



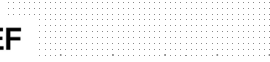
Frankfurt School
FS-UNEP Collaborating Centre
for Climate & Sustainable Energy Finance



GLOBAL TRENDS IN RENEWABLE ENERGY INVESTMENT 2020



BloombergNEF



Data set UNEP - Global Trends in Renewable Energy Investment

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Renewable power additions required to meet government targets with deadlines between 2020 and 2030, GW

	GW
Solar PV	460
Onshore wind	143
Offshore wind	80
Biomass & waste	35
Geothermal	2

Footnote:

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Figure 2. Renewable power additions required to meet government targets with deadlines between 2020 and 2030, by country, GW

Renewable power additions required to meet government targets with deadlines between 2020 and 2030, by country, GW

	Solar PV	Onshore wind	Offshore wind	Biomass & waste	Geothermal
India	68.0	25.3	30.0	0.8	0.0
Germany	48.0	13.0	17.0	5.4	0.0
China	69.8	8.7	0.6	2.4	0.4
Saudi Arabia	39.9	20.0	0.0	0.0	0.0
U.K.	0.0	0.0	32.1	0.0	0.0
South Korea	27.9	2.1	0.0	0.5	0.0
U.A.E.	26.4	0.0	0.0	0.0	0.0
Italy	19.0	0.1	0.0	3.5	0.2
South Africa	7.0	15.6	0.0	0.0	0.0
France	15.4	6.1	0.0	1.0	0.0
Algeria	15.0	5.0	0.0	1.4	0.0
Netherlands	12.8	2.2	0.1	0.7	0.0
Japan	8.2	1.4	0.0	3.6	0.3
Spain	6.1	5.5	0.0	0.7	0.0
Taiwan	10.6	0.6	0.0	0.2	0.0
Nigeria	9.8	0.0	0.0	0.0	0.0
Mexico	6.4	2.5	0.0	0.1	0.6
Belgium	7.4	1.4	0.1	0.5	0.0
Brazil	3.3	0.4	0.0	4.5	0.0
Turkey	6.3	1.5	0.0	0.4	0.1

Footnote: For targets based on electricity consumption or generation, the equivalent volume of capacity was devised, based on BloombergNEF's New Energy Outlook 2019 estimates for future demand and capacity factors for the relevant technologies.

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Growth of corporate members of RE100

	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15
Number of members	12	12	12	12	15	15	16	17

Footnote: Data to end of January 2020

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Projected renewable electricity shortfall for the RE100, TWh

	2018	2019	2020	2021	2022	2023	2024	2025
Wind (contracted)	23.4	29.8	37.9	47.4	47.4	47.4	47.4	47.4
Solar (contracted)	2.4	8.4	15.8	15.8	15.8	15.8	15.8	15.8
Certificate purchases	76.2	66.7	59.3	53.3	48.0	43.2	38.8	34.9
Onsite generation	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Renewable shortfall	5.9	18.3	26.1	34.6	52.2	69.9	87.9	106.4
Electricity demand	233.0	237.3	242.1	247.4	253.2	259.6	266.7	274.4

Footnote: Certificate purchases are assumed to step down 10% each year. Onsite generation and renewable electricity demand don't intersect in 2030, as some companies have targets that exceed their generation capacity.

Source: BloombergNEF, Bloomberg Terminal, The Climate Group, company sustainability reports

Main Figure 5. Capacity additions to 2030 implied by targets, versus required for 2 degrees, GW

Capacity additions to 2030 implied by targets, versus required for 2 degrees, GW

	Government and corporate targets	Required for 2 degrees
Renewables excluding hydro	826	2836
Hydro	488	167

Footnote:

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Figure 6. Number of governments that have announced plans to phase out combustion vehicle sales

Main

Number of governments that have announced plans to phase out combustion vehicle sales

	2015	2016	2017	2018	2019
National	0	2	6	9	13
Municipal or regional	8	12	22	26	30
Total	8	14	28	35	43

Footnote:

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Share of energy from renewable sources for heating and cooling in the EU 27, %

	2004	2005	2006	2007	2008	2009	2010	2011
Share	11.7	12.4	13.2	14.8	15.3	16.8	17	17.5

Footnote:

Source: Eurostat

Global renewable energy capacity investment, 2004 to 2019
\$bn

	2004	2005	2006	2007	2008	2009	2010	2011
Asset finance	32.1	50.3	79.2	106.3	133.5	111.8	152.2	189.6
Small distributed capacity	8.0	10.1	9.0	13.9	22.2	34.7	60.9	75.1
Total	40.1	60.4	88.2	120.2	155.7	146.5	213.0	264.7
% Growth	-	51%	46%	36%	29%	-6%	45%	24%

Footnote: Total values include estimates for undisclosed deals

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Main

Figure 9. Global investment in renewable energy capacity by sector in 2019, and growth on 2018

Global investment in renewable energy capacity by sector in 2019, and growth on 2018
\$bn

	2019	% growth on 2018
Marine	0.0	Close to zero in 2018
Biofuels	0.5	-43%
Geothermal	1.0	-56%
Small hydro	1.7	-3%
Biomass & waste	9.7	9%
Solar	131.1	-3%
Wind	138.2	6%

Footnote: Total values include estimates for undisclosed deals.

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Main Figure 10. Investment in renewable energy capacity by region, 2019, \$bn

Investment in renewable energy capacity by region, 2019, \$bn

	2019	% growth on 2018
China	83.4	-8%
United States	55.5	28%
Europe	54.6	-7%
Other APAC	45.1	-2%
Other EMEA	15.2	-8%
Other AMER	12.6	28%
India	9.3	-14%
Brazil	6.5	74%

Footnote:

Total values include estimates for undisclosed deals.

Source:

UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Main

Figure 11. Investment in renewables capacity by top 30 country or territory in 2019, and growth on 2018

Investment in renewables capacity by top 30 country or territory in 2019, and growth on 2018
\$bn

		% growth on 2018
China	83.4	-8%
United States	55.5	28%
Japan	16.5	-10%
India	9.3	-14%
Taiwan	8.8	390%
Spain	8.4	25%
Brazil	6.5	74%
Australia	5.6	-40%
Netherlands	5.5	25%
United Kingdom	5.3	-40%
Chile	4.9	302%
United Arab Emirates	4.5	1223%
Germany	4.4	-30%
France	4.4	3%
Mexico	4.3	17%
Sweden	3.7	-19%
Ukraine	3.4	56%
Vietnam	2.6	-64%
Korea (Republic)	2.4	31%
Russian Federation	2.3	76%
Argentina	2.0	-18%
Turkey	1.9	-16%
Poland	1.8	349%
Finland	1.5	41%
Italy	1.3	-35%
Norway	1.0	-8%
South Africa	1.0	-76%
Kazakhstan	0.8	58%
Greece	0.7	11%
Israel	0.7	113%

Footnote:

Source:

UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Main Figure 12. Renewable energy capacity investment in the U.S., Europe and China, 2004-2019

Renewable energy capacity investment in the U.S., Europe and China, 2004-2019
\$bn

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
China	2.4	7.3	8.9	13.5	22.5	31.4	36.9	39.3	54.8	61.7	85.0	119.3	103.5	143.0	91.1	83.4
Europe	21.6	28.3	35.1	51.6	71.9	74.3	105.8	126.7	88.0	52.5	63.2	58.5	65.8	45.7	58.6	54.6
United States	4.9	9.2	23.3	26.2	26.5	15.1	27.3	45.3	35.5	29.3	31.8	37.2	41.4	45.7	43.4	55.5

Footnote:

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Main

Figure 13. Investment in renewable energy capacity, developed v developing countries, 2004-2019

Investment in renewable energy capacity, developed v developing countries, 2004-2019
\$bn

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
China and India	5.0	10.0	13.6	18.7	27.5	35.3	43.6	51.4	61.6	66.4	91.1	126.9	116.0	156.3	101.9	92.7
Other developing	3.1	7.3	10.3	16.5	24.6	17.2	24.3	26.7	33.9	26.1	32.4	39.6	29.0	39.7	50.7	59.5
Developed	32.0	42.8	64.3	85.0	103.6	94.0	145.1	186.5	144.5	119.3	141.7	133.9	135.0	119.2	127.5	130.0
Total	40.1	60.1	88.2	120.2	155.7	146.5	213.0	264.7	239.9	211.7	265.1	300.3	280.0	315.1	280.2	282.2
% Growth	-	50%	47%	36%	29%	-6%	45%	24%	-9%	-12%	25%	13%	-7%	13%	-11%	1%

Footnote: Total values include estimates for undisclosed deals. Developed volumes are based on OECD countries excluding Mexico, Chile, and Turkey.

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Main

Figure 14. Global capacity in renewable power, 2004-2019

Global capacity in renewable power, 2004-2019
GW

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Solar	4	5	7	9	16	25	44	73	105	147	193	249	324	423	532	650
Wind	45	55	70	90	117	157	193	233	279	313	361	424	476	528	577	638
Biomass & waste	47	50	57	59	63	69	76	84	91	96	102	106	114	120	124	127
Other renewables	131	135	147	153	158	163	168	174	183	193	198	203	205	208	210	211
Total	227	245	281	311	354	414	481	564	658	749	854	982	1120	1279	1443	1627

Footnote: "Other renewables" does not include large hydro-electric projects of more than 50MW

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Main

Figure 15. Renewable energy capacity investment in \$bn vs GW capacity added, 2005-2019

Renewable energy capacity investment in \$bn vs GW capacity added, 2005-2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
GW added	18	36	30	43	60	67	82	94	91	105	128	138	160	164	184
Capacity investment	60	88	120	156	147	213	265	240	212	265	300	280	315	280	282

Footnote:

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Main Figure 16. Levelized cost of electricity, by main renewable energy technology, 2009 to 2019

Levelized cost of electricity, by main renewable energy technology, 2009 to 2019
\$/MWh

	H2 2009	H1 2010	H2 2010	H1 2011	H2 2011	H1 2012	H2 2012	H1 2013	H2 2013	H1 2014	H2 2014	H1 2015	H2 2015	H1 2016	H2 2016	H1 2017	H2 2017	H1 2018	H2 2018	H1 2019	H2 2019
Onshore wind	92.9	85.7	87.8	85.8	78.5	78.2	82.4	79.7	80.9	81.8	82.0	85.5	82.5	81.2	88.2	67.4	67.4	56.0	52.0	50.0	47.0
Offshore wind	159.8	177.0	180.3	186.7	213.7	226.8	219.1	215.4	212.3	209.8	203.1	175.7	174.1	160.8	126.2	124.0	124.0	118.0	115.0	89.0	78.0
PV	303.6	303.9	278.1	239.8	198.7	176.2	164.1	136.2	146.0	147.5	142.9	128.5	122.0	99.4	100.7	86.0	86.0	70.0	60.0	57.0	51.0

Footnote: PV is crystalline silicon with no tracking

Source: UN Environment, Frankfurt School-UNEP Centre, BloombergNEF

Main Figure 17. Renewable power generation and capacity as a share of global power, 2007-2019

Renewable power generation and capacity as a share of global power, 2007-2019
%

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Renewable capacity change as a % of global capacity change (net)	19.5%	27.3%	41.7%	31.6%	39.8%	48.6%	37.9%	41.0%	51.2%	50.8%	63.7%	67.6%	77.6%
Renewable power as a % of global power capacity	7.5%	8.2%	9.2%	10.2%	11.4%	12.4%	13.5%	14.7%	16.2%	17.6%	19.4%	21.0%	22.8%
Renewable power as a % of global power generation	5.2%	5.3%	5.9%	6.1%	6.9%	7.9%	8.3%	9.0%	9.7%	10.6%	11.6%	12.4%	13.4%

Footnote: Renewables figure excludes large hydro. Capacity and generation based on BloombergNEF totals.

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Main

Figure 18. Net power generating capacity added in 2019 by main technology

Net power generating capacity added in 2019 by main technology
GW

Sector	GW
Coal	18
Gas	30
Large hydro	15
Other renewables	5
Solar	118
Wind	61

Footnote: The chart does not show the negative figures from net closure of nuclear and oil-fired capacity in 2019

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Main

Figure 19. Renewable energy capacity investment over the decade, 2010-2019

Renewable energy capacity investment over the decade, 2010-2019
\$bn

Solar	1369.4
Wind	1067.2
Biomass & waste	123.1
Small hydro	44.5
Biofuels	27.7
Geothermal	20.0
Marine	0.4

Footnote:

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF

Main

Figure 20. Renewable energy capacity investment from 2010 to 2019, top 20 markets

Renewable energy capacity investment from 2010 to 2019, top 20 markets
\$bn

Country	
China	818.0
United States	392.3
Japan	210.9
Germany	183.4
United Kingdom	126.5
India	90.0
Italy	82.9
Brazil	60.6
France	49.9
Australia	47.6
Spain	37.2
Canada	33.5
Netherlands	31.5
Mexico	24.8
Belgium	22.3
Sweden	22.1
Turkey	21.1
South Africa	20.1
Chile	18.0
Korea (Republic)	15.3

Footnote:

Source: UNEP, Frankfurt School-UNEP Centre, BloombergNEF