Frankfurt School
FS-UNEP Collaborating Centre
for Climate & Sustainable Energy Finance



GLOBAL TRENDS IN RENEWABLE ENERGY INVESTMENT 2015

Bloomberg
NEW ENERGY FINANCE

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METHODOLOGY AND DEFINITIONS

All figures in this report, unless otherwise credited, are based on the output of the Desktop of Bloomberg New Energy Finance – an online portal to the world's most comprehensive database of investors, projects and transactions in clean energy.

The Bloomberg New Energy Finance Desktop collates all organisations, projects and investments according to transaction type, sector, geography and timing. It covers many tens of thousands of organisations (including start-ups, corporate entities, venture capital and private equity providers, banks and other investors), projects and transactions.

METHODOLOGY

The following renewable energy projects are included: all biomass and waste-to-energy, geothermal, and wind generation projects of more than 1MW; all hydropower projects of between 1MW and 50MW; all wave and tidal energy projects; all biofuel projects with a capacity of one million litres or more per year; and all solar projects, with those less than 1MW estimated separately and referred to as small-scale projects, or small distributed capacity, in this report.

The 2015 Global Trends report concentrates on renewable power and fuels and does not cover energy-smart technologies such as smart grid, electric vehicles and power storage – except in the box at the end of Chapter 2.

The main body of the report also does not cover large hydro-electric projects of more than 50MW, since this technology has been mature for decades and is at a very different stage of its roll-out than, for instance, wind or solar. However there is coverage of large hydro in the box at the end of Chapter 5.

Where deal values are not disclosed, Bloomberg New Energy Finance assigns an estimated value based on comparable transactions. Deal values are rigorously back-checked and updated when further information is released about particular companies and projects. The statistics used are historic figures, based on confirmed and disclosed investment.

Annual investment in small-scale and residential projects such as rooftop solar is estimated. These figures are based on annual installation data, provided by industry associations and REN21. Bloomberg New Energy Finance continuously monitors investment in renewable energy. 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.

This 2015 report contains revisions to a number of investment figures published in the 2014 UNEP Global Trends In Renewable Energy Investment report. Revisions reflect improvements made by Bloomberg New Energy Finance to its data during the course of the last 12 months, and also new transactions in 2013 and before that have since come to light.

DEFINITIONS

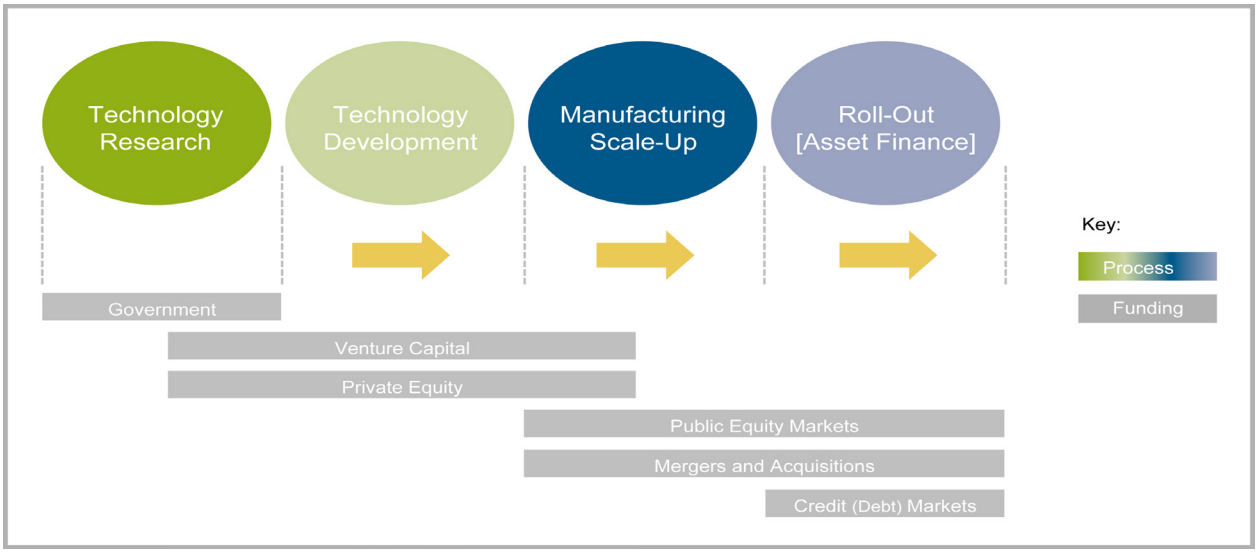
Bloomberg New Energy Finance tracks deals across the financing continuum, from R&D funding and venture capital for technology and early-stage companies, through to public market financing for projects and mature companies. Investment categories are defined as follows:

Venture capital and private equity (VC/PE): all money invested by venture capital and private equity funds in the equity of companies developing renewable energy technology. Similar investment in companies setting up generating capacity through special purpose vehicles is counted in the asset financing figure.

Public markets: all money invested in the equity of publicly quoted companies developing renewable energy technology and clean power generation.

Asset finance: all money invested in renewable energy generation projects (excluding large hydro), whether from internal company balance sheets, from loans, or from equity capital. This excludes refinancings.

Mergers and acquisitions (M&A): the value of existing equity and debt purchased by new corporate buyers, in companies developing renewable energy technology or operating renewable power and fuel projects.



REN21's **Renewables Global Status Report (GSR)**, first released in 2005, grew out of an effort to comprehensively capture the full status of renewable energy worldwide. Over the years, the GSR has expanded in scope and depth, in parallel with tremendous advances in renewable energy markets and industries. The report is a true collaborative effort of several authors, REN21 Secretariat staff and Steering Committee members, regional research partners, and more than 500 individual contributors and reviewers; and has become the most frequently referenced report on renewable energy business and policy, serving a wide range of audiences. The GSR is a sister publication to this Global Trends in Renewable Energy Investment (GTR) report. The most recent edition of the GSR, launch date mid-June 2015, will be available at www.ren21.net/gsr

KEY FINDINGS

- Global investment in renewable power and fuels (excluding large hydro-electric projects) was $270.2 billion in 2014, nearly 17% higher than the previous year. This was the first increase for three years, and reflected several influences, including a boom in solar installations in China and Japan, totalling $74.9 billion between those two countries, and a record $18.6 billion of final investment decisions on offshore wind projects in Europe.

- The trend last year was, arguably, even more impressive than it would seem from the investment numbers, because a record number capacity of wind and solar photovoltaic power was installed, at about 95GW. This compared to 74GW in 2013, 79GW in 2012 and 70GW in 2011, the only year in which dollar investment was higher than 2014, at $278.8 billion. The main reason why investment last year was below that three years earlier was that technology costs, particularly in solar, have fallen sharply during the intervening period.

- A key feature of 2014 was the continuing spread of renewable energy to new markets. Investment in developing countries, at $131.3 billion, was up 36% on the previous year and came the closest ever to overhauling the total for developed economies, at $138.9 billion, up just 3% on the year. Indonesia, Chile, Mexico, Kenya, South Africa and Turkey were all in the billion-dollar-plus club in 2014 in terms of investment in renewables, and others such as Jordan, Uruguay, Panama, the Philippines and Myanmar were in the $500 million to $1 billion range.

- Renewables faced challenges as 2015 began – notably from policy uncertainty in markets such as the US and the UK, retroactive policy changes in countries such as Italy and Romania, and concerns about grid access for small-scale solar in Japan and some US states. The most daunting challenge was, at first sight, the impact of the 50%-plus collapse in the oil price in the second half of last year. However, although the oil price is likely to dampen investor confidence in parts of the sector, such as solar in oil-exporting countries, and biofuels, in most parts of the world, oil and renewables do not compete for power investment dollars. Wind and solar sectors should be able to carry on flourishing, particularly if they continue to cut costs per MWh.

- The cost-cutting achieved to date helped to ensure strong momentum for both those technologies in 2014. Overall investment in solar was up 29% to $149.6 billion, while that in wind advanced 11% to a record $99.5 billion. Other renewable energy sources mostly did less well, biofuels seeing an 8% fall in investment to $5.1 billion, a 10-year low; biomass and waste-to-energy dropping 10% to $8.4 billion; small hydro slipping 17% to $4.5 billion; and geothermal managing to rise 23% to $2.7 billion.

- The biggest locations for renewable energy investment last year were, predictably, the established markets in major economies – with China far out in front at $83.3 billion, a record number and 39% ahead of 2013. In second place came the US, at $38.3 billion, up 7% on the year but still well below its all-time high, reached in 2011. Third came Japan, at $35.7 billion, a tenth higher than in 2013 and its biggest total ever. India was up 14% at $7.4 billion, and Brazil 93% higher, at $7.6 billion.

- Investment in Europe advanced less than 1% to $57.5 billion. There were seven billion-dollar-plus financings of offshore wind projects, boosting the investment totals for the Netherlands, the UK and Germany. These included, at the euro equivalent of $3.8 billion, the largest single renewable energy asset finance deal ever, outside large hydro – that of the 600MW Gemini project in Dutch waters.

- Renewable energy technologies excluding large hydro made up 48% of the net power capacity added worldwide in 2014, the third successive year in which this figure has been above 40%. New investment in renewable power capacity last year, at $242.5 billion excluding large hydro, was below the gross investment in fossil fuel capacity, at some $289 billion, but far above the figure for net investment in additional fossil fuel capacity, at $132 billion.

- Altogether, wind, solar, biomass and waste-to-power, geothermal, small hydro and marine power are estimated to have contributed 9.1% of world electricity generation in 2014, compared to 8.5% in 2013. This would be equivalent to a saving of 1.3 gigatonnes of CO2 taking place as a result of the installed capacity of those renewable sources. The methodology behind this calculation is explained in Chapter 2 below.

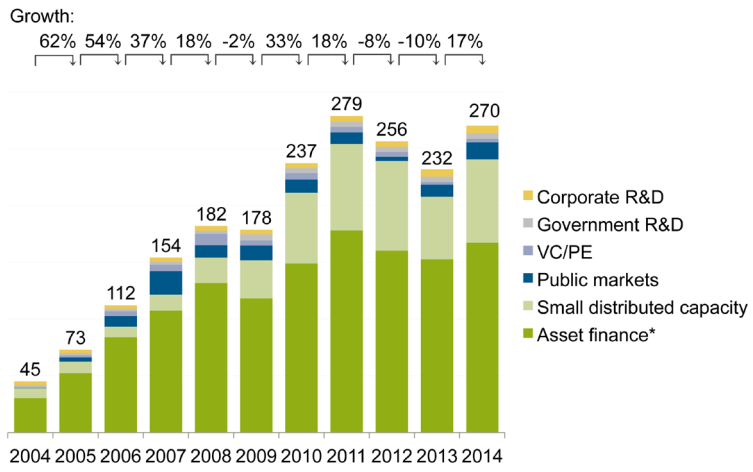
- Equity raising by renewable energy companies on public markets jumped 54% in 2014 to $15.1 billion, helped by the recovery in sector share prices between mid-2012 and March 2014, and by the popularity with investors of US "yieldcos" and their European equivalents, quoted project funds. These vehicles, owning operating-stage wind, solar and other projects, raised a total of $5 billion from stock market investors on both sides of the Atlantic in 2014.

EXECUTIVE SUMMARY

2014 was a year of eye-catching steps forward for renewable energy. Investment rallied strongly after two years of decline, renewables excluding large hydropower reached 100GW of installations for the first time ever, developing countries led by China came within just a few billion dollars of overtaking investment in developed economies, and there were record statistics for financings of solar in China and Japan and offshore wind in Europe.

It is also the case that the recent period has seen the competitive environment for renewables become even more exacting. The near-50% plunge in crude oil prices between June 2014 and March 2015 will have a direct effect on renewable energy in a few places, such as developing countries burning oil for power and biofuel markets not covered by mandates. More significant may be the indirect effect, via downward pressure on gas prices. That will lower the cost of gas-fired generation, a competitor of wind and solar in many countries. So far, renewables have been up to the challenge, with for instance January this year seeing a project in Dubai setting a clear, new record for the lowest price ever agreed for electricity from a solar photovoltaic plant. Further cuts in the cost of generation for both solar and wind look to be on the cards in 2015.

FIGURE 1. GLOBAL NEW INVESTMENT IN RENEWABLE ENERGY BY ASSET CLASS, 2004-2014, $BN



*Asset finance volume adjusts for re-invested equity. Total values include estimates for undisclosed deals

Source: UNEP, Bloomberg New Energy Finance

The top headline for renewable energy in 2014 was that investment rebounded by 17% to $270.2 billion (see Figure 1). This was the first annual increase in dollar commitments to renewables excluding large hydro for three years, and brought the total up to just 3% below the all-time record of $278.8 billion set in 2011.

The 2014 performance by renewable energy investment was arguably more impressive than that in 2011 anyway – because capital costs in wind, and particularly in solar PV, fell sharply in the intervening three years, so each billion dollars committed added up to many more MW of capacity than it did in the earlier year. Some 103GW of renewable power capacity

[1] The Emissions Gap Report 2013, UNEP, Nairobi.



excluding large hydro is estimated to have been built in 2014, compared to 86GW in 2013 and 80.5GW back in 2011. The 2014 total was dominated by wind and PV, with 49GW and 46GW respectively, both record figures.

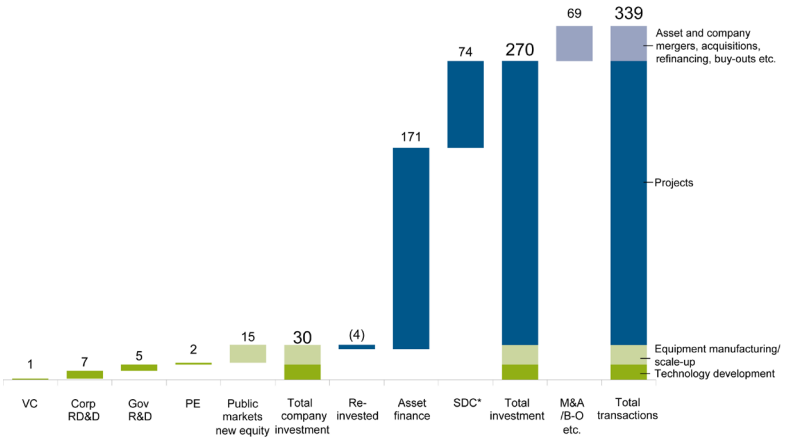
This Executive Summary looks at some of the key elements in the rebound in global renewable energy investment in 2014, and then at the continuing challenges, the role of clean power in the climate issue, and the trends in costs of generation.

SUN IN ASIA, WIND IN NORTH SEA

Figure 2 shows the elements that made up that 2014 investment figure of $270.2 billion. Starting on the left with technology-oriented funding, venture capital equity raising for renewables jumped 39% last year to $1 billion, although this remained less than half the totals achieved in 2008 and in each of the years 2010-12. Research and development spending edged up 2% in 2014 to $11.7 billion, with governments contributing $5.1 billion and companies a record $6.6 billion.

Moving along to the right on Figure 2, private equity investors pumped $1.7 billion into specialist renewable energy companies, up 20% on 2013 but still far below the $6.8 billion record set in 2008.

FIGURE 2. GLOBAL TRANSACTIONS IN RENEWABLE ENERGY, 2014, $BN



SDC = small distributed capacity. Total values include estimates for undisclosed deals. Figures may not add up exactly to totals, due to rounding.
Source: UNEP, Bloomberg New Energy Finance

Equity raising by renewable energy companies on public markets increased more sharply, by 43% to $15.1 billion, the second-highest annual figure ever, thanks partly to the 100%-plus rally in clean energy share prices from summer 2012 to March 2014.

The two biggest categories of renewable energy investment were asset finance of utility-scale projects, at $170.7 billion, up 10% on 2013, and investment in small distributed capacity, largely rooftop solar, at $73.5 billion, no less than 34% higher than in the previous year. Figure 3 provides further data on the growth in these various types of investment since 2004, and also shows the split in investment by sector.

Once again, solar and wind were runaway leaders in terms of renewable energy investment, the former accounting for $149.6 billion, the second highest figure ever and up 25% on 2013; and the latter bringing in $99.5 billion, up 11% to a new record.

Within these solar and wind totals, two features stood out last year. The first was an unprecedented solar boom in China and Japan. The two giant Asian economies invested $74.9 billion between them in solar in 2014, almost exactly half the global total, with China at $40 billion, up 45% on the previous year, and Japan at $34.8 billion, up 13%. In China, utility-scale solar projects (of more than 1MW) made up about three quarters of the solar investment, whereas in Japan, it was small-scale projects of less than 1MW that made up 81%. Chapters 1, 5 and 6 provide much more detail on the drive by these two countries to increase solar capacity.

The other big feature was European offshore wind. No fewer than seven projects costing $1 billion or more reached "final investment decision" stage during 2014, the largest being the $3.8 billion financing by 12 banks, three export credit agencies, the European Investment Bank and a Danish pension fund of the 600MW Gemini installation in waters off the coast of the Netherlands – the largest ever go-ahead for a renewable energy



FIGURE 3. GLOBAL TRENDS IN RENEWABLE ENERGY INVESTMENT 2014 DATA TABLE, $BN

Category / Year / Unit	2004 $bn	2005 $bn	2006 $bn	2007 $bn	2008 $bn	2009 $bn	2010 $bn	2011 $bn	2012 $bn	2013 $bn	2014 $bn	2012-14 Growth %	2004-14 CAGR %
1 Total Investment													
1.1 New investment	45.1	72.9	112.1	153.9	181.8	178.5	237.2	278.8	256.4	231.8	270.2	17%	20%
1.2 Total transactions	53.9	99.1	148.1	212.5	241.1	242.7	295.7	352.3	324.1	298.6	339.0	13%	20%
2 New Investment by Value Chain													
2.1 Technology development													
2.1.1 Venture capital	0.4	0.6	1.2	2.1	3.2	1.6	2.5	2.5	2.4	0.7	1.0	39%	11%
2.1.2 Government R&D	1.9	2.0	2.2	2.7	2.8	5.3	4.7	4.6	4.5	4.9	5.1	3%	10%
2.1.3 Corporate RD&D	3.2	2.9	3.1	3.5	4.0	4.1	4.2	5.1	5.0	6.6	6.6	1%	7%
2.2 Equipment Manufacturing													
2.2.1 Private equity expansion capital	0.3	1.0	3.0	3.6	6.8	2.9	3.1	2.5	1.7	1.4	1.7	20%	18%
2.2.2 Public markets	0.3	3.7	9.1	20.7	10.9	13.1	11.4	10.1	3.9	10.5	15.1	43%	50%
2.3 Projects													
2.3.1 Asset finance	30.4	52.5	84.7	110.4	135.4	120.0	154.6	181.2	163.2	154.6	170.7	10%	19%
Of which re-invested equity	0.0	0.2	0.7	3.1	3.7	1.9	5.6	3.3	2.9	1.9	3.6	90%	-
2.3.3 Small distributed capacity	8.6	10.3	9.5	14.1	22.3	33.4	62.2	76.1	78.8	54.9	73.5	34%	24%
Total Financial Investment	31.4	57.6	97.3	133.7	152.7	135.6	166.1	192.9	168.1	165.4	185.0	12%	19%
Gov't R&D, corporate RD&D, small projects	13.7	15.3	14.8	20.2	29.1	42.8	71.2	85.9	88.3	66.4	85.2	28%	20%
Total New Investment	45.1	72.9	112.1	153.9	181.8	178.5	237.2	278.8	256.4	231.8	270.2	17%	20%
3 M&A Transactions													
3.1 Private equity buy-outs	0.8	3.7	1.8	3.6	5.4	2.2	2.0	3.1	3.3	0.6	2.5	335%	12%
3.2 Public markets investor exits	0.4	2.4	2.7	4.0	1.0	2.5	4.9	0.2	0.4	1.8	1.9	6%	18%
3.3 Corporate M&A	2.4	7.6	12.3	20.3	17.6	21.8	19.4	30.1	10.1	15.2	9.8	-35%	15%
3.4 Project acquistion & refinancing	5.3	12.5	19.1	30.6	35.4	37.8	32.1	40.1	53.8	49.3	54.5	11%	26%
4 New Investment by Sector													
4.1 Wind	17.9	29.1	39.6	61.6	75.2	81.2	98.9	84.2	84.1	89.3	99.5	11%	19%
4.2 Solar	12.0	16.3	22.1	38.0	60.8	63.7	103.3	155.7	144.3	119.8	149.6	25%	29%
4.3 Biofuels	3.9	9.6	28.4	28.7	19.2	10.2	10.1	10.4	7.0	5.5	5.1	-8%	3%
4.4 Biomass & w-t-e	7.4	9.6	12.1	15.8	16.9	13.9	16.0	17.4	12.4	9.3	8.4	-10%	1%
4.5 Small hydro	2.6	7.2	7.6	7.1	7.8	6.3	5.7	7.2	6.4	5.5	4.5	-17%	6%
4.6 Geothermal	1.2	1.0	1.5	2.0	1.7	2.9	3.0	3.7	1.8	2.2	2.7	23%	9%
4.7 Marine	0.0	0.1	0.9	0.8	0.2	0.3	0.3	0.3	0.3	0.2	0.4	110%	24%
Total	45.1	72.9	112.1	153.9	181.8	178.5	237.2	278.8	256.4	231.8	270.2	17%	20%
5 New Investment by Geography													
5.1 United States	5.4	11.6	29.1	33.0	35.1	24.3	35.1	50.0	38.2	36.0	38.3	7%	22%
5.2 Brazil	0.8	3.1	5.2	11.8	12.1	7.9	7.7	10.1	7.2	3.9	7.6	93%	25%
5.3 AMER (excl. US & Brazil)	1.7	3.3	3.9	5.0	5.8	5.8	12.2	9.2	10.2	12.2	14.8	21%	24%
5.4 Europe	23.6	33.6	46.7	66.4	81.6	81.2	111.1	120.7	89.6	57.3	57.5	0%	9%
5.5 Middle East & Africa	0.6	0.8	1.1	2.4	2.3	1.7	4.2	2.9	10.4	8.7	12.6	46%	36%
5.6 China	3.0	8.2	11.1	16.6	25.7	39.5	38.7	49.1	62.8	62.6	83.3	33%	39%
5.7 India	2.7	3.1	4.9	6.3	5.6	4.3	9.0	12.7	7.4	6.4	7.4	14%	10%
5.8 ASOC (excl. China & India)	7.2	9.2	10.0	12.5	13.6	13.7	19.3	24.1	30.5	44.7	48.7	9%	21%
Total	45.1	72.9	112.1	153.9	181.8	178.5	237.2	278.8	256.4	231.8	270.2	17%	20%

New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals.
Source: UNEP, Bloomberg New Energy Finance

generation plant anywhere in the world. [1] Globally, $18.6 billion worth of offshore wind projects were financed in 2014, some 148% up on the previous year and 45% above the next highest year ever, 2010. Europe accounted for $16.2 billion of the world offshore wind investment, with China the remaining $2.4 billion.

Previous years' Global Trends reports have followed the spread of renewable energy technologies from their early-adopter locations in Europe and North America to more and more parts of the world, notably to developing economies. Figure 4 shows that the split in investment between developed and developing countries was more equal than ever before in 2014, with the first group attracting $138.9 billion and the second group $131.3 billion. Developing countries have increased their investment in renewable energy almost in a straight line since 2004, with a single blip in 2013, while developed economies saw commitments reach a peak in 2011 on the back of stimulus programmes in the US and runaway solar booms in Germany and Italy. The level of investment in developed nations has fallen back into a range of $135 billion to $150 billion in the last three years.

Much of the surge by developing economies over recent years has been thanks to investment in China. This raced up from just $3 billion in 2004 to $83.3 billion in 2014 (see Figure 3), helped by supportive government policies aimed at boosting power generation in the country, at providing demand for domestic wind and solar manufacturing industries, and – especially recently – at offering an alternative to pollution-inducing fossil fuel generation.

However, the advance of the developing nations in renewable energy has not been only about China. In 2014, Brazil ($7.6 billion), India ($7.4 billion) and South Africa ($5.5 billion) were all in the top 10 of investing countries, while Mexico, Chile, Indonesia, Kenya and Turkey were all in the $1 billion-plus club and several others were challenging to join them.

Figure 5 underlines how far behind wind and solar the other renewable energy technologies have fallen. In 2014, these two sectors accounted for 92% of overall global investment in renewable power and fuels, while biomass and waste-to-energy made up 3% of total, with $8.4 billion invested, biofuels and small hydro each contributed

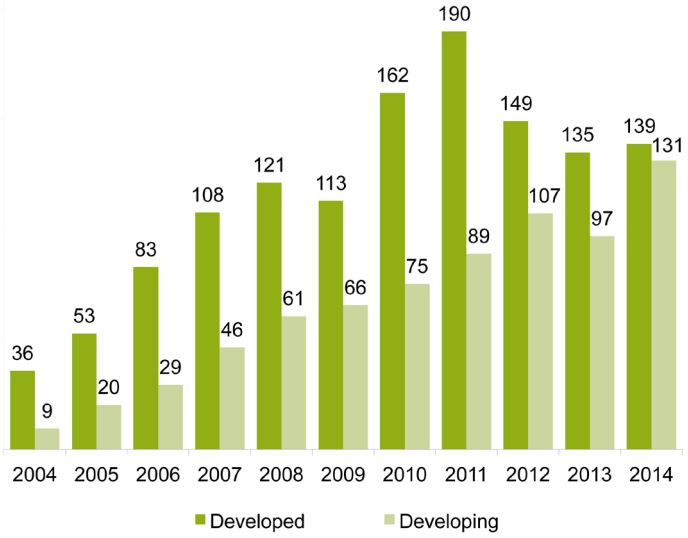
[1] Excluding large hydro-electric projects

just under 2%, with $5.1 million and $4.5 billion respectively, and geothermal was responsible for 1%, with $2.7 billion committed.

Figure 6 shows that the balance was slightly different as far as the venture capital and private equity category of investment was concerned, with solar the largest recipient at $1.6 billion and biofuels second at $610 million. In Figure 7, a relatively strong year for public markets investment in clean energy featured some impressive increases for the individual sectors, with solar companies receiving 73% more equity capital from stock markets than in 2013, at $8.3 billion, and wind companies 120% more, at $5.4 billion.

Wind was the largest sector in terms of utility-scale asset finance in 2014, as previously, but the gap between it and solar narrowed somewhat. Figure 8 shows that asset finance of wind farms increased 10% to $92.4 billion while that for solar parks advanced 15% to $62.8 billion. The next largest sector was biomass and waste-to-power, with $7.4 billion, down 10% on the previous year. If you add together all capacity investment (both utility-scale and small projects), solar came out on top in 2014, with $136.3 billion, up 25% (see Figure 9).

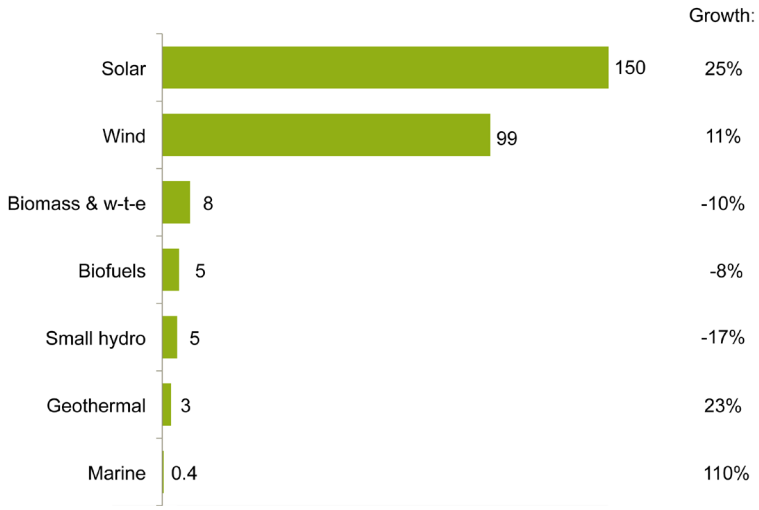
FIGURE 4. GLOBAL NEW INVESTMENT IN RENEWABLE ENERGY: DEVELOPED V DEVELOPING COUNTRIES, 2004-2014, $BN



New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals. Developed volumes are based on OECD countries excluding Mexico, Chile, and Turkey.

Source: UNEP, Bloomberg New Energy Finance

FIGURE 5. GLOBAL NEW INVESTMENT IN RENEWABLE ENERGY BY SECTOR, 2014, AND GROWTH ON 2013, $BN



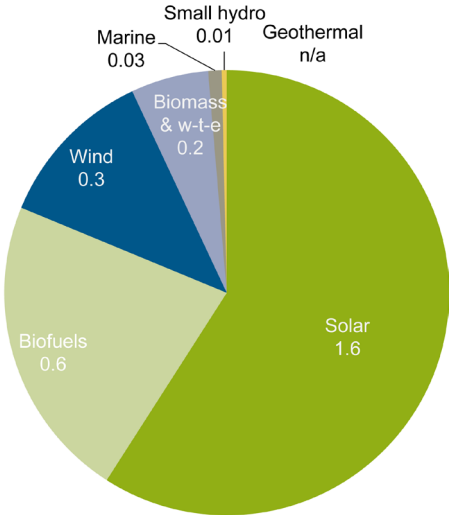
New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals.

Source: UNEP, Bloomberg New Energy Finance

COSTS AND CHALLENGES

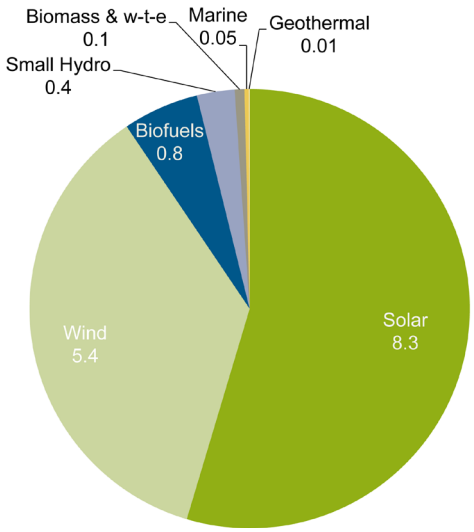
For five years now (2010-14), investment in renewable energy has bobbed around the $230 billion to $280 billion range. Last year's total was towards the top end of that range, but that does not mean that 2014's upward momentum will necessarily continue. In 2015 and after, renewables will face plenty of challenges, including support policies that are less predictable than before for investors – with the trend towards auctions and away from feed-in tariffs or green certificates in countries such as the UK and Germany, and the incidence of retroactive

FIGURE 6. VC/PE NEW INVESTMENT IN RENEWABLE ENERGY BY SECTOR, 2014, $BN



VC/PE new investment excludes PE buy-outs. Total values include estimates for undisclosed deals.
Source: UNEP, Bloomberg New Energy Finance

FIGURE 7. PUBLIC MARKETS NEW INVESTMENT IN RENEWABLE ENERGY BY SECTOR, 2014, $BN



Source: UNEP, Bloomberg New Energy Finance

changes in subsidy for existing projects (most recently affecting PV parks in Italy). Meanwhile, the all-to-familiar type of policy uncertainty is still in the air, most notably over the continuation or not of the US Production Tax Credit for wind and the steepness of the coming reductions in Japan's feed-in tariff for PV.

Governments in Europe and Asia may also be tempted to see a bigger role for gas in the future generation mix, now that oil prices have plunged to the $50 to $60-a-barrel area and there is a chance of some of this reduction being mirrored in future oil-linked gas purchase contracts. If gas becomes more favoured, then this is likely to be at the expense of coal in the main, but renewables and nuclear could also be affected.

There are also structural challenges in the electricity system, such as the difficulty created for grids and utilities from Japan to Europe and the US, as the penetration of wind and solar increases in the generation mix, and these are explored in Chapter 3 of this report. In developing countries, there are many different obstacles. These can be an entrenched national electricity company with little knowledge of renewables, or a difficulty in accessing project finance at affordable interest rates or in striking power purchase agreements, or the presence of subsidised electricity prices in the local market, making the economics of rooftop generation unattractive.

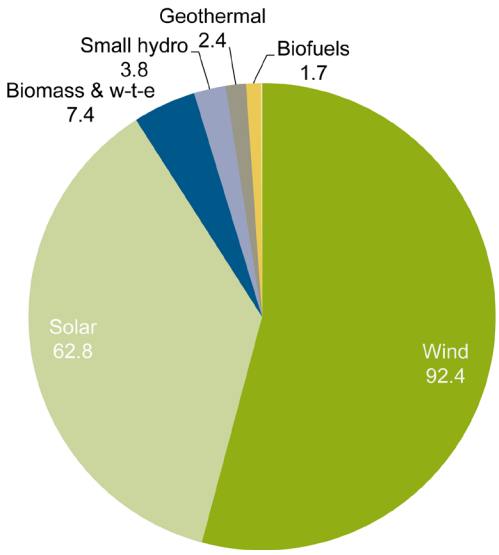
However, other issues have been moving in favour of renewables. One is that there is increasing evidence of the role that renewables and energy-efficiency technologies are playing in limiting the increase in global emissions. As Chapter 2 shows, renewables excluding large hydro accounted for 9.1% of world electricity generation in 2014, up from 8.5% in 2013. Meanwhile, energy efficiency has been one of the factors contributing to a remarkably weak trend in electricity demand in OECD countries.



A second is the fact that the battle to curb emissions is looking more and more urgent, as the world prepares for the Paris climate change conference in November-December 2015. Recent data on the carbon dioxide content of the atmosphere have shown a three-parts-per-million increase in 12 months and a 21ppm increase in a decade. CO2 could hit 404ppm later this spring.

Third, renewables are being seen increasingly as a stable – even relatively low-risk – investment by institutional funds. This is evident partly in the rising commitment by institutions to renewable power projects, and partly in their backing for green bonds, which hit a record $39 billion of issuance in 2014 (see Chapter 4). Giant German utility EON gave a strong hint in November last year on where it sees relative risk, when it committed to retaining its renewables, distribution and transmission businesses, while putting its conventional generation arm into a separate company.

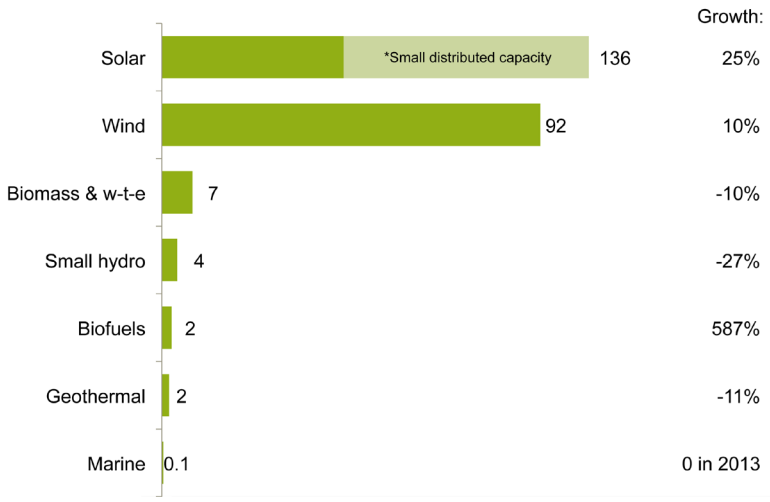
FIGURE 8. ASSET FINANCE OF RENEWABLE ENERGY ASSETS BY SECTOR, 2014, $BN



Total values include estimates for undisclosed deals
Source: UNEP, Bloomberg New Energy Finance

The costs of wind and solar generation are, meanwhile, continuing to fall. Figure 10 shows that Bloomberg New Energy Finance's average for global levelised costs was $315 per MWh for crystalline silicon PV projects in the third quarter of 2009, but this had fallen to $129 per MWh in the first half of 2015, a reduction of 59% in just five and a

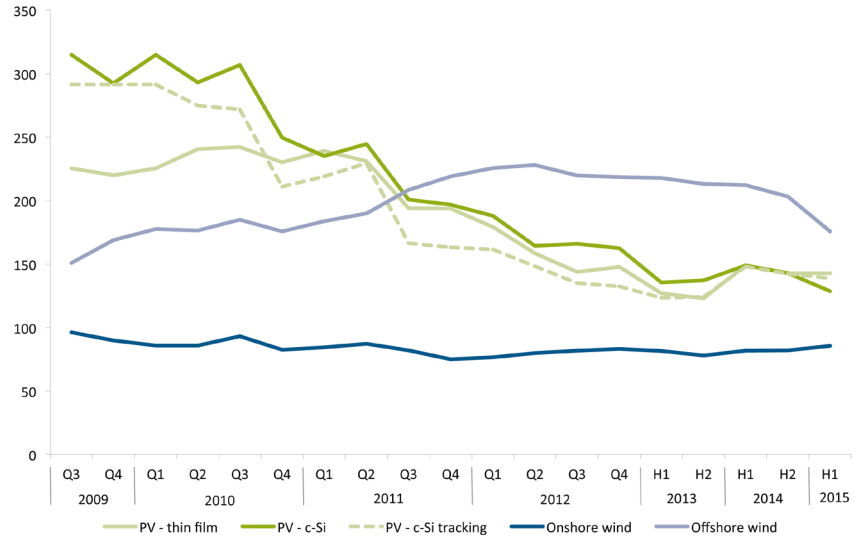
FIGURE 9. ASSET FINANCE OF RENEWABLE ENERGY ASSETS AND SMALL DISTRIBUTED CAPACITY BY SECTOR, 2014, AND GROWTH ON 2013, $BN



Total values include estimates for undisclosed deals.
Source: UNEP, Bloomberg New Energy Finance

half years. The equivalent for onshore wind dropped from $96 to $85 per MWh over the same period, a decline of 11.5%. Offshore wind had been travelling in the wrong direction on levelised costs, seeing these increase from $151 to $203 per MWh over 2009-14, as project developers moved out into deeper waters and had to deal with bottlenecks in the supply of vessels and cables. But the latest snapshot, for H1 2015, shows offshore wind levelised costs falling back again in dollar terms, helped by low debt costs and exchange rate effects.

FIGURE 10. GLOBAL AVERAGE LEVELISED COST OF ELECTRICITY FOR WIND AND PV, Q3 2009 TO H1 2015, $ PER MWH



PV-c-Si stands for crystalline silicon photovoltaics
Source: Bloomberg New Energy Finance

The news over the last few months has backed up the story of falling costs. In January this year, Dubai Electricity & Water Authority awarded a contract to build a 200MW, $330 million PV plant to a group led by Saudi Arabia's ACWA Power International, backed by a deal to sell electricity at $58.50 per MWh, the cheapest such contract seen anywhere in the world to date. ACWA later said in an interview: "Is it a repeatable tariff? Absolutely. It is repeatable. If DEWA was to launch another tender on the same basis – with a 25-year off-take contract – in the same locale tomorrow, I am a 100% sure the tariff will be this same number, if not slightly lower."[2]

In the first round of the UK's auction programme for its new Contracts for Difference to support renewables, winning bids came in at tariffs estimated to be some 10% below the all-in remuneration available under the outgoing Renewables Obligation incentive. The results, announced in late February 2015, also showed offshore wind bids winning through at 14-18% below what would have been available under the RO.

In Andhra Pradesh state, India, in October 2014, First Solar and Acme Solar Energy won licences to build PV capacity with bids as low as $86 per MWh, higher than the ACWA deal early this year but nearly 40% below Bloomberg New Energy Finance's estimate for the average global levelised cost of electricity of PV in the second half of 2014.

[2] Bloomberg Briefs: Clean Energy & Carbon Brief, 2 March 2015

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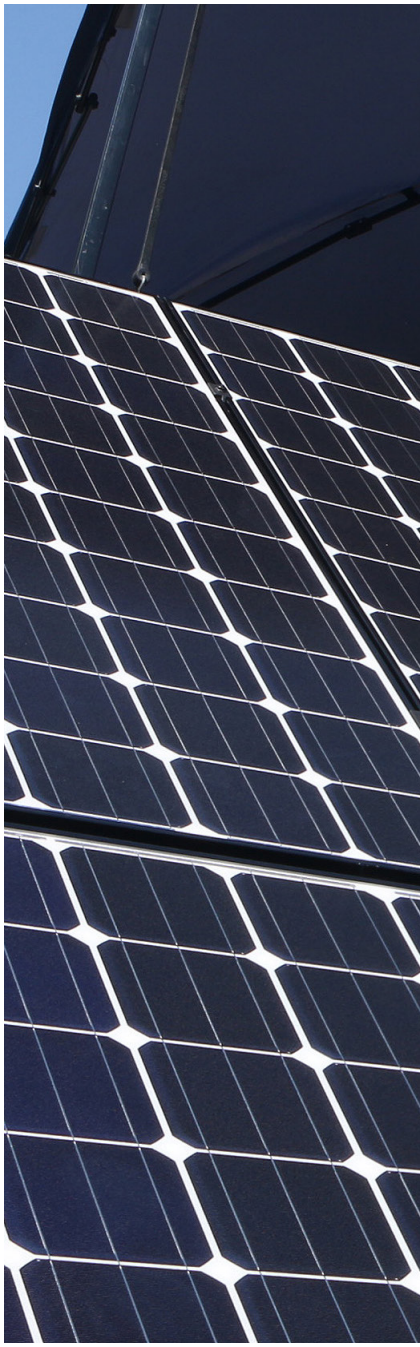
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