $225 billion worth of nongovernment, non-research clean energy investments in 2011, signaling investors' overwhelming preference for deploying existing technologies over developing or scaling up new technologies and companies. Asset finance increased by 12 percent and accounted for $141 billion worth of 2011 clean energy investments, followed by $71.5 billion for small distributed photovoltaic projects, a 25 percent increase. China led the world in attracting asset finance with $44.3 billion, or 32 percent of the G-20 total. Italy was the top recipient of small distributed capacity investments, with $24.1 billion.

KEY FINDINGS

Venture capital and private equity investments were up 8.6 percent in 2011 to $8.6 billion. The United States, which attracted $6 billion, continues to dominate this finance class, accounting for 70 percent of all venture capital and private equity investments. Public and private research and development investments were off sharply in 2011, decreasing 18 percent to $26 billion. Declining R&D investments are reflective of the tight budgetary environments caused by sluggish global economic conditions. The United States also led the world in research and development investments in 2011, accounting for 30 percent of total corporate and 31 percent of government R&D investments. With strong venture capital and research and development investments, the United States continues to lead the world in clean energy innovation, but other data indicate that it trails in deployment and manufacturing of clean energy technologies.

With clean energy stock prices severely depressed by product price declines and intense competition in the private sector, few companies looked to public stock markets to raise capital. As a result, public market financing fell in 2011 to $10.2 billion, its lowest level since 2006 and a 21 percent decline from a year earlier.

FIGURE 4: G-20 INVESTMENT BY FINANCING TYPE, 2009-11 (BILLIONS OF $)



* Research and development figures represent total global funding

INSTALLED CLEAN ENERGY CAPACITY SOARS ON PRICE DECLINES

The combination of falling prices and growing investments in asset finance and small distributed clean energy projects fueled a record 83.5 GW of new capacity around the world in 2011. By the end of of 2011, more than 565 GW of clean energy generating capacity was in place globally (Figure 5). With 43 GW of new generating capacity installed in 2011, the wind sector leads all others with 239 GW deployed worldwide. A record 29.7 GW of solar was installed in 2011—10 times the level installed in 2007—raising global installed capacity by 70 percent to 73 GW.

China, the United States, and Germany were top destinations for wind energy investments and accounted for almost 29 GW of wind capacity additions. The United States was the top destination for solar energy investments but deployed only 1.7 GW of new capacity, as the majority of investments were used to initiate large-scale utility projects that will take several years to build. Germany and Italy accounted for more than half of all solar energy capacity additions, with Germany installing 7.4 GW and Italy 8 GW. Germany installed 3 GW of solar energy in December 2011 alone.

FIGURE 5: TOTAL WORLDWIDE INSTALLED CLEAN ENERGY CAPACITY BY TECHNOLOGY (AS OF DECEMBER 2011)

Wind	239 GW
Small-Hydro	184 GW
Biomass and Waste-to-Energy	57 GW
Solar	73 GW
Geothermal	11 GW
Marine	0.6 GW
Total	**565 GW**

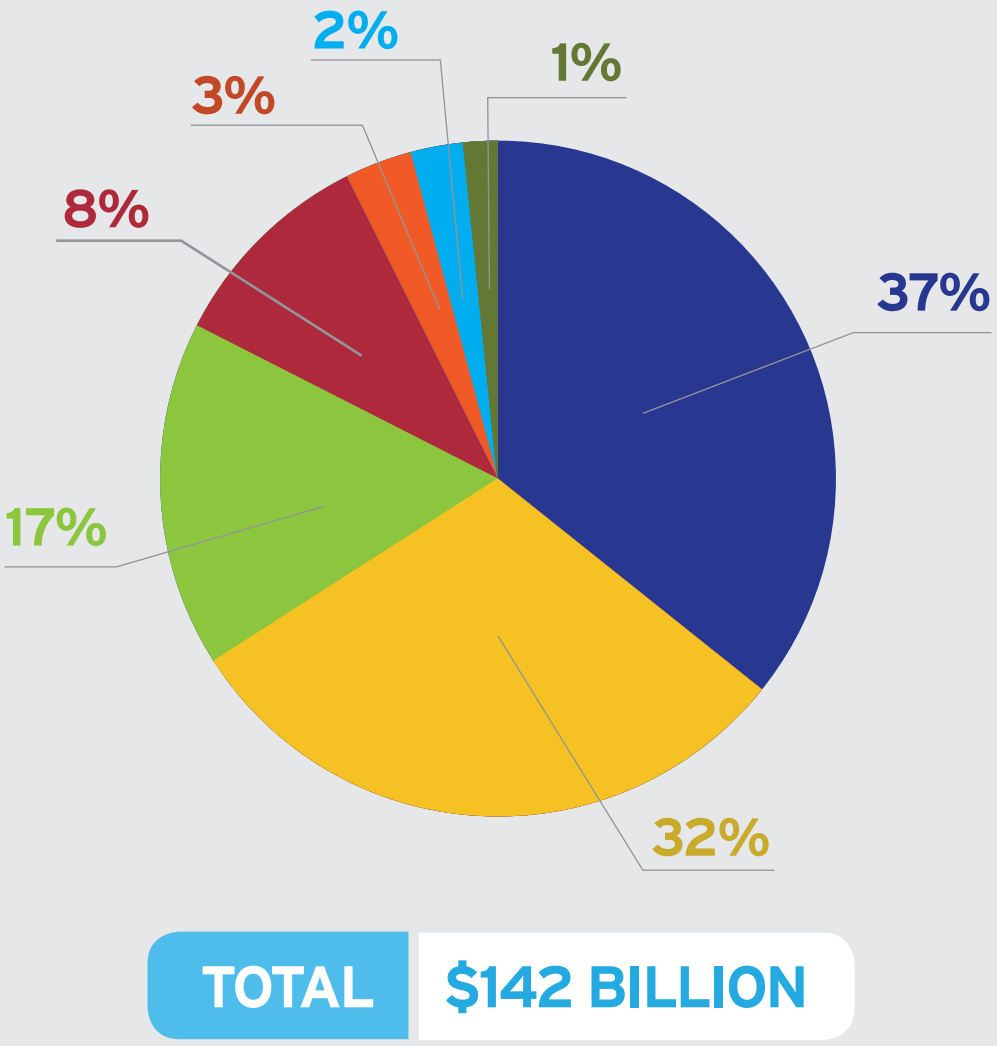
View of solar panels for power production in Saxony, Germany.

THREE-QUARTERS OF STIMULUS FUNDING FOR CLEAN ENERGY SPENT THROUGH 2011

A handful of governments around the world have placed a priority on clean energy investments as part of economic recovery and stimulus initiatives undertaken in response to the global economic crisis of 2008-09. Governments allocated more than $194 billion for clean energy efforts in stimulus plans. By the end of 2011, almost three-fourths of those funds ($142 billion) had reached the sector. In 2011, $46 billion in stimulus funding for clean energy was spent, more than half of that by the United States and China together. About $53 millon remains to be spent, of which 67 percent ($35.7 billion) is expected to be spent in 2012. Thirty-two percent of stimulus funding spent to date has been directed to renewable energy initiatives, 37 percent to energy efficiency programs, and 17 percent to smart grid. Eight percent of stimulus funding has been allocated by governments for research and development efforts.

At a wind turbine construction site, workers mount the rotor hub onto a turbine gearbox or generator.

FIGURE 6: TOTAL STIMULUS FUNDING TO DATE, BY SECTOR (PERCENT OF TOTAL)*



* Government stimulus funding is not included in the G-20 private investment figures presented in this report.

WHO'S WINNING THE CLEAN ENERGY RACE?

The United States reclaimed the top spot in the worldwide clean energy race in 2011. Because of policy uncertainty, however, its leadership is likely to be short-lived after a variety of American clean energy programs expired at the end of 2011. Nothing appears likely to stem the long-term shift in the clean energy sector's center of gravity as investment swings from the West (Europe and the United States) to the East (Asia) and from the Northern Hemisphere to the Southern. Although China's relatively flat year in 2011 cooled the rapid pace of growth in the Asian region, new opportunities are emerging in the flourishing markets of India, Indonesia, Australia, and Japan.

Deployment of clean energy in Europe is likely to slow in 2012 as governments continue or accelerate efforts to rein in incentives for clean energy technologies. At the same time, Indonesia, China, Australia, and India are likely to see clean energy investment growth as these countries seek to meet the increasing electricity demands of an emerging middle class.

FIGURE 7: INVESTMENT BY COUNTRY AND SECTOR, 2011 (BILLIONS OF $)

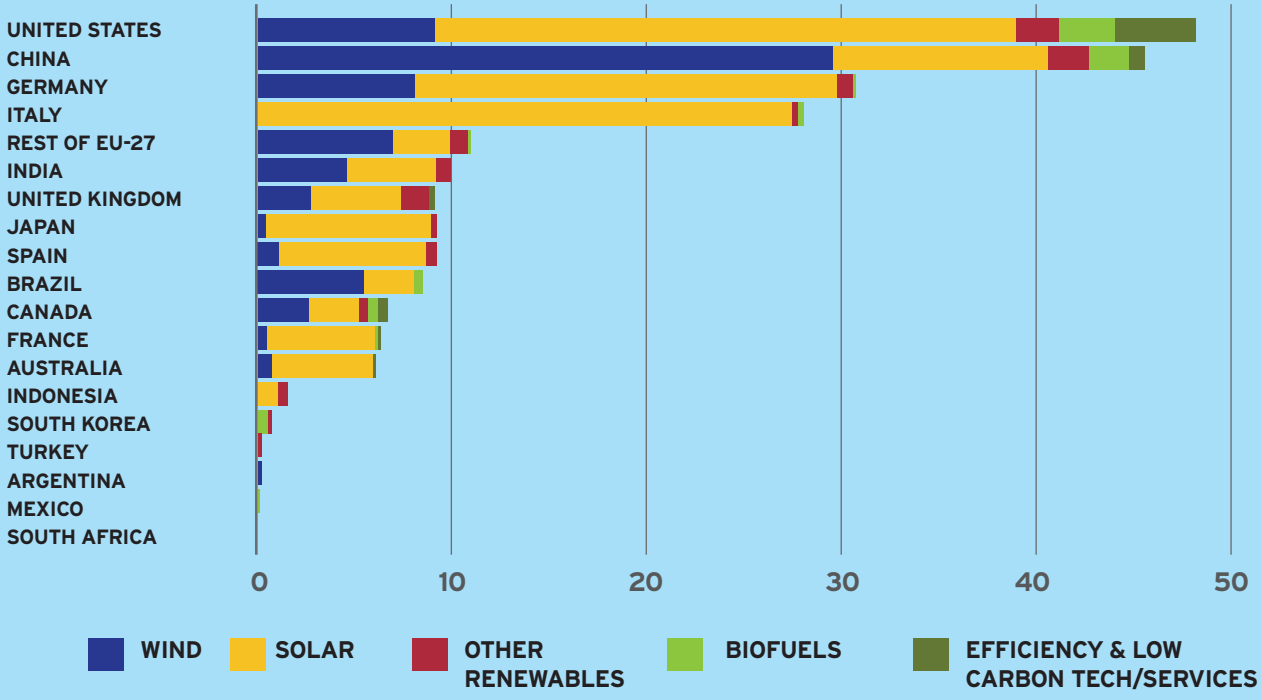


FIGURE 8: INVESTMENT BY COUNTRY AND FINANCING TYPE, 2011 (BILLIONS OF $)

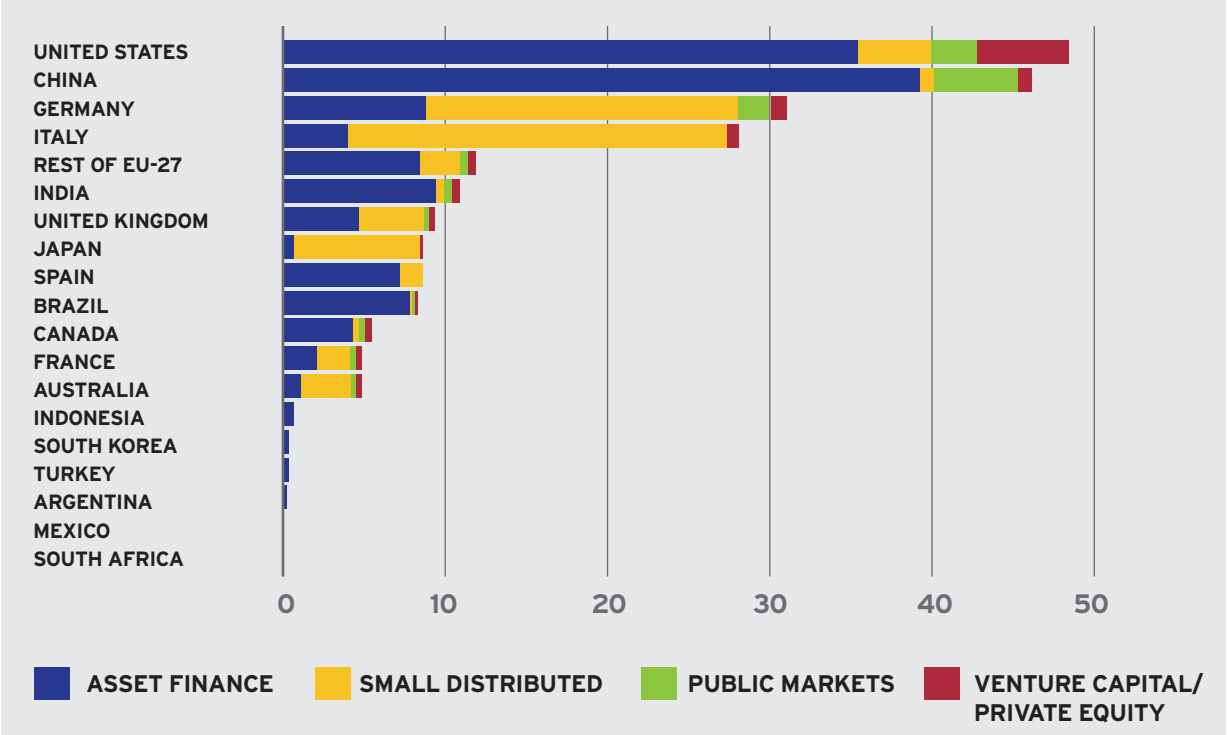


FIGURE 9: TOP 10 IN CLEAN ENERGY INVESTMENT, 2011

2011 Rank	Country	2011 Investment (billions of $)	2010 Investment (billions of $)[3]
1	United States	48	33.7
2	China	45.5	45.0
3	Germany	30.6	32.1
4	Italy	28.0	20.2
5	Rest of EU-27	11.1	15.2
6	India	10.2	6.6
7	United Kingdom	9.4	7.0
8	Japan	8.6	7.0
9	Spain	8.6	6.9
10	Brazil	8.0	6.9

3 These figures have been revised by Bloomberg New Energy Finance as of February 2012.

FIGURE 10: TOP 10 IN INVESTMENT GROWTH 2010 VS. 2011

Rank	Country	1-Year Growth Rate
1	Indonesia	521%
2	India	54%
3	United States	42%
4	Italy	38%
5	France	36%
6	United Kingdom	35%
7	Spain	25%
8	Japan	23%
9	Brazil	15%
10	Australia	11%

FIGURE 11: TOP 10 FIVE-YEAR GROWTH IN INVESTMENT, 2006-11

Rank	Country	5-Year Growth Rate
1	Italy	89%
2	Indonesia	53%
3	China	37%
4	Australia	28%
5	India	23%
6	Japan	22%
7	Canada	22%
8	Germany	20%
9	Brazil	14%
10	Rest of EU-27	12%

FIGURE 12: TOP 10 INVESTMENT INTENSITY (CLEAN ENERGY INVESTMENT PER $ GDP)

Rank	Country	Intensity
1	Italy	1.58%
2	Germany	1.04%
3	Australia	0.55%
4	China	0.45%
5	United Kingdom	0.43%
6	Canada	0.41%
7	Brazil	0.37%
8	United States	0.33%
9	India	0.25%
10	France	0.23%

FIGURE 13: TOP 10 IN INSTALLED RENEWABLE ENERGY CAPACITY (GW)

Rank	Country	Capacity
1	China	133
2	United States	93
3	Germany	61
4	Rest of EU-27	60
5	Spain	32
6	Italy	28
7	Japan	25
8	India	22
9	France	18
10	Brazil	15

FIGURE 14: TOP 10 FIVE-YEAR GROWTH IN RENEWABLE ENERGY CAPACITY, 2006-11

Rank	Country	Percentage Increase
1	China	92%
2	Turkey	85%
3	Brazil	49%
4	Italy	47%
5	Argentina	46%
6	South Korea	43%
7	France	41%
8	Canada	32%
9	Australia	29%
10	United States	28%

UNITED STATES RECLAIMS WORLDWIDE LEAD IN CLEAN ENERGY INVESTMENT

After slipping to second in Pew's 2009 report on the G-20 clean energy race and to third the next year, the United States reclaimed its leadership position in the G-20 in 2011, attracting $48.1 billion worth of clean energy investments, our report finds. Finance and investment rose 42 percent from 2010, achieving record levels in investment overall and in the solar sub–sector.

By the end of 2011, the United States had 93 GW of installed renewable energy capacity, second only to China in terms of total installed capacity. Almost 10 GW of new capacity was added, including 6.7 GW of wind and 1.7 GW of solar, the first time the United States has ever installed more than 1 GW of solar energy. A significant portion of the country's clean energy investments in 2011 was directed toward large, utility-scale solar power plants that will add to America's installed capacity in the coming years. As a result, financings in the United States were high, while deployment lagged those countries with concentrated investments in wind (e.g., China) and small distributed photovoltaic projects (e.g., Germany, Italy, and Japan). In all, the United States led the world with $30 billion invested in solar, but deployments in Germany and Italy were more than four times greater than in the United States.

The country continues to lead in the energy efficiency and low-carbon technology and biofuels-related investment categories, which attracted $3.7 billion and $3.1 billion, respectively. In addition, venture capital/private equity investments in the United States continue to dominate that class of

UNITED STATES CLEAN ENERGY INITIATIVES THAT EXPIRED IN 2011

- Advanced Energy Manufacturing Tax Credit
- Department of the Treasury Section 1603 Grant Program
- Department of Energy Section 1705 Loan Guarantees
- Energy Efficient Appliance Manufacturing Tax Credit
- Energy Efficient Homes Tax Credit for Builders

Construction workers install bolts in the shaft end of a wind turbine blade.

"Our current system of on-and-off tax incentives, while partially helpful to new energy technology deployment, has proven not to be the sort of sustained signal that is really needed in order to release innovation in the marketplace."

—Sen. Jeff Bingaman (NM) at the 2012 Advanced Research Projects Agency-Energy (ARPA-E) Energy Innovation Summit Feb. 29, 2012

financing, accounting for $6 billion of the $8.6 billion invested, or 70 percent of the total. Similarly, public and private research and development investments are highest in the United States, which accounts for 30 percent of the worldwide total. U.S. strength in research and venture capital investments indicates that America continues to lead in innovation and early stage technology development, whereas capacity and other data show it lagging behind world leaders such as China and Germany in deployment and manufacturing of these inventions.

INVESTMENT GROWTH IN CHINA SLOWS

After substantial gains in each of the past five years, clean energy investments paused in China in 2011, growing by only 1 percent to $45.5 billion. Nonetheless, China remains a dynamic hub of clean energy activity in terms of manufacturing and deployment. Most of the finance and investment the country attracted were directed at new clean energy generating capacity, especially wind resources. Wind energy investments in China were more than three times that of the next-closest G-20 nation at $29 billion. Such substantial investment helped spur deployment of 20 GW of wind capacity, matching record installations in 2010. China now has more than 64 GW of installed wind energy capacity, although a quarter or more of this capacity may not be operational or connected to the grid.

China also attracted $11.3 billion to the solar sector and has established policies that should accelerate solar investments in the future. A national target for solar deployment was revised upward in 2011 to

installation of 50 GW by 2020. To help achieve these targets, China adopted its first national feed-in tariff for solar projects in 2011. Provincial governments are also looking for opportunities to harness solar energy sources. China's national and provincial interest in solar technologies could be important to the worldwide solar industry if anticipated demand decline in Europe is to be offset in 2012.

A building powered by solar energy in a Chinese industrial park.

> "We believe we as a country can be a trailblazer for a new age of renewable energy sources. . . . We can be the first major industrialized country that achieves the transition to renewable energy with all the opportunities—for exports, development, technology, jobs—it carries with it."
>
> —German Chancellor Angela Merkel
> (Source: BBC. "Nuclear phase-out can make Germany trailblazer—Merkel." May 30, 2011.)

A solar collector field next to a village in Germany.

SOLAR DEPLOYMENT IN GERMANY CONTINUES

Overall clean energy investments in Germany declined 5 percent in 2011 to $30.6 billion as the government reduced feed-in tariffs. This did little to stem the demand of project developers for small distributed photovoltaic projects as more than $20 billion was invested in the sector and 7.4 GW of capacity was installed, replicating 2010 deployment levels. Germany leads the world with 24.6 GW of installed solar energy generating capacity. The country also attracted $8.5 billion for wind power projects, deploying 2 GW in 2011 to bring its total installed wind capacity to 29 GW.

Germany already obtains more energy from renewable power sources than it does from nuclear, coal, or natural gas. Adoption in 2011 of a plan to accelerate the phaseout of nuclear power is likely to ensure continued investment, as Germany pursues some of the world's most ambitious clean energy goals.

ITALY'S SOLAR INVESTMENTS SOAR

Clean energy investments in Italy rose to $28 billion in 2011, increasing by 38 percent over 2010 levels, fourth-largest increase among G-20 nations. Nearly all of these investments were directed to small distributed solar energy projects. By year's end, an additional 8 GW of solar was deployed as developers sought to get projects commissioned before anticipated cuts in feed-in tariff rates. Solar energy is cost-competitive with conventional alternatives in a variety of Italian markets, and 12.8 GW of solar capacity has now been installed. Over the past five years, no G-20 country has experienced greater investment growth rates than Italy, which also achieves world-leading investment levels relative to the size of its economy.

A photovoltaic system for renewable energy in Italy.

INDIA CONTINUES TO EMERGE AS A CLEAN ENERGY LEADER

Clean energy investments in India increased 54 percent in 2011 to $10.2 billion, vaulting that country from 10th to sixth place in the G-20 in just one year. The wind sector in India led the way, attracting $4.6 billion and spurring deployment of 2.8 GW during the year, a 38 percent increase in wind generating capacity.

India's pursuit of its "National Solar Mission," which aims to deploy 20 GW of solar energy by 2020, is evident in the sevenfold increase in solar energy investments, to $4.2 billion, and record installation levels. Late in the year, a reverse auction on 350 MW of solar energy brought bids that were 30 percent lower than 2010 levels.

Workers construct a solar reflector in Noida, India.

UNITED KINGDOM INVESTMENT REBOUNDS

After a sharp drop in 2010, investments in the United Kingdom's clean energy sector rebounded in 2011 to $9.4 billion, a 35 percent increase over 2010 levels. The country's growth was driven in part by a tenfold increase in solar energy investments, which grew to $4.8 billion, financing the installation of more than 300 MW of power in 2011. Sustained interest in development of offshore wind turbines also helped to spur $2.3 billion worth of investment and 900 MW of capacity in the wind sector. To date, the United Kingdom has installed 6.5 GW of wind capacity.

The United Kingdom did not make the top-10 lists for annual clean energy capacity additions (Figure 13) or five-year growth in renewable energy capacity (Figure 14). Ongoing efforts to reform the nation's electricity sector could help spur additional investment and capacity additions in the sector.

Two large wind turbines in a North Sea wind farm off the coast of Norfolk, U.K.

FINANCING TYPES AND TRENDS

ABOUT THE INVESTMENT DATA

This report presents data on 2011 clean energy finance and investment in the G-20 nations. Public and private investments in research and development totaling about $35 billion in 2011 are not included in the G-20 investment presentations. No data are presented for G-20 members Russia and Saudi Arabia, because clean energy investment in those countries was negligible. Spain, a member of the EU but not an individual member of the G-20, is presented independently in this report in view of the size and relevance of its clean energy sector. For more details on the research methodology underlying this report, please see Appendix II.

Bloomberg New Energy Finance tracks thousands of transactions across the spectrum of clean energy finance, from research and development (R&D) funding and venture capital invested in technology and early-stage companies, to the public market and asset financing used to finance business growth and clean energy deployment. The key investment categories are:

Asset Financing: This category includes all money invested in renewable energy generation projects, whether from internal company balance sheets, debt finance, or equity finance. The category excludes refinancing and short-term construction loans. Asset financing typically is associated with installation of clean energy equipment and generating capacity.

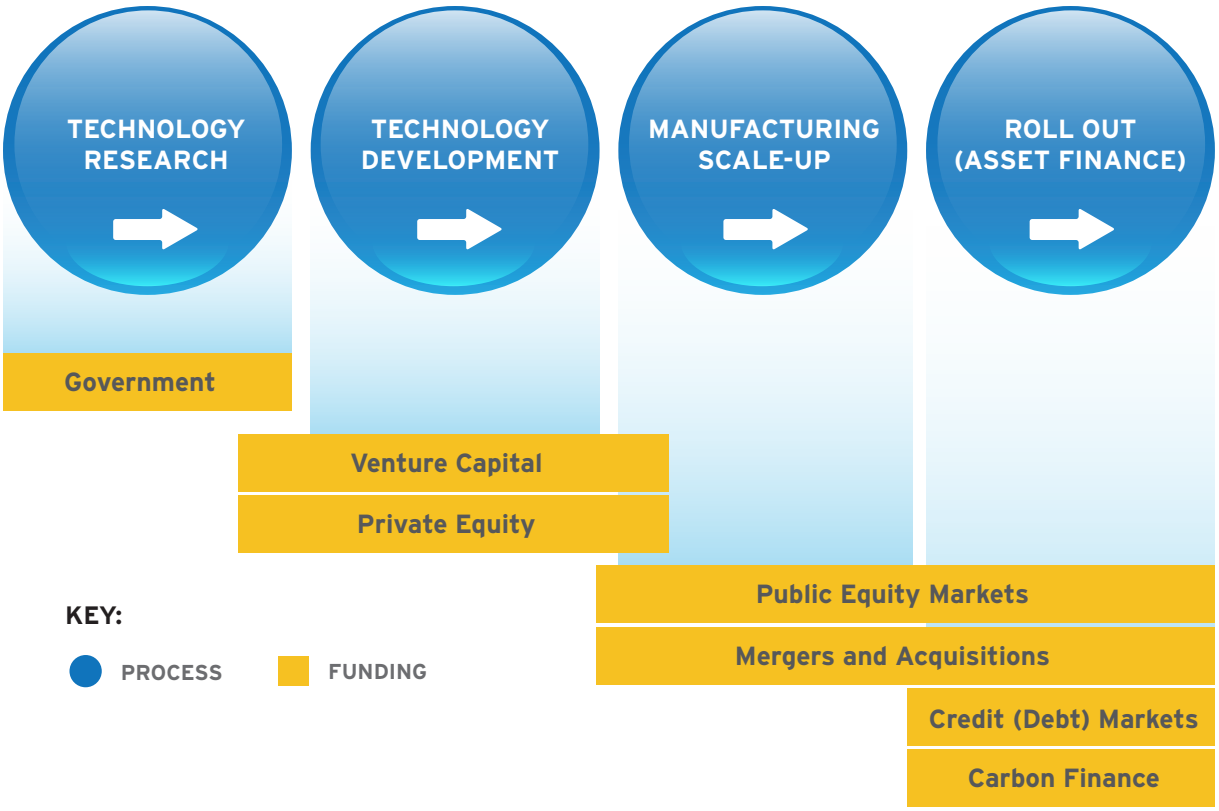
Small Distributed Capacity (SDC): This category includes all money invested in residential scale solar projects of less than 1 MW.

Public Markets: This category includes all money invested in the equity of publicly quoted companies developing renewable energy technology and clean power generation. Public market finance is typically associated with the scale-up phase, when companies are raising capital in public stock markets to finance product manufacturing and rollout. Investment in companies setting up generating capacity is included in the next category.

Venture Capital/Private Equity (VC/PE): This category includes all money invested by venture capital funds in the equity of companies developing renewable energy technology. In general, venture capital is invested at the innovation stage, when companies are proving the market potential of goods and services.

Finally, the 2011 edition of *Who's Winning the Clean Energy Race?* factors reinvested equity into investment totals. Reinvested equity is actually a deduction and is therefore referred to as an adjustment, whose purpose is to remove double counting upon aggregation of asset classes. Double counting is caused when companies that raise funds from the venture capital/private equity community or on the capital markets subsequently invest these funds in projects through asset finance within a period of 12 months.

FIGURE 15: THE SUSTAINABLE ENERGY FINANCING CONTINUUM



ASSET FINANCING

Asset financing, typically associated with the installation of clean energy equipment and generating capacity, is a barometer of clean energy deployment and the creation of new jobs. It is the dominant class of clean energy finance, accounting for 63 percent of all G-20 clean energy investments. A total of $141 billion was invested in physical assets that generate clean energy services (power, heat, fuels), with onshore wind the dominant sector because of its relative maturity and scalability (Figure 16). Key observations include:

- Asset financing increased 12 percent above 2010 levels.
- G-20 investments in clean energy assets helped finance the installation of a record 78 GW of clean energy capacity in 2011.
- Wind energy was the preferred sector for asset financing in 2011, attracting $72 billion. Solar energy attracted $51.5 billion in asset financing, an increase of almost 200 percent over 2010 levels. Other renewable energy sources, such as geothermal, small-hydro, and marine, garnered $12 billion. Asset financing for biofuels was $5.4 billion, virtually identical to 2010 levels.
- China led all G-20 competitors in clean energy asset financing, attracting $44.3 billion. The United States was second at $36.5 billion, followed by India at $9.5 billion and Germany at $8.7 billion.

FIGURE 16: G-20 ASSET FINANCE BY SECTOR, 2004-11 (BILLIONS OF $)

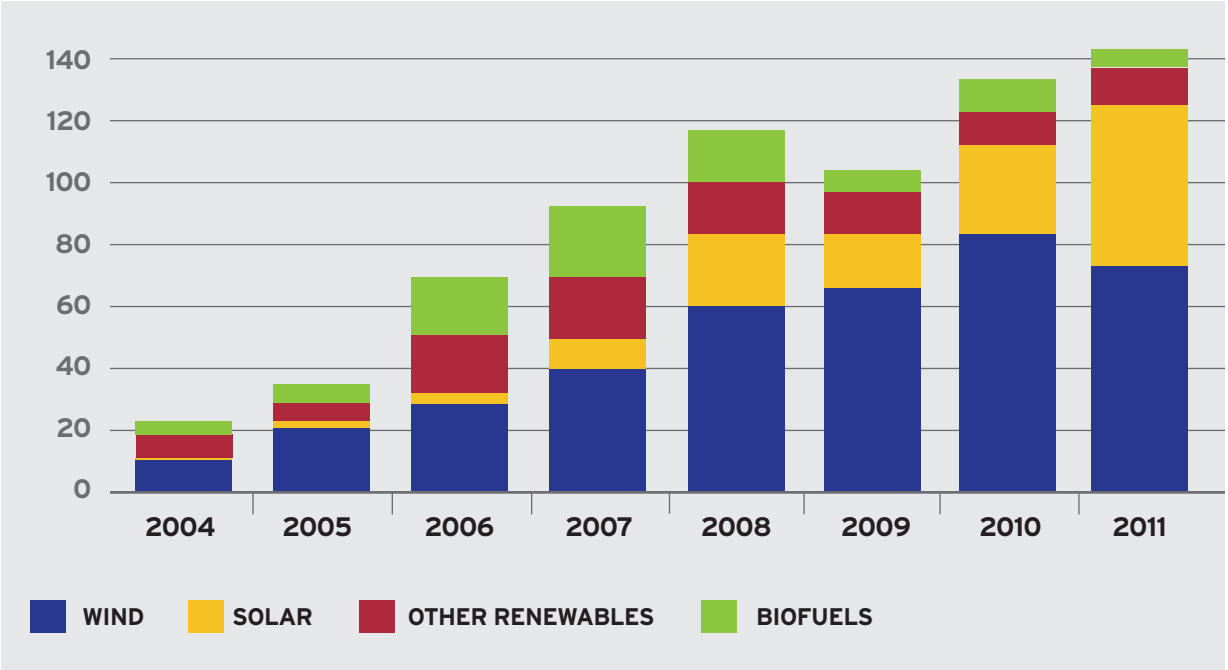
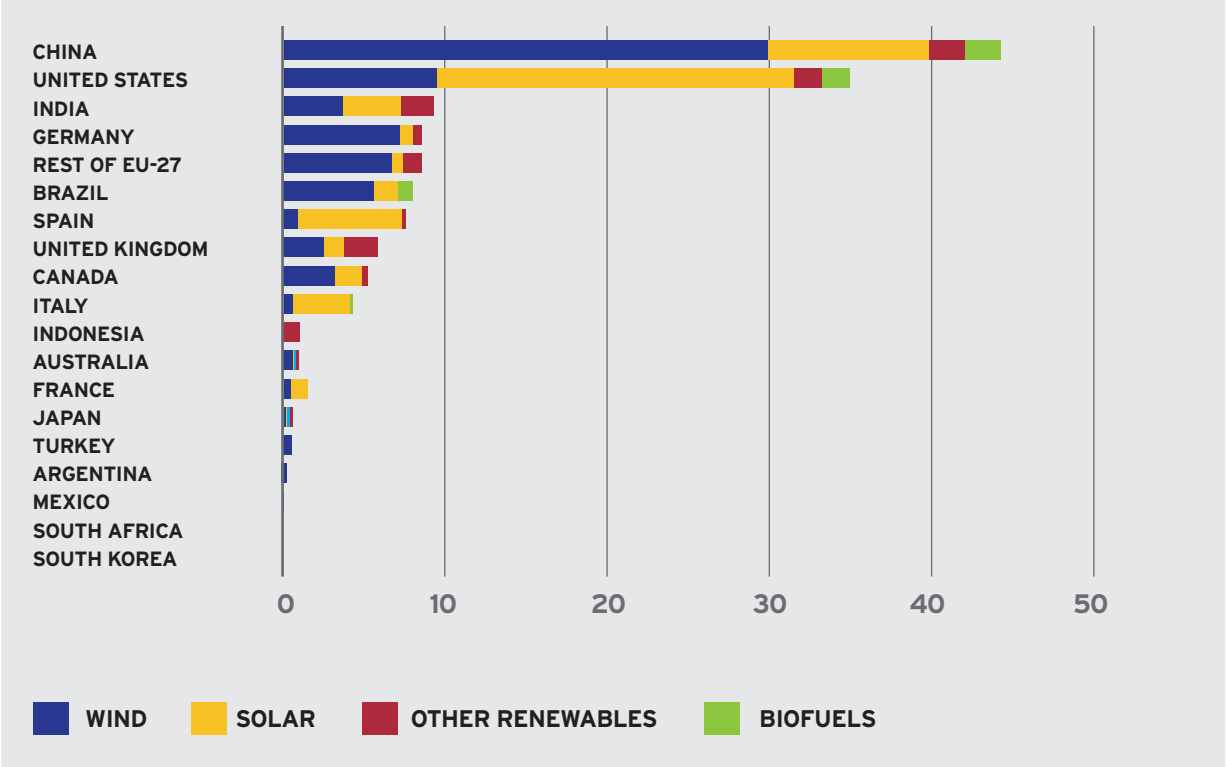


FIGURE 17: G-20 ASSET FINANCE BY SECTOR, 2011 (BILLIONS OF $)



SMALL DISTRIBUTED CAPACITY

Small distributed capacity is associated with residential-scale solar projects of less than 1 megawatt (MW). Investment in small distributed capacity has grown by 900 percent over the past five years, reaching a record $71.5 billion in 2011. Key observations include:

- G-20 investments in small distributed capacity increased 25 percent in 2011.
- Italy's small distributed capacity investments increased 76 percent to a record $24.1 billion, which represents 34 percent of the G-20 total in this category.
- Germany accounted for 28 percent of G-20 investment in small distributed capacity, attracting $20 billion.
- Japan's investment in this class increased 25 percent to $8.1 billion. The United Kingdom's investments grew by 1,800 percent to $3.8 billion.

FIGURE 18: G-20 INVESTMENT IN SMALL DISTRIBUTED CAPACITY 2004-11 (IN BILLIONS OF DOLLARS)

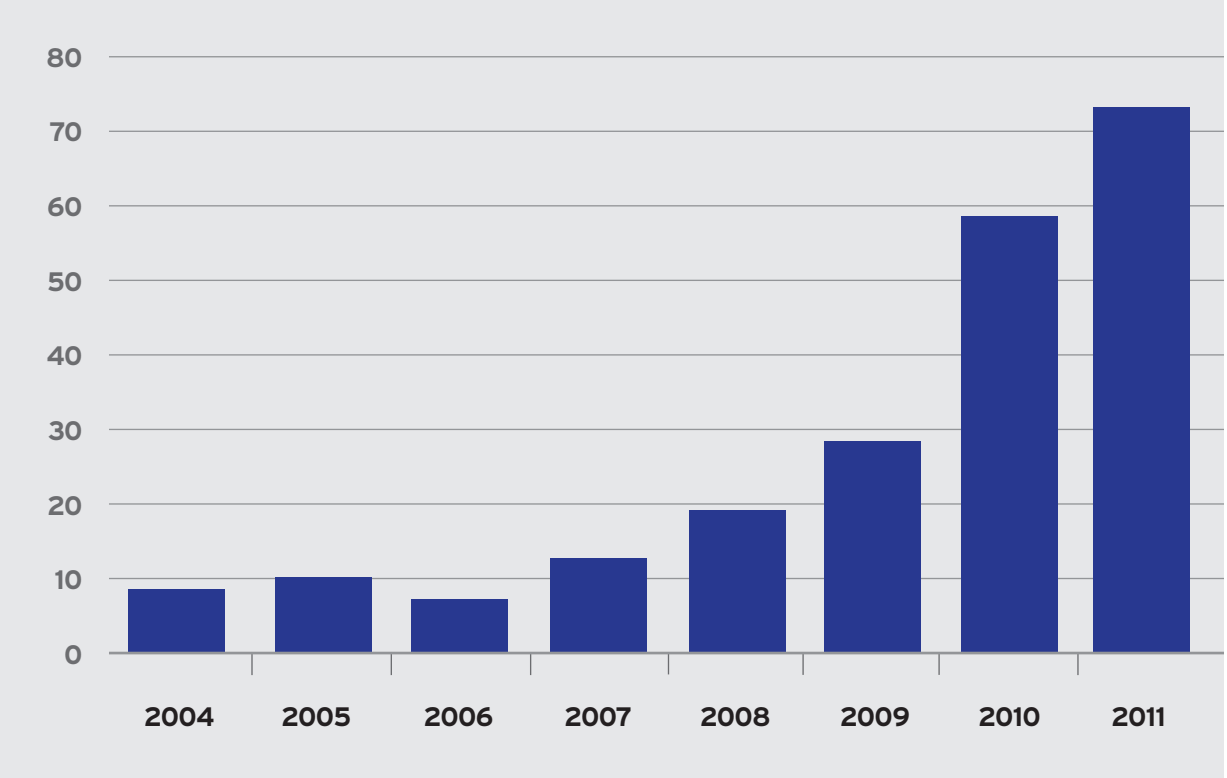
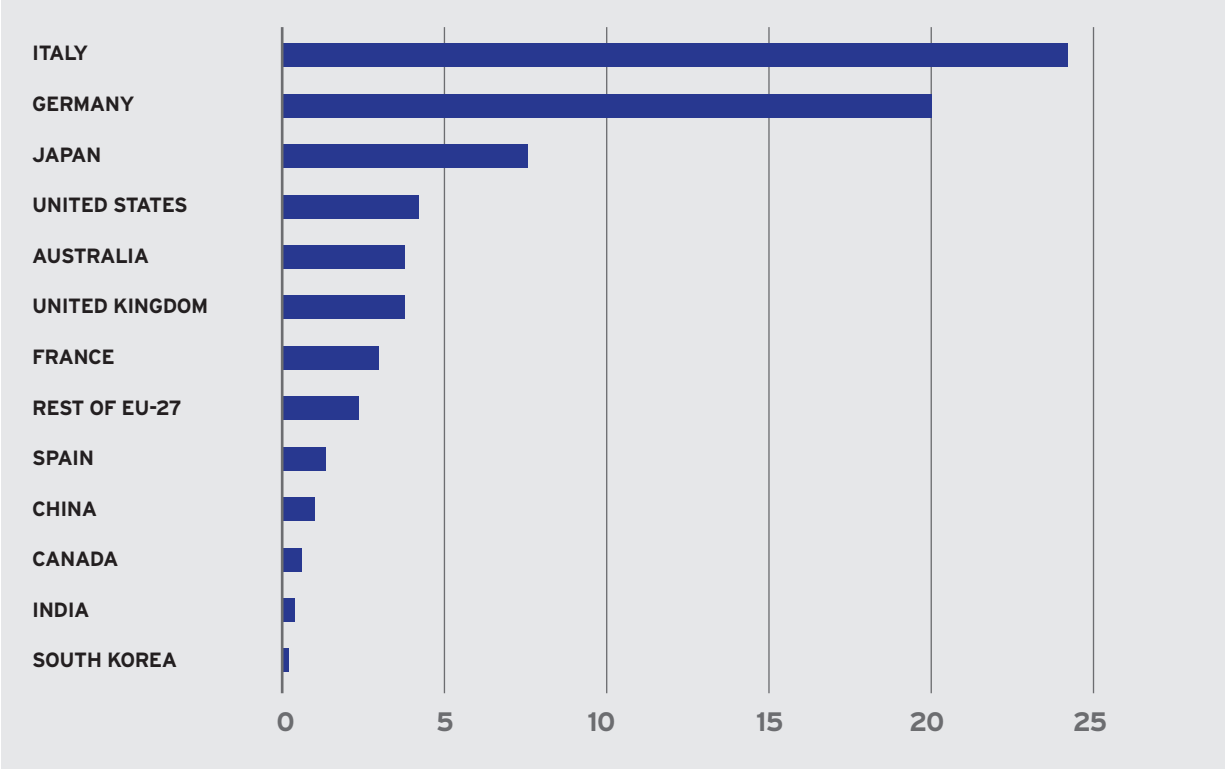


FIGURE 19: G-20 SMALL DISTRIBUTED CAPACITY INVESTMENT, BY COUNTRY, 2001 (BILLIONS OF $)



PUBLIC MARKET FINANCING

Public market financing enables companies to raise capital for expansion and growth.

As the clean energy economy emerged in the mid-2000s, many companies used the stock markets to fund their growth plans. At its peak in 2007, public market funding reached $24.7 billion (Figure 20). But G-20 public offerings have been just half of that level for the past four years. In 2011, total public market financing fell to $10.2 billion, the lowest amount since 2006, and 21 percent below 2010 levels.

Key observations include:

- Steep price declines, manufacturing overcapacity, and increased competition significantly diminished the value of clean energy stock indexes, making it less attractive for companies to issue initial public offerings in 2011.

- China dominated this financing category, attracting $4.9 billion, almost half of the G-20 total. Public market offerings in the United States totaled $2 billion. Germany was the only other country that recorded more than $1 billion in public market investments, with $1.2 billion raised in 2011.

- The wind energy sector led all others for public market financing, attracting $4.4 billion, followed by solar energy at $3.4 billion and the efficiency/low-carbon technology sector at $1.2 billion.

FIGURE 20: PUBLIC MARKET INVESTMENT BY SECTOR, 2004-11 (BILLIONS OF $)

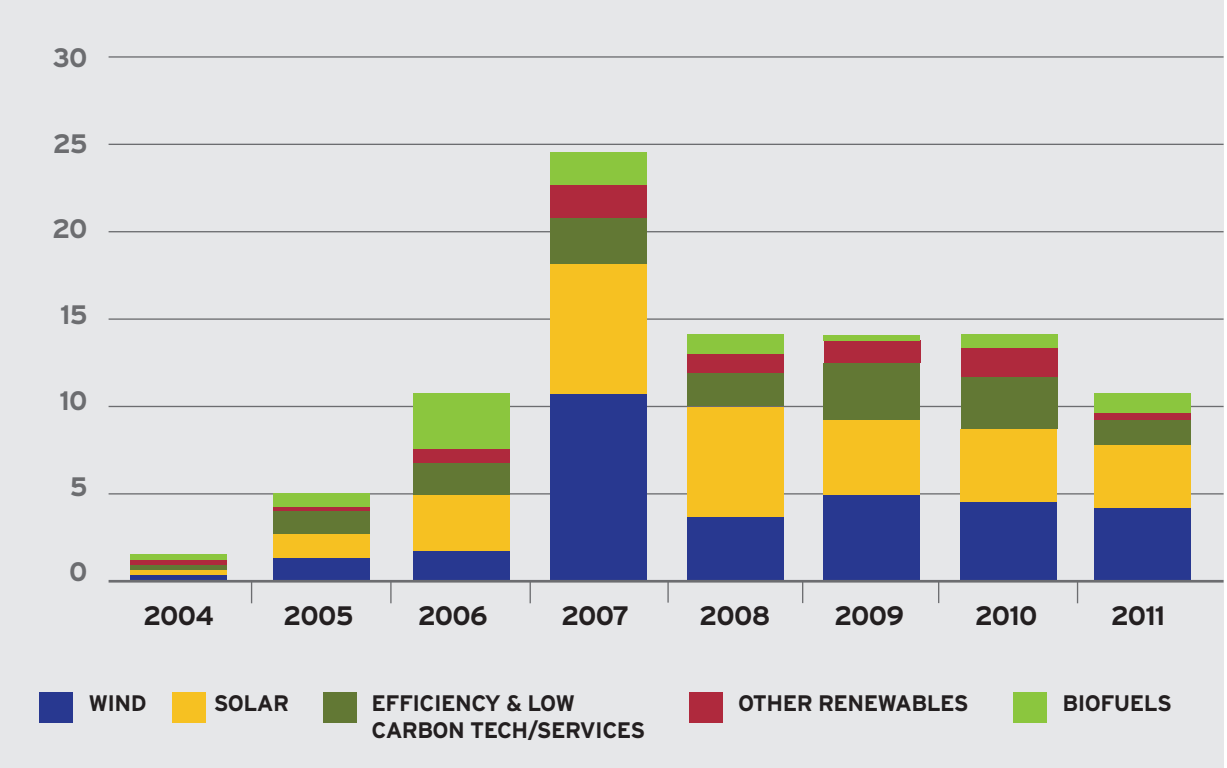
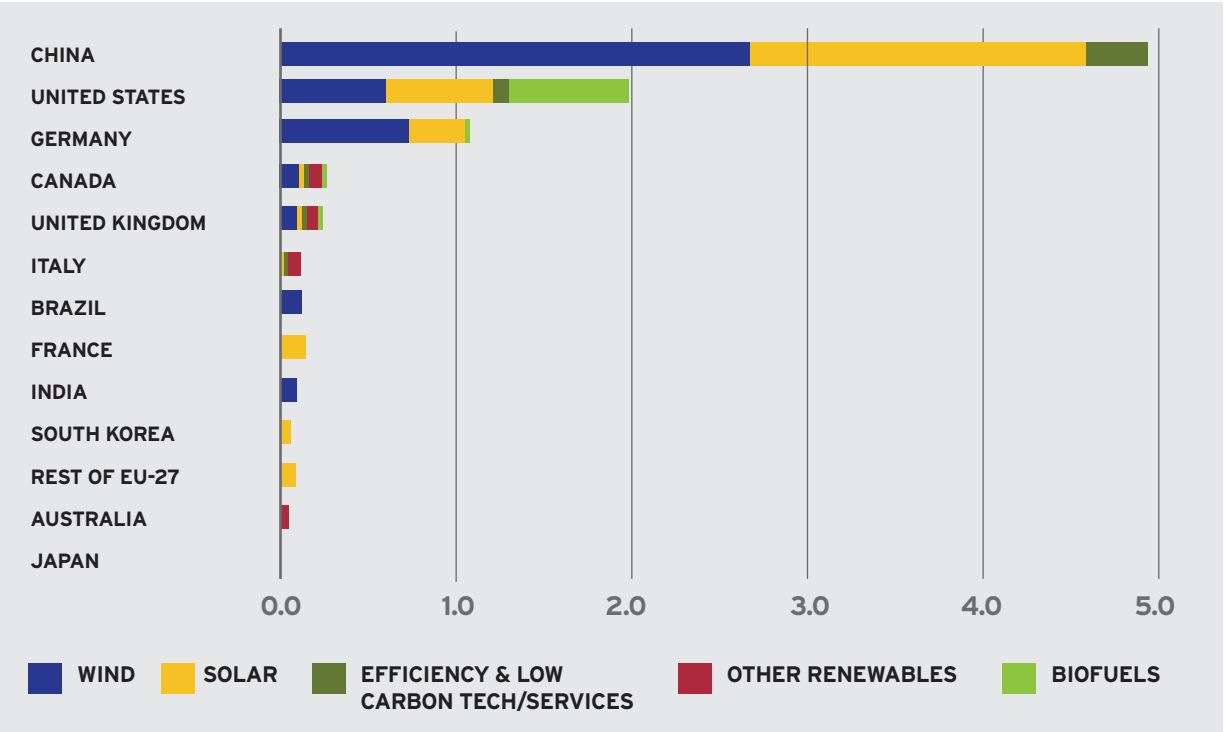


FIGURE 21: G-20 PUBLIC MARKET INVESTMENT BY COUNTRY AND SECTOR, 2011 (BILLIONS OF $)



VENTURE CAPITAL/PRIVATE EQUITY FINANCING

Venture capital and private equity financing are closely linked with technology innovation and development.

Although it accounts for only 4 percent of clean energy investment, venture capital is an important indicator of innovation and development of promising new clean energy technologies. Venture capital financing in 2011 increased 8.6 percent to $8.6 billion.

Key observations include:

- The United States remains the dominant leader in venture capital financing, accounting for $6 billion in 2011, 70 percent of the G-20 total. Germany and China trailed at a distance with $635 million and $458 million, respectively, in venture capital investments.
- For the third year in a row, energy efficiency/low-carbon technologies were the leading beneficiaries of venture capital investments, attracting $3.4 billion in 2011. Solar energy attracted $2.6 billion.

FIGURE 22: G-20 VENTURE CAPITAL/PRIVATE EQUITY FINANCING BY SECTOR, 2004-11 (BILLIONS OF $)

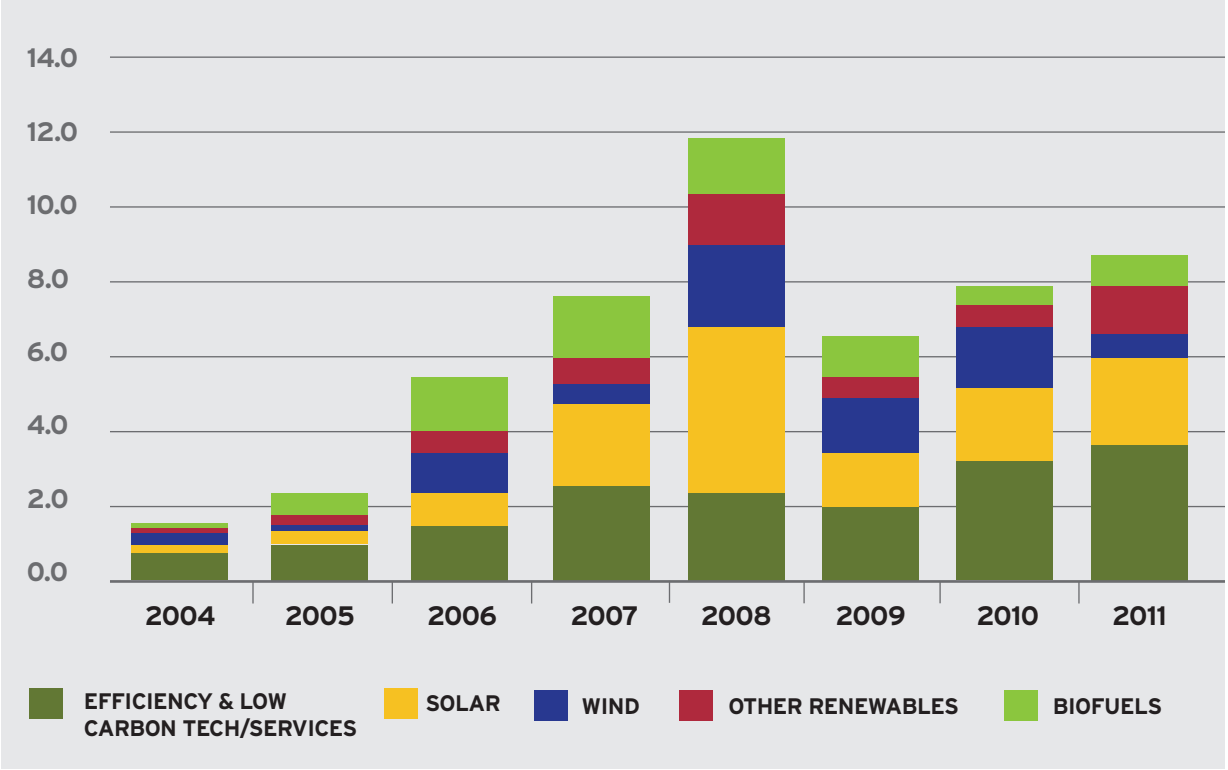
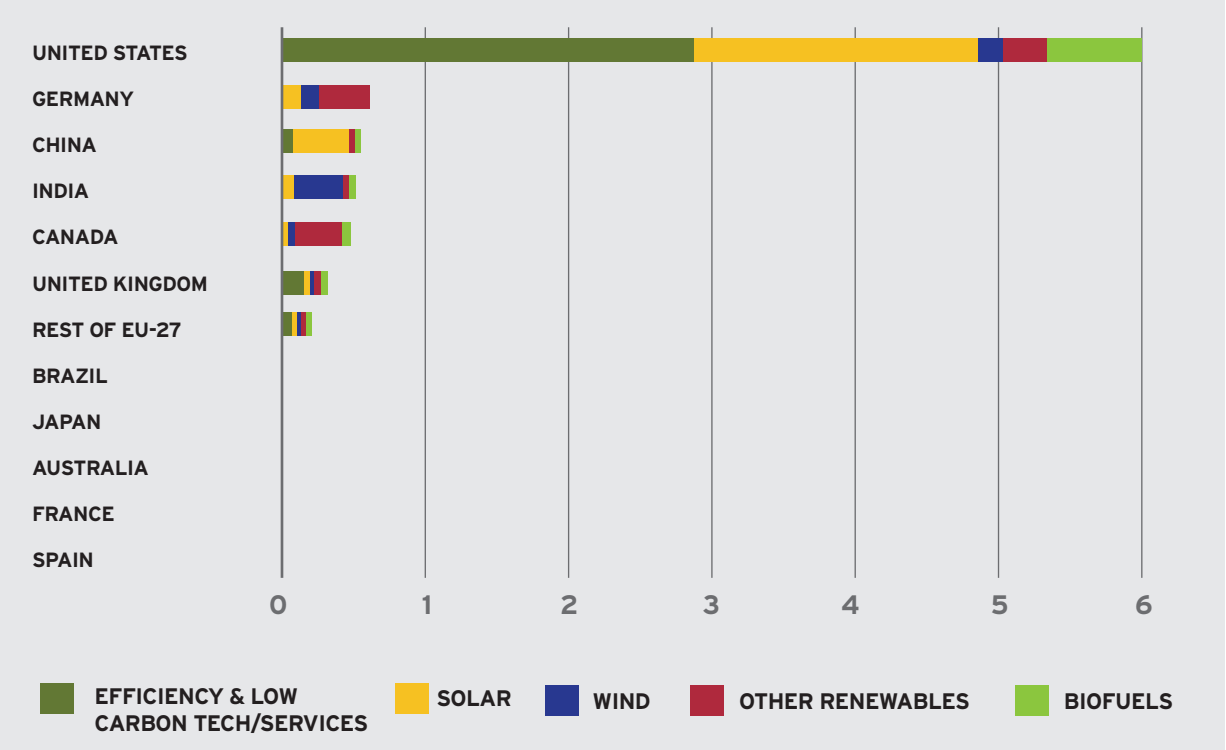


FIGURE 23: G-20 VENTURE CAPITAL/PRIVATE EQUITY FINANCING BY COUNTRY AND SECTOR, 2011 (BILLIONS OF $)



INSTALLED RENEWABLE ENERGY CAPACITY

The combination of falling prices and growing investments in asset finance and small distributed clean energy projects fueled record capacity additions around the world in 2011 totaling 83.5 GW of clean power, 59 percent above 2010 installations. At the end of of 2011, more than 565 GW of clean energy generating capacity was in place globally (Figure 5). The wind sector, with 43 GW of new generating capacity installed in 2011, leads all others with 239 GW. A record 29.7 GW of solar was installed in 2011—10 times the amount installed in 2007—raising global installed solar energy capacity by 68 percent to 73 GW. Key observations include:

- China leads the world in clean energy capacity, with 133 GW installed. The country added 20 GW of wind energy in 2011, raising total installed wind energy capacity to more than 60 GW.

- The United States added wind energy installations of 6.7 GW in 2011 for a total of 47 GW. The country leads the world in installed biomass and waste-to-energy capacity, as well as geothermal energy generating capacity.

- For the second year in a row, Germany installed more than 7 GW of solar energy generating capacity in 2011. Italy installed even more—8 GW—more than doubling its installed solar energy capacity to 12.4 GW.

FIGURE 24: G-20-INSTALLED WIND, BIOMASS, SMALL-HYDRO CAPACITY (IN GW)

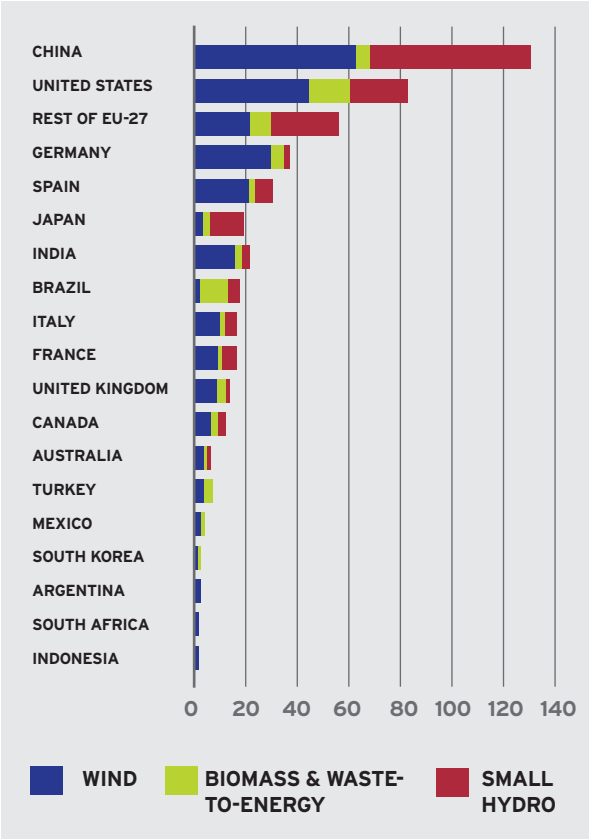
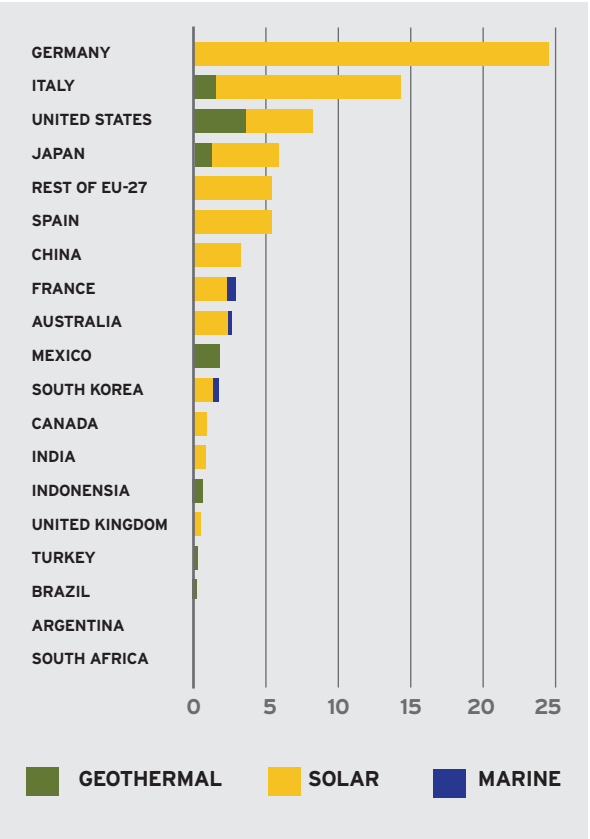


FIGURE 25: G-20-INSTALLED SOLAR, GEOTHERMAL, MARINE CAPACITY (IN GW)



G-20 STIMULUS FUNDING FOR CLEAN ENERGY

In response to the global economic crisis of 2008-09 and the long-term strategic significance of the clean energy sector, 12 members of the G-20 committed more than $194 billion in stimulus funding for clean energy programs. By the end of 2011, $142 billion (73 percent) had been spent, including $46 billion (24 percent) in 2011. The United States and China accounted for more than half of 2011 spending.

To date, 32 percent of stimulus funding spent has been directed to renewable energy initiatives, 37 percent to energy efficiency programs, and 17 percent to smart grid. Eight percent of stimulus funding has been allocated by governments for research and development efforts.

Of the funding, $53.2 billion remains to be spent. It is estimated that governments will spend $35.7 billion in 2012, bringing total clean energy stimulus spending to 91 percent of total commitments, with the balance to be spent in 2013 and 2014.

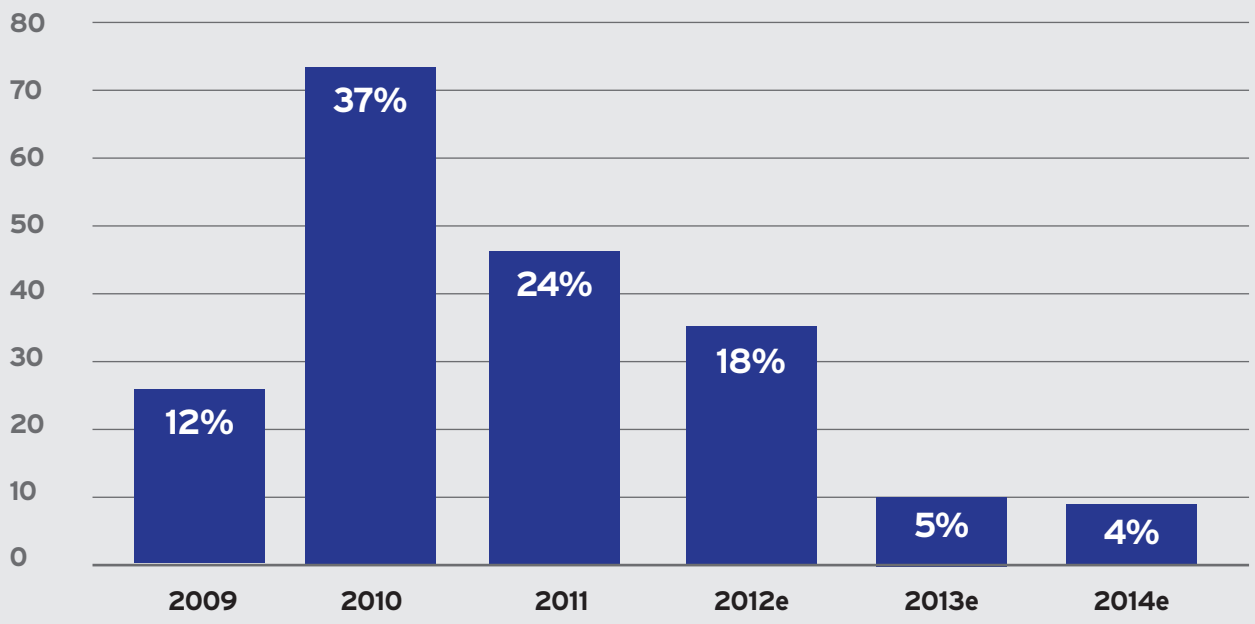
France and Canada have spent all clean energy stimulus funds, and Germany and Japan have spent almost all funding. In dollar terms, China has spent the most, about $44 billion, followed by the United States, with $42 billion spent.

FIGURE 26: CLEAN ENERGY STIMULUS FUNDS SPENT AND REMAINING, END OF 2011 (BILLIONS OF $)

Country	2010	2011	Remaining	Total
United States	26.3	15.7	23.6	65.6
Canada	0.1	0.5	0	0.6
Japan	8.9	1.4	0.1	10.5
South Korea	10.2	6.3	15.8	32.4
Germany	8.9	6.2	0.002	15.1
France	2.1	0	0	2.1
United Kingdom	1.3	1.4	0.8	3.4
EU 27	3.2	2.6	5.3	11.1
China	32	12	2.2	46.2
Brazil	0.2	0	2.3	2.4
Australia	1.6	0.008	2.2	3.9
TOTAL	**95.4**	**46.3**	**53.2**	**194**

Source: Bloomberg New Energy Finance

FIGURE 27: ANNUAL STIMULUS FUNDING FOR CLEAN ENERGY PROGRAMS (BILLIONS OF $)



APPENDIX I:
LIST OF FIGURES

APPENDIX 2:
METHODOLOGY

All figures in this report, unless otherwise credited, are based on the output of the Desktop database and analysis by sector experts of Bloomberg New Energy Finance, an online portal to the world's most comprehensive database of investors, projects, and transactions in clean energy. Data are current as of the end of 2011 and are categorized by country. Members of the EU not profiled individually are aggregated as the "Rest of the EU." [1]

The Bloomberg New Energy Finance Desktop collates all organizations, projects, and investments according to transaction type, sector, geography, and timing. It covers 30,000 transactions, 32,000 renewable energy projects, and more than 50,000 organizations, including start-ups, corporations, venture capital and private equity providers, banks, and other investors.

Research included the following renewable energy projects: all biomass, geothermal, and wind generation projects of more than 1 MW; all hydro projects between 1 and 50 MW; all marine energy projects; all biofuels projects with a capacity of 1 million liters or more per year; and all solar projects, with those less than 1 MW estimated separately and referred to as small distributed capacity in this report.

Efficiency and low-carbon tech/services include financial investment in technology companies covering energy efficiency, smart grid, energy storage, advanced transportation, carbon capture and storage, and general clean energy services. These sectors are also included in the corporate and government R&D investment figures. Investment in efficiency and low-carbon tech projects by governments and public financing institutions are excluded.

Where deal values are not disclosed, Bloomberg New Energy Finance assigned an estimated value based on comparable transactions. Deal values are rigorously rechecked and updated when further information is released about particular companies and projects. The statistics used are historic figures, based on confirmed and disclosed investment. This year, we have included an adjustment for reinvested equity in order to remove potential double counting of aggregating funds raised (through public markets and venture capital/private equity) and funds spent (through asset finance). This calculation looks to match organizations that raised funds and then acted as investors in the financing of a project that occurred within one year of the funds being raised.

Bloomberg New Energy Finance continuously monitors investment in renewable energy and energy efficiency. This is a dynamic process. As the sector's visibility grows, information flow improves. New deals come to light and existing data are refined, meaning that historical figures are constantly updated.

1 The "Rest of the EU" category includes Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, and Sweden.

ARGENTINA

After recording the G-20's sharpest increase in clean energy finance in 2010, Argentina experienced one of the sharpest declines in 2011. Investment fell 64 percent to $139 million for a No. 17 ranking in the G-20. Seventy-six percent of all investments were in the biofuels subsector for biodiesel plants. With only 60 MW of wind energy capacity installed in 2011, Argentina made little progress toward its target of generating 8 percent of its power from clean energy in 2016.

Finance and Investment (2011)

Total Investment	$139 million
G-20 Investment Rank	17
Percentage of G-20 Total	0.1%
5-Year Growth Rate	2.4%

Installed Clean Energy (2011)

Total Installed Renewable Energy	0.67 GW
Percentage of G-20 Total	0.1%
5-Year Growth Rate	46%
Key Renewable Energy Sectors	
Biodiesel (mLpa)	3090
Small-Hydro	0.48 GW
Wind	0.19 GW

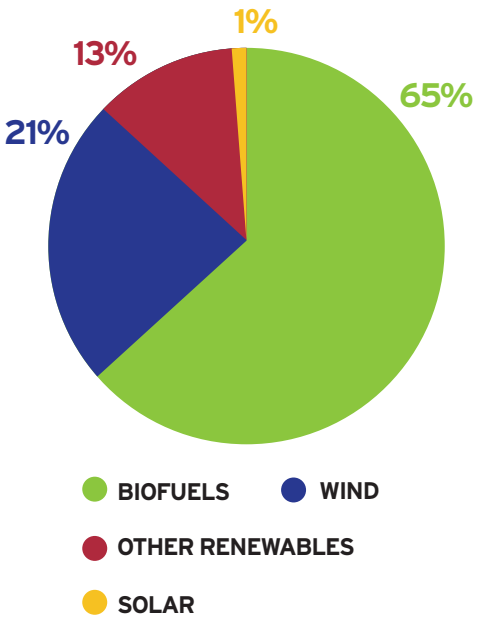
Key Clean Energy Targets (2012)

Renewable Energy	8% of total power generation (by 2016)
Ethanol	5% of total gasoline consumption
Biodiesel	7% of total diesel consumption

Key Investment Incentives

Wind, Solar, Biomass, Small-Hydro	Tax incentives: Value-Added Tax Rebate / Accelerated Depreciation Benefit
Biofuels	Tax exemption for producers and guaranteed fixed prices set by government

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



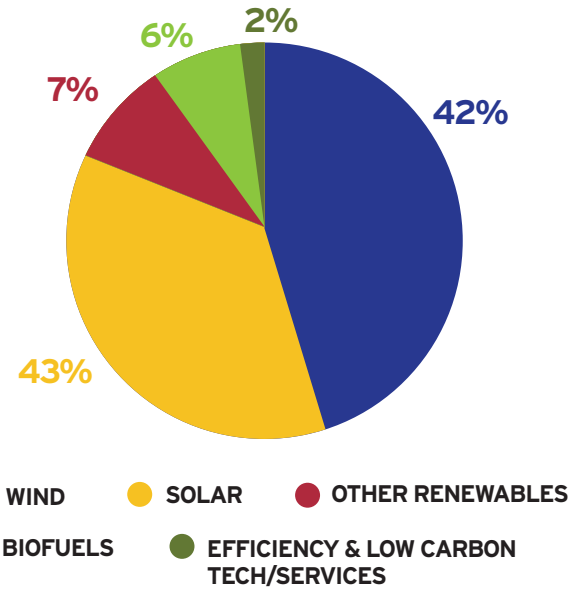
National Clean Energy Policies

Carbon Cap	✔ Auto Efficiency Standards
Carbon Market	✔ Feed-In Tariffs
✔ Renewable Energy Standard	Government Procurement
✔ Clean Energy Tax Incentives	Green Bonds

AUSTRALIA

Clean energy investment in Australia increased 11 percent in 2011 to $4.9 billion for the No. 13 position in the G-20. The vast majority of investments in Australia—82 percent, or $4 billion—were directed toward the solar sector, primarily for small residential projects, which accounted for 700 MW of the 1,000 MW of clean energy added in 2011. An additional 285 MW of wind capacity was installed, although investment in the wind sector fell sharply to less than $800 million. Australia recorded the third-highest level of clean energy investment per unit of overall economic output. The nation ranks fourth in terms of five-year rate of investment growth and ninth for five-year rate of growth in clean generation capacity. In 2011, Australia adopted a carbon tax, which is scheduled to take effect in July 2012. This policy could spur the additional investment needed to achieve the nation's target of 20 percent renewable energy in 2020.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



Finance and Investment (2011)

Total Investment	$4.9 billion
G-20 Investment Rank	13
Percentage of G-20 Total	2.2%
5-Year Growth Rate	28%

Installed Clean Energy (2011)

Total Renewable Energy Capacity	5.2 GW
Percentage of G-20 Total	1%
5-Year Growth Rate	29%
Key Renewable Energy Sectors	
Wind	2.3 GW
Biomass & Waste	0.06 GW
Solar	1.3 GW

Key Clean Energy Targets (2020)

Renewable energy	20% of total consumption

Key Investment Incentives

Solar	Generation-based subsidies
All Renewable Energy	Green certificates Equity fund—venture capital for small renewable energy companies

National Clean Energy Policies

✔ Carbon Cap	✔ Auto Efficiency Standards
✔ Carbon Market	✔ Feed-In Tariffs
✔ Renewable Energy Standard	Government Procurement
Clean Energy Tax Incentives	Green Bonds

BRAZIL

Finance and Investment (2011)	
Total Investment	$8 billion
G-20 Investment Rank	10
Percentage of G-20 Total	3.6%
5-Year Growth Rate	14%

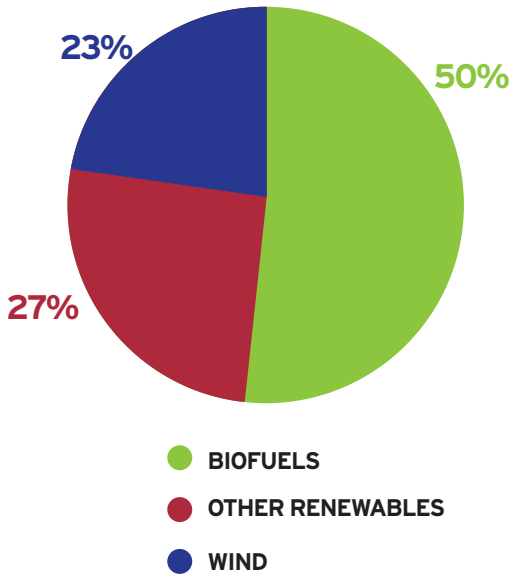
Installed Clean Energy (2011)	
Total Renewable Energy Capacity	15.3 GW
Percentage of G-20 Total	3%
5-Year Growth Rate	49%
Key Renewable Energy Sectors	
Bioethanol (mLpa)	36 Billion
Biomass	8.7 GW
Small-Hydro	5 GW

Key Clean Energy Targets (2012)	
Wind	1.8 GW
Ethanol	20% of total gasoline consumption
Biodiesel	5% of total diesel consumption

Key Investment Incentives	
Wind	Generation-based subsidies / Preferential BNDES loans/ Transmission and distribution taxes discount / Tax incentives
Small-Hydro	Generation-based subsidies / Preferential BNDES loans/ Transmission and distribution taxes discount / Tax incentives
Biomass	Generation-based subsidies / Preferential BNDES loans/ Transmission and distribution taxes discount / Tax incentives

Clean energy investment in Brazil increased by 15 percent to $8 billion, 10th overall in the G-20. Brazil is making clear progress in its clean energy sector, which has recorded the third-fastest installed capacity growth in the past five years. Brazil surpassed 1 GW in installed wind capacity in 2011, adding 400 MW, and the sector is primed to expand in the coming years. An additional 1.9 GW of biomass was installed in 2011, making Brazil the world leader for installed capacity in this category for the first time. Brazil also remains the world leader in biodiesel output capacity. In a 2011, reverse auction for new power generation capacity, bids for 1.9 GW of wind power came in at $62/MW-h less expensive than conventional power alternatives and then wind offerings anywhere in the world.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)

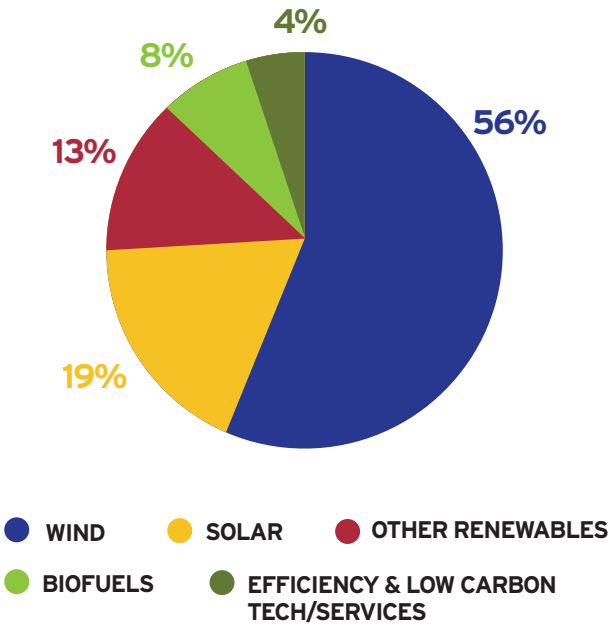


National Clean Energy Policies	
✔ Carbon Cap	✔ Auto Efficiency Standards
Carbon Market	✔ Feed-In Tariffs
✔ Renewable Energy Standard	✔ Government Procurement
✔ Clean Energy Tax Incentives	Green Bonds

CANADA

Canada's clean energy investment grew by 4 percent in 2011 to $5.5 billion. The country ranks 11th among the G-20 nations for clean energy investment but sixth in investment intensity and seventh in five-year investment growth. In addition, Canada experienced the eighth-fastest growth in installed clean energy generating capacity. In 2011, just over half of the investments in Canada were directed to wind resources ($2.8 billion), enabling addition of 1.3 GW of wind generating capacity. Thirty-seven percent of investments ($2 billion) were directed to the solar sector, where 200 MW of residential and commercial solar was installed. Almost all of the Canadian investment was in the asset finance category.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



Finance and Investment (2011)	
Total Investment	$5.5 billion
G-20 Investment Rank	11
Percentage of G-20 Total	2.4%
5-Year Growth Rate	22%

Installed Clean Energy (2011)	
Total Renewable Energy Capacity	9.6 GW
Percentage of G-20 Total	1.9%
5-Year Growth Rate	32%
Key Renewable Energy Sectors	
Wind	5.4 GW
Small-Hydro	2 GW
Biomass & Waste	1.8 GW
Solar	0.47 GW

Key Clean Energy Targets (2020)	
Wind(Quebec)	4.7 GW
Solar	0.5 GW

Key Investment Incentives*	
Wind, Solar, Biomass	Generation-based subsidies / Preferential loans

*Incentives primarily through provincial governments

National Clean Energy Policies			
	Carbon Cap	✔	Auto Efficiency Standards
	Carbon Market		Feed-In Tariffs
	Renewable Energy Standard		Government Procurement
✔	Clean Energy Tax Incentives		Green Bonds

CHINA

Finance and Investment (2011)	
Total Investment	$45.5 billion
G-20 Investment Rank	2
Percentage of G-20 Total	20.2%
5-Year Growth Rate	37%

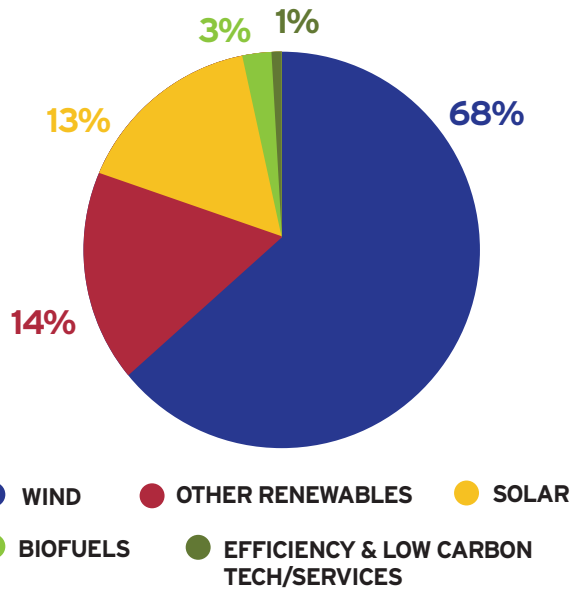
Installed Clean Energy (2011)	
Total Renewable Energy Capacity	133
Percentage of G-20 Total	26%
5-Year Growth Rate	92%
Key Renewable Energy Sectors	
Wind	64 GW
Small-Hydro	62 GW
Biomass & Waste	4 GW
Solar PV	3 GW

Key Clean Energy Targets (2020)	
Wind	160 GW
Biomass & WTE	30 GW
Solar	50 GW

Key Investment Incentives	
Wind	Fixed feed-in tariff
Renewable Energy	Renewable energy surcharge and subsidy scheme
Solar	Fixed feed-in tariff, rooftop and building integrated PV subsidy, photovoltaic tax subsidies

China attracted $45.4 billion worth of clean energy investments in 2011, which was 1 percent above 2010 levels, dropping the country from the G-20 lead to second place for the first time in three years. China continued to attract significant investment in wind, which totaled $29 billion in 2011, spurring deployment of 20 GW of wind capacity. China also leads in a number of categories, including overall installed capacity, headed by a world-leading 64 GW of wind capacity and 62 GW of small-hydro power. It ranks third in five-year investment growth, first in installed generating capacity in 2011 and over the past five years, and third in investment intensity. Investments in solar energy increased to $11.3 billion, and 2.3 GW of capacity was installed in 2011, most of it utility-scale projects. China's recent adoption of solar incentives and targets could be critical to the worldwide industry in the years ahead.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)

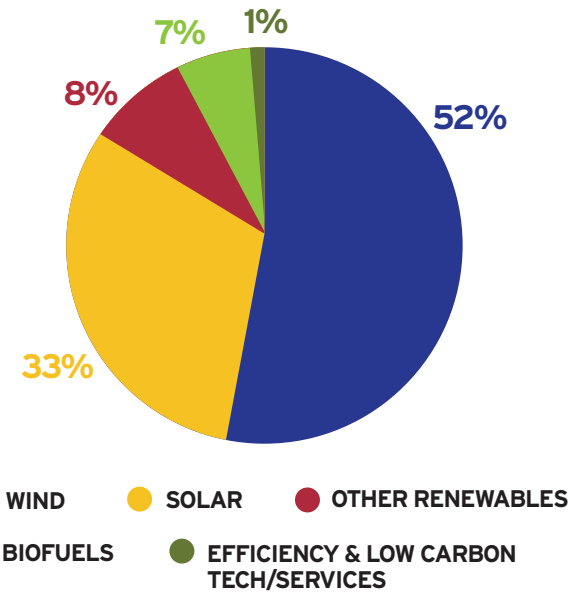


National Clean Energy Policies			
	Carbon Cap	✔	Auto Efficiency Standards
✔	Carbon Market	✔	Feed-In Tariffs
✔	Renewable Energy Standard		Government Procurement
✔	Clean Energy Tax Incentives	✔	Green Bonds

FRANCE

France in 2011 experienced 36 percent growth in clean energy investments, which increased to $5 billion, the fifth-highest growth rate in the G-20. The solar sector in France grew significantly, with installations increasing 145 percent over 2010 levels to 1.6 GW, including 600 MW of utility-scale solar. More than 80 percent of the clean energy investments in France went to the solar sector, which received $4.4 billion. Investment was fairly evenly split between asset finance and small distributed capacity. France also added 700 MW of wind capacity and is No. 7 in the G-20 for five-year rate of growth in installed clean energy capacity. The nation adopted solar photovoltaic feed-in tariffs and is placing a priority on development of offshore wind and energy efficiency resources in the coming years.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



Finance and Investment (2011)	
Total Investment	$5 billion
G-20 Investment Rank	5
Percentage of G-20 Total	2.2%
5-Year Growth Rate	0.1%

Installed Clean Energy (2011)	
Total Renewable Energy Capacity	18 GW
Percentage of G-20 Total	3.5%
5-Year Growth Rate	41%
Key Renewable Energy Sectors	
Wind	6.3 GW
Small-Hydro	7.6 GW
Solar PV	2.7 GW
Biomass & Waste	0.84 GW

Key Clean Energy Targets	
Renewable Energy	23% of final energy consumption by 2020
Transportation	Renewable energy 10% of transportation energy by 2020
Efficiency	20% reduction in primary energy consumption

Key Investment Incentives	
Wind, Solar	Feed-in tariffs
RE Equipment	Tax credit for RE equipment used for residential power
Tender offers	Offshore wind 6 GW 2011-12; PV larger than 100 kW is preferred by ap
Efficiency	Energy saving certificate program

National Clean Energy Policies

✔ Carbon Cap	✔ Auto Efficiency Standards
✔ Carbon Market	✔ Feed-In Tariffs
Renewable Energy Standard	✔ Government Procurement
✔ Clean Energy Tax Incentives	Green Bonds

GERMANY

Finance and Investment (2011)

Total Investment	$30.6 billion
G-20 Investment Rank	3
Percentage of G-20 Total	14%
5-Year Growth Rate	20%

Installed Clean Energy (2011)

Total Renewable Energy Capacity	61 GW
Percentage of G-20 Total	12%
5-Year Growth Rate	19%
Key Renewable Energy Sectors	
Wind	29 GW
Solar	25 GW
Biomass & Waste	5.7 GW
Small-Hydro	1.9 GW

Key Clean Energy Targets (2020)

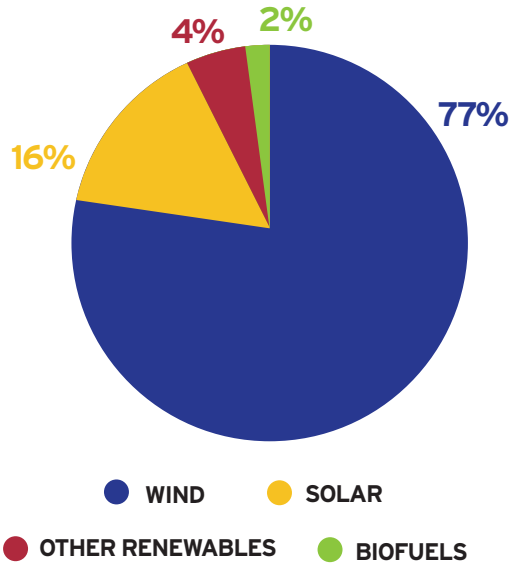
Renewable Energy	23% of final energy consumption by 2020
Transportation	Renewable energy 10% of transportation energy by 2020

Key Investment Incentives

Wind, Solar, Biomass	Feed-in tariffs (accelerated FiT for offshore wind)
Biofuels	Biofuel blending requirement
Renewable heating	Market incentives

Germany attracted 5 percent less investment in 2011 than in 2010, garnering $30.6 billion. This decline shifted Germany's rank from second to third place in the G-20. However, investment levels were significant enough to spur deployment of 7.5 GW of solar generating capacity, the same level recorded in 2010. More than two-thirds of the installed solar constituted small, commercial projects. Sixty-five percent of investment in Germany was directed toward solar, with 29 percent ($8.5 billion) directed to wind. In addition, 700 MW of biomass capacity was added in 2011. Germany is second in the G-20 for investment intensity and third in installed capacity. The country's curtailment of solar incentives could be mitigated by its decision to accelerate the phaseout of nuclear generating capacity by 2022.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



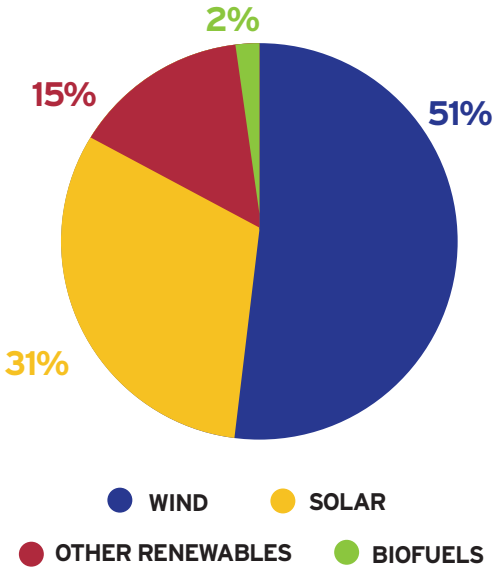
National Clean Energy Policies

- ✔ Carbon Cap
- ✔ Carbon Market
- Renewable Energy Standard
- ✔ Clean Energy Tax Incentives
- ✔ Auto Efficiency Standards
- ✔ Feed-In Tariffs
- ✔ Government Procurement
- Green Bonds

INDIA

India's clean energy sector was the second-fastest-growing in the G-20 in 2011, with investments increasing 54 percent to $10.2 billion. Solar energy investments were up sevenfold, and installed capacity increased 10 times above 2010 levels. In the utility solar category, about 300 MW of capacity was added, and 46 MW was installed in residential solar. Wind energy capacity additions were a record 2.8 GW. These numbers reflect balanced investments in India, where 45 percent of financing ($4.6 billion) was directed to wind resources and 41 percent ($4.2 billion) went to solar. India's growth propelled it from 10th to sixth place in the G-20, and the country ranks fifth in terms of five-year investment growth.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



Finance and Investment (2011)	
Total Investment	$10.2 billion
G-20 Investment Rank	6
Percentage of G-20 Total	4.5%
5-Year Growth Rate	23%

Installed Clean Energy (2011)	
Total Renewable Energy Capacity	22.4 GW
Percentage of G-20 Total	4.4%
5-Year Growth Rate	21%
Key Renewable Energy Sectors	
Wind	15.7 GW
Small-Hydro	3.2 GW
Biomass & Waste	3 GW
Solar	0.4 GW

Key Clean Energy Targets (2012)	
Wind	17.6 GW
Solar	3.4 GW
Biomass	2.8 GW

Key Investment Incentives*	
Wind, Solar	Feed-in tariffs, Renewable
Small-Hydro, Biomass	Accelerated depreciation of 80% in year one
Renewable Energy	Preferential tax rate of 15% instead of the standard 30%
National Goal	"National Solar Mission"which aims to deploy 20 GW of solar energy by 2020

National Clean Energy Policies			
	Carbon Cap	✔	Auto Efficiency Standards
	Carbon Market		Feed-In Tariffs
	Renewable Energy Standard	✔	Government Procurement
✔	Clean Energy Tax Incentives	✔	Green Bonds

*Incentives primarily through provincial investments

INDONESIA

Finance and Investment (2011)	
Total Investment	$1 billion
G-20 Investment Rank	14
Percentage of G-20 Total	0.4%
5-Year Growth Rate	53%

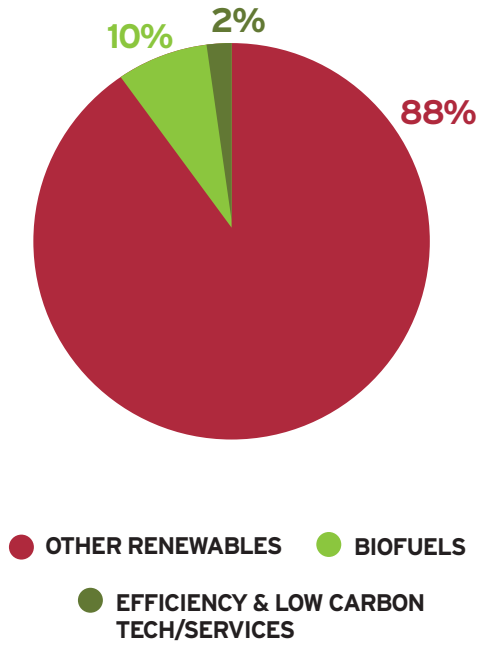
Installed Clean Energy (2011)	
Total Renewable Energy Capacity	1.2 GW
Percentage of G-20 Total	0.2%
5-Year Growth Rate	8%
Key Renewable Energy Sectors	
Biodiesel (mLpa)	2,437
Geothermal	1 GW
Small-Hydro	0.2 GW

Key Clean Energy Targets (2025)	
Geothermal	9.5 GW
Wind	970 MW
Solar	870 MW
Renewable Energy Power	15% of all electricity to be sourced from clean energy

Key Clean Energy Incentives	
Geothermal	Preferential tariffs, no import duties or VAT, income tax reduction
Renewable Energy Power	Preferential tariff for projects below 10MW, import duty and VAT exemption, income tax reduction, guaranteed purchase of renewable power by state utilities

Indonesia recorded 520 percent growth in attracting clean energy investments in 2011, the fastest rate among G-20 member nations. Overall, more than $1 billion was invested in clean energy assets in Indonesia in 2011. The country has an estimated 40 percent of the world's known geothermal energy resource, and 2011 investments were guided toward developing this natural source of heat. Indonesia's rapid 2011 growth increased its five-year growth rate, ranking it second among G-20 nations in that category.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)

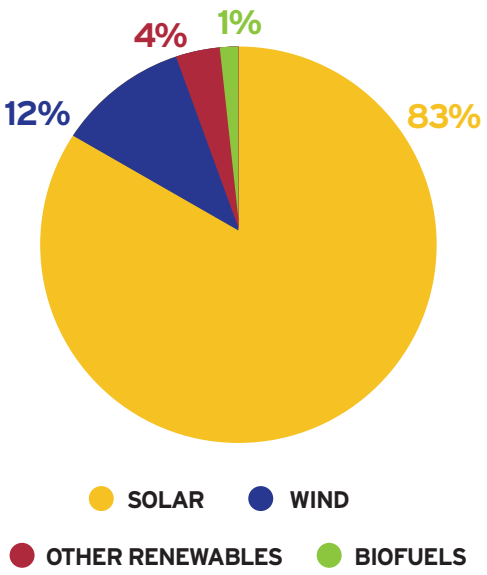


National Clean Energy Policies	
	Carbon Cap
	Carbon Market
✔	Renewable Energy Standard
✔	Clean Energy Tax Incentives
	Auto Efficiency Standards
✔	Feed-In Tariffs
✔	Government Procurement
	Green Bonds

ITALY

Italy continued to distinguish itself as one of the world's most dynamic solar markets, with overall clean energy investment rising 38.4 percent to a record $28 billion. Almost all of these investments were directed toward development of solar energy, propelling installation of 8 GW of generating capacity, more than half of it small commercial projects, but also a world-leading 2.2 GW of utility-scale generating capacity. The country also installed 1 GW of wind. Italy now ranks fourth in the G-20 for clean energy investment, first in five-year rate of investment growth, first in investment intensity, and sixth in installed clean energy capacity. Whereas other European nations have significantly curtailed renewable energy incentives in view of budget pressures, Italy has protected these incentives in hopes of stimulating economic growth.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



Finance and Investment (2011)	
Total Investment	$28 billion
G-20 Investment Rank	4
Percentage of G-20 Total	12.4%
5-Year Growth Rate	89%

Installed Clean Energy (2011)	
Total Renewable Energy Capacity	28 GW
Percentage of G-20 Total	5.5%
5-Year Growth Rate	47%
Key Renewable Energy Sectors	
Solar	12.4 GW
Small-Hydro	5.8 GW
Biomass & Waste	1.9 GW
Geothermal	0.87 GW
Wind	6.7 GW

Key Clean Energy Targets (2020)	
Renewable Energy	17% of final energy consumption by 2020
Transportation	Renewable energy 10% of transportation energy by 2020

Key Investment Incentives	
Wind, Solar, Biomass	Feed-in tariffs
Renewable Energy	Green certificates
Energy Efficiency	Energy efficiency credits

National Clean Energy Policies

- ✔ Carbon Cap
- ✔ Carbon Market
- ✔ Renewable Energy Standard
- ✔ Clean Energy Tax Incentives
- ✔ Auto Efficiency Standards
- ✔ Feed-In Tariffs
- ✔ Government Procurement
- Green Bonds

JAPAN

Finance and Investment (2011)	
Total Investment	$8.6 billion
G-20 Investment Rank	8
Percentage of G-20 Total	4%
5-Year Growth Rate	22%

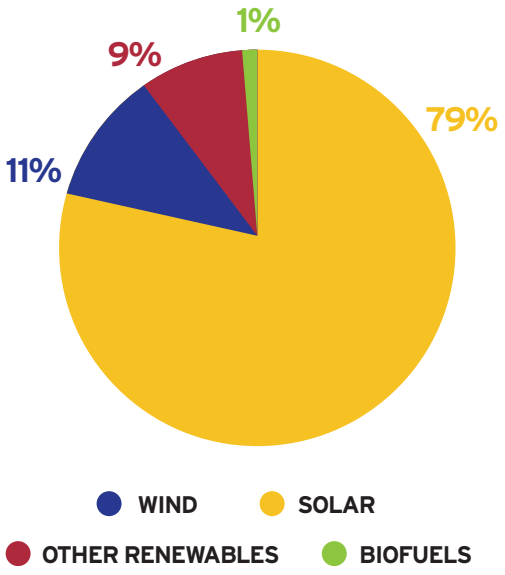
Installed Clean Energy (2011)	
Total Renewable Energy Capacity	24 GW
Percentage of G-20 Total	4.7%
5-Year Growth Rate	16%
Key Renewable Energy Sectors	
Small-Hydro	13.2 GW
Solar	5 GW
Biomass & Waste	3.3 GW
Wind	2.5 GW
Geothermal	0.55 GW

Key Clean Energy Targets (2020)	
Wind	5 GW
Solar	28 GW

Key Investment Incentives	
Solar	Residential feed-in tariff
Energy Efficiency	Energy bank: Fund for energy efficiency and CO_2

Against the backdrop of the disaster at the Fukushima nuclear power plant, clean energy investment in Japan increased by 23 percent to $8.6 billion, perhaps foreshadowing future growth as the nation moves away from nuclear power. Ninety-four percent of clean energy investment in Japan went to the solar sector, mostly for small distributed capacity, including 1.1 GW in the residential sector. An additional 190 MW of commercial solar was deployed as well, along with 150 MW of wind. Legislation adopted in the wake of the Fukushima disaster established feed-in tariffs for wind, solar, and geothermal energy resource development.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)

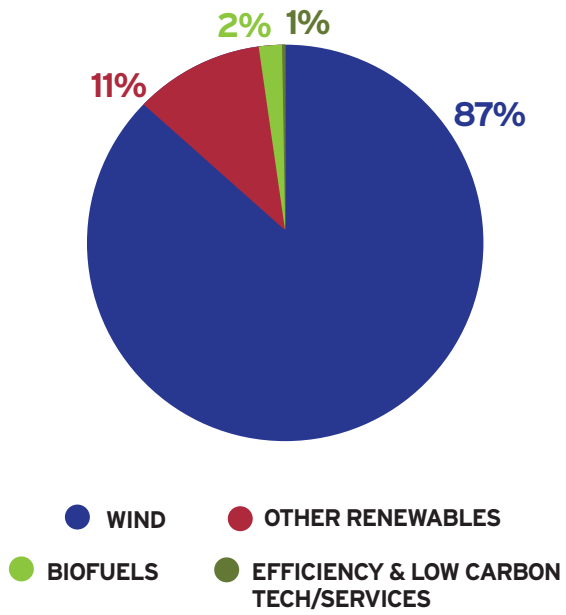


National Clean Energy Policies			
	Carbon Cap	✔	Auto Efficiency Standards
	Carbon Market	✔	Feed-In Tariffs
✔	Renewable Energy Standard		Government Procurement
✔	Clean Energy Tax Incentives	✔	Green Bonds

MEXICO

After a record $2 billion level of investment in 2010, clean energy financing in Mexico collapsed in 2011, falling 97 percent to only $46 million. Some of the decline is the result of the conclusion of some large project financings in 2010. Several major projects were announced in 2011 but were not completed and do not appear in 2011 investments. About 300 MW of wind generating capacity, Mexico's leading source of clean energy, was added in 2011. Mexico's uneven performance in the clean energy sector is reflected in its absence from any top-10 rankings among the G-20 countries.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



Finance and Investment (2011)	
Total Investment	$46 million
G-20 Investment Rank	18
Percentage of G-20 Total	0.02%
5-Year Growth Rate	-7.5%

Installed Clean Energy (2011)	
Total Renewable Energy Capacity	2.6 GW
Percentage of G-20 Total	0.5%
5-Year Growth Rate	17%
Key Renewable Energy Sectors	
Wind	1.3 GW
Geothermal	0.95 GW

Key Clean Energy Targets (2012)	
Renewable Energy	35% by 2024
Ethanol	25% of total gasoline consumption
Bio-diesel	5% of total diesel consumption

Key Investment Incentives	
Wind	Generation-based subsidies
Geothermal	Generation-based subsidies
Biomass	Generation-based subsidies
Renewable Energy	Full depreciation of renewable generation assets after 5 years

National Clean Energy Policies

Carbon Cap		Auto Efficiency Standards	
Carbon Market		Feed-In Tariffs	
Renewable Energy Standard	✔	Government Procurement	
Clean Energy Tax Incentives		Green Bonds	

SOUTH AFRICA

Finance and Investment (2011)	
Total Investment	$16 million
G-20 Investment Rank	19
Percentage of G-20 Total	0.01%
5-Year Growth Rate	-34%

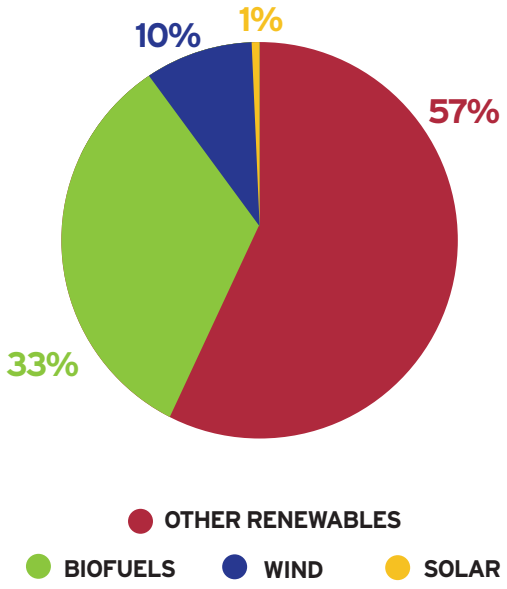
Installed Clean Energy (2011)	
Total Renewable Energy Capacity	29 MW
Percentage of G-20 Total	0.006%
5-Year Growth Rate	0
Key Renewable Energy Sectors	
Wind	8 MW
Small-Hydro	11 MW

Key Clean Energy Targets (2011)	
Renewable Energy (MW)	17.8 GW by 2030
Ethanol	5% of total gasoline consumption
Bio-diesel	2% of total diesel consumption
Demand Response Aggregation Pilot Programme (DRAPP)	500 MW by 2013

Key Investment Incentives	
Wind, Solar, Small-Hydro, Biomass	Government Procurement

Clean energy investment in South Africa remains insignificant, totaling $26 million in 2010, second-lowest in the G-20. Investment in 2011 was lower because of a strong focus by the Department of Energy on restructuring renewable energy policy, targets, and incentives. In June 2011, the South African government scrapped the renewable energy feed-in tariff mechanism in favor of a renewable energy tender program. In December 2011, 28 renewable energy projects were granted preferred bidder status, including 634 MW of wind energy; 632 MW of solar PV; and 150 MW of solar thermal. The investment value of the renewable tender program is projected to be $10 billion to $12 billion by 2016.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



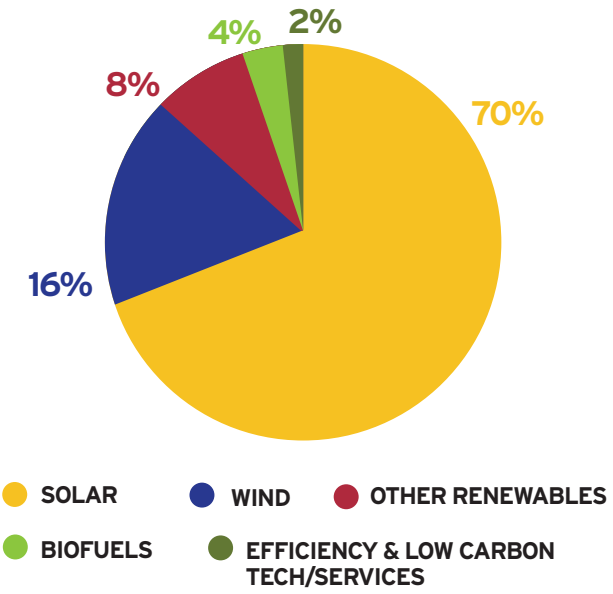
National Clean Energy Policies

	Carbon Cap		Auto Efficiency Standards
	Carbon Market		Feed-In Tariffs
	Renewable Energy Standard	✔	Government Procurement
	Clean Energy Tax Incentives		Green Bonds

SOUTH KOREA

Clean energy investment in South Korea declined 43 percent to $333 million in 2011. Although the country has placed a priority on clean energy manufacturing, low levels of investment in clean energy deployment persist. South Korea ranks 15th among G-20 nations for overall clean energy investment. Ninety percent of its clean energy investments are in the solar sector. More than 150 MW of solar generating capacity was added in 2011, mostly utility-scale projects. 50 MW of wind also was added.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



Finance and Investment (2011)	
Total Investment	$333 million
G-20 Investment Rank	15
Percentage of G-20 Total	0.1%
5-Year Growth Rate	-9%

Installed Clean Energy (2011)	
Total Renewable Energy Capacity	1.7 GW
Percentage of G-20 Total	0.3%
5-Year Growth Rate	43%
Key Renewable Energy Sectors	
Biomass	0.14 GW
Solar	0.82 GW
Small-Hydro	0.07 GW
Wind	0.43 GW

Key Clean Energy Targets (2011)	
Wind	2.2 GW
Solar	1.3 GW

Key Investment Incentives	
Wind, Solar	Residential installation support
Renewable Energy	Feed-in tariffs

National Clean Energy Policies			
	Carbon Cap	✔	Auto Efficiency Standards
✔	Carbon Market	✔	Feed-In Tariffs
✔	Renewable Energy Standard	✔	Government Procurement
✔	Clean Energy Tax Incentives	✔	Green Bonds

SPAIN*

Finance and Investment (2011)	
Total Investment	$8.6 billion
G-20 Investment Rank	9
Percentage of G-20 Total	4%
5-Year Growth Rate	5.9%

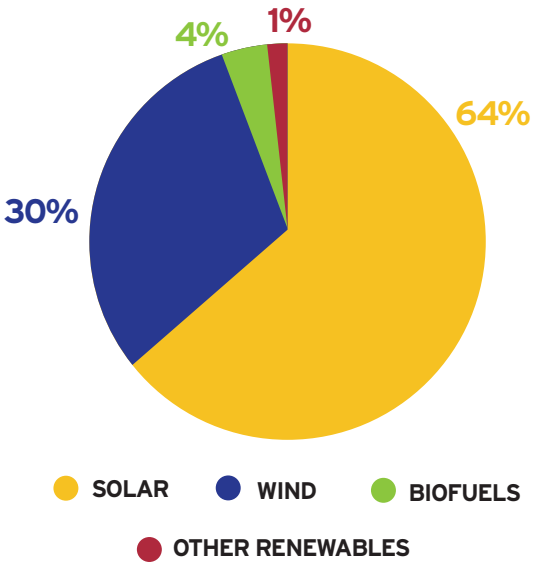
Installed Clean Energy (2011)	
Total Renewable Energy Capacity	32 GW
Percentage of G-20 Total	6.3%
5-Year Growth Rate	18%
Key Renewable Energy Sectors	
Wind	22 GW
Biomass & Waste	0.9 GW
Small-Hydro	4.4 GW
Solar	5.3 GW

Key Clean Energy Targets (2020)	
Renewable Energy	20.8% of final energy consumption by 2020
Biofuels	10% of transportation consumption by 2020

Key Investment Incentives	
Wind, Solar, Biomass	Feed-in tariffs – suspended
Biomass Cogeneration	Preferential loans of up to 1.5 million euros
Biofuels	Exempt from hydro-carbon tax until 2012

Spain bounced back from sharp investment declines in 2010 to record 25 percent growth in the clean energy sector, attracting $8.6 billion in 2011. Almost 90 percent of investment ($7.6 billion) was directed toward asset finance in the solar sector, spurring addition of almost 700 MW of new solar generating capacity. In addition, 1 GW of wind generating capacity came online in 2011. Spain has been one of the most important clean energy markets in the world, ranking fifth in installed generating capacity. The suspension of renewable energy feed-in tariffs in 2012 and ongoing priority placed on austerity measures could curtail future investments in the sector. To prevent a collapse, Spanish authorities are exploring a move from incentives to net metering policies that would encourage small project development.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



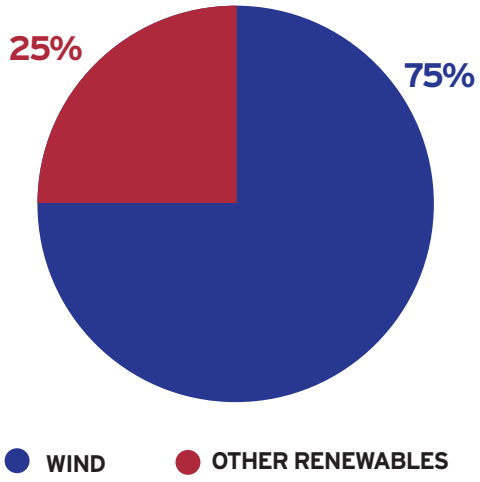
National Clean Energy Policies	
✔ Carbon Cap	✔ Auto Efficiency Standards
✔ Carbon Market	Feed-In Tariffs
Renewable Energy Standard	✔ Government Procurement
✔ Clean Energy Tax Incentives	Green Bonds

*Spain is not a G-20 member, but it is an important clean energy player within the EU.

TURKEY

Turkey was one of the most rapidly developing clean energy markets until 2011, when investments declined 74 percent, falling to $284 million. Fifty-six percent of that investment went toward deployment of wind assets. The Turkish government recently adopted policies to spur domestic production of wind turbines as the country deployed 470 MW of wind in 2011. Renewable energy investments should increase in coming years as the country struggles to mobilize the $130 billion worth of investment that will be needed to keep up with rising energy demand through 2020.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



Finance and Investment (2011)	
Total Investment	$284 million
G-20 Investment Rank	16
Percentage of G-20 Total	0.1%
5-Year Growth Rate	-0.5%

Installed Clean Energy (2011)	
Total Renewable Energy Capacity	4.2 GW
Percentage of G-20 Total	0.8%
5-Year Growth Rate	85%
Key Renewable Energy Sectors	
Small-Hydro	2.5 GW
Wind	1.6 GW

Key Clean Energy Targets (2020)	
Wind	15 GW
Renewable Energy	25% of energy consumption by 2020

Key Investment Incentives	
Wind, Solar, Geothermal	25% of generation by 2020
Wind	Equipments exempt from VAT and customs duty

National Clean Energy Policies

	Carbon Cap		Auto Efficiency Standards
	Carbon Market	✔	Feed-In Tariffs
✔	Renewable Energy Standard	✔	Government Procurement
✔	Clean Energy Tax Incentives		Green Bonds

UNITED KINGDOM

Finance and Investment (2011)	
Total Investment	$9.4 billion
G-20 Investment Rank	7
Percentage of G-20 Total	4.2%
5-Year Growth Rate	11.7%

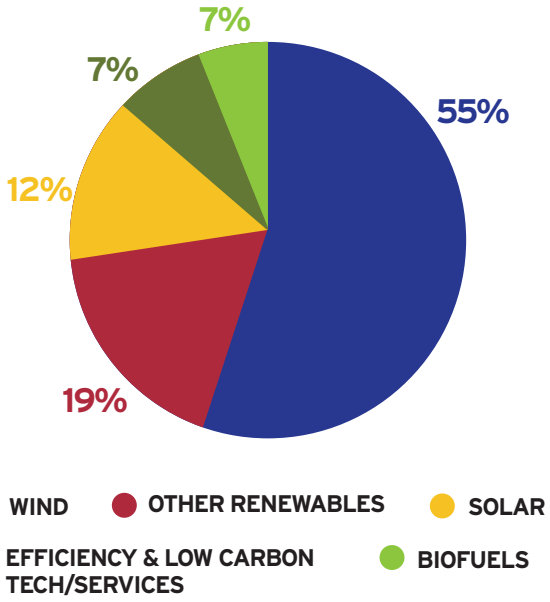
Installed Clean Energy (2011)	
Total Renewable Energy Capacity	10.7 GW
Percentage of G-20 Total	2%
5-Year Growth Rate	24%
Key Renewable Energy Sectors	
Wind	6.5 GW
Biomass & Waste	2 GW
Solar	0.3 GW
Small-Hydro	0.99 GW

Key Clean Energy Targets (2020)	
Renewable Energy	15% of final energy consumption by 2020
Transportation	Renewable energy 10% of total transportation energy by 2020

Key Investment Incentives	
Renewable Energy	Feed-in tariffs for small-scale projects; green certificate for large-scale projects
Energy Efficiency	Green Deal building efficiency incentives
Biofuels	Renewable Transport Fuel Obligation, a blending mandate and certificate program aiming for 5% renewable fuel by 2013-14

Clean energy investments rebounded in the United Kingdom during 2011. Overall investment in the sector increased 35 percent to $9.4 billion, seventh in the G-20. More than half of the investments were in solar resources ($4.8 billion), and 25 percent ($2.3 billion) went to wind energy. Results in 2011 were enhanced as investors rushed to initiate projects before policy reforms go into effect that could curtail incentives. Public- and private-sector leaders in the U.K. continue to explore development of abundant offshore wind resources, which could compel significant future investments. More than 800 MW of wind generating capacity was added In 2011, along with 300 MW of solar and 500 MW of biomass.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)

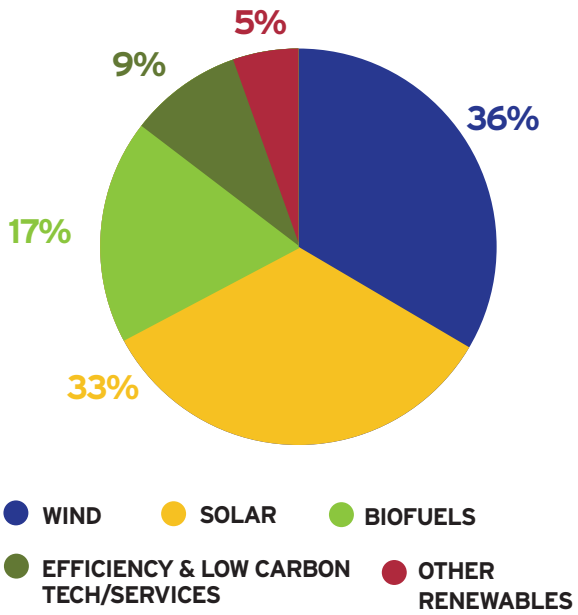


National Clean Energy Policies	
✔ Carbon Cap	✔ Auto Efficiency Standards
✔ Carbon Market	✔ Feed-In Tariffs
✔ Renewable Energy Standard	✔ Government Procurement
✔ Clean Energy Tax Incentives	Green Bonds

UNITED STATES

The United States in 2011 reclaimed G-20 leadership for overall clean energy investments, which grew by 42 percent to $48.1 billion. A world-leading $30 billion was invested in solar energy resources, including several large utility-scale projects. For the first time, the United States installed more than 1 GW of solar energy capacity in just a year. The country led the G-20 in attracting the greatest levels of investment in the efficiency, biofuel, and solar sectors. The wind sector alone attracted $9.2 billion. Investment growth in 2011 helped move the United States higher in many of the top-10 rankings for investment and capacity growth. But the U.S. clean energy sector will be hard-pressed to sustain 2011's record levels with the expiration of Treasury grants, the Department of Energy's loan guarantee programs, and other stimulus initiatives. Significant policy uncertainty also undermines investor confidence in 2012.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



Finance and Investment (2011)	
Total Investment	$48 billion
G-20 Investment Rank	1
Percentage of G-20 Total	21.4%
5-Year Growth Rate	11.6%

Installed Clean Energy (2011)	
Total Renewable Energy Capacity	93 GW
Percentage of G-20 Total	18%
5-Year Growth Rate	28%
Key Renewable Energy Sectors	
Wind	47 GW
Small-Hydro	25.3 GW
Biomass & Waste	13 GW
Solar	4.6 GW
Geothermal	3.3 GW

Key Clean Energy Targets (2020)	
Biofuels	36 billion gallons by 2020

Key Investment Incentives *	
Wind, Solar	Production Tax Credit / Investment Tax Credit
Solar, Biomass, Geothermal, Fuel Cells	Business Energy Investment Tax Credit

*Incentives provided by local, state, and federal goverments

National Clean Energy Policies			
	Carbon Cap	✔	Auto Efficiency Standards
	Carbon Market		Feed-In Tariffs
	Renewable Energy Standard	✔	Government Procurement
✔	Clean Energy Tax Incentives		Green Bonds

OTHER EU-27*

Finance and Investment (2011)	
Total Investment	$11 billion
G-20 Investment Rank	5
Percentage of G-20 Total	5%
5-Year Growth Rate	11.7%

Installed Clean Energy (2011)	
Total Renewable Energy Capacity	60GW
Percentage of G-20 Total	12%
5-Year Growth Rate	22%
Key Renewable Energy Sectors	
Wind	22 GW
Small-Hydro	11.7 GW
Biomass	7.2 GW

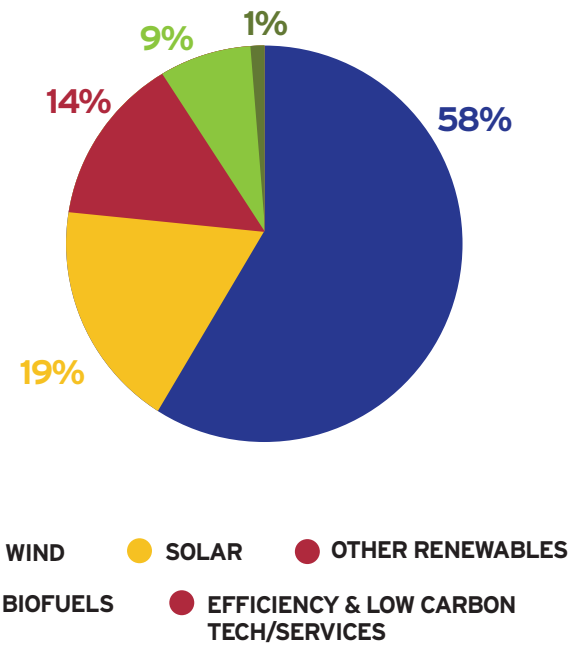
Key Clean Energy Targets (2020)	
Renewable Power	20% of final consumption by 2020 differentiated
Biofuels	10% of total transportation sector by 2020

Key Investment Incentives	
Portugal	Green certificates, preferential loans, investment grants
Greece	Feed-in tariffs, tax incentives
Netherlands	Green premiums, investment subsidies

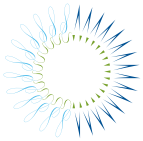
* Does not include data for Spain.

In the European Union countries not profiled independently in this report, investments declined 27 percent to $11.1 billion. Budget austerity across the region led to reduced national incentives and policy reforms. These countries directed $7.4 billion to wind resources (67 percent) and $2.6 billion (23 percent) to solar energy. Together, they now account for 51 GW of renewable energy generating capacity. The ongoing debt crisis in Europe is likely to make it difficult to sustain the region's clean energy investments in coming years.

DISTRIBUTION OF INVESTMENT BY SECTOR (2005-11)



National Clean Energy Policies	
✔ Carbon Cap	✔ Auto Efficiency Standards
✔ Carbon Market	✔ Feed-In Tariffs
✔ Renewable Energy Standard	✔ Government Procurement
✔ Clean Energy Tax Incentives	Green Bonds



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