German Patent and Trade Mark Office

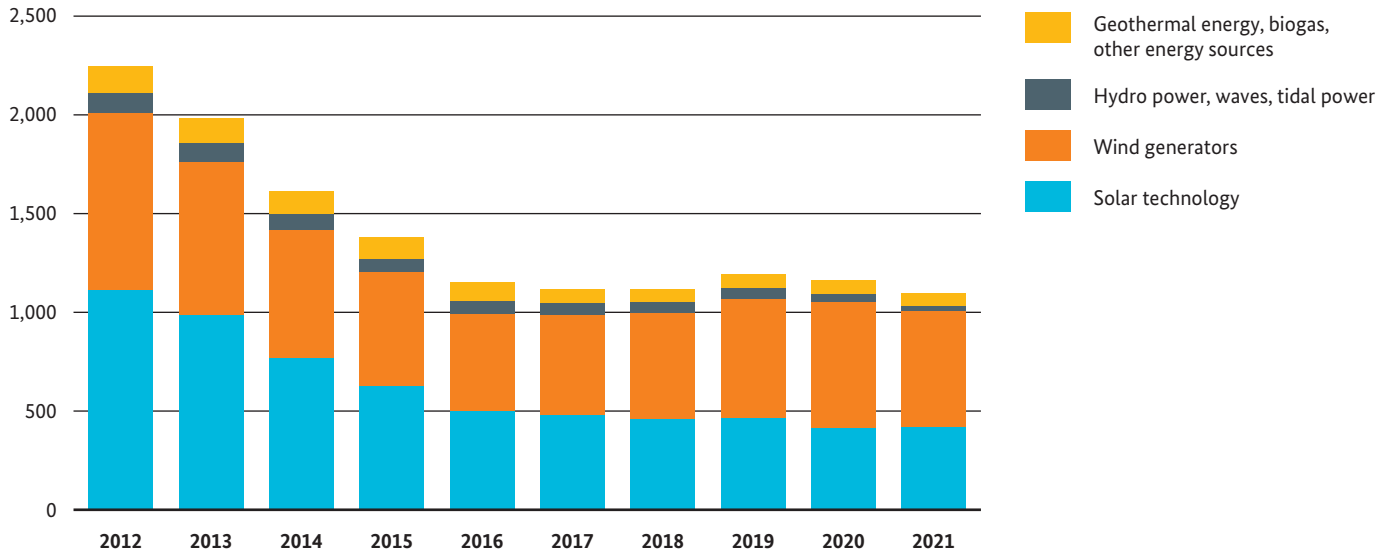
Renewable energy

(as of February 2022)

Development of patent applications effective in Germany [1] in selected fields of renewable energy

Fields of technology [2]	Year of publication									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Solar technology [3]	1,114	983	768	626	497	478	457	464	411	420
Wind generators [4]	892	779	648	579	492	510	540	604	640	583
Hydro power, waves, tidal power [5]	105	92	80	62	70	56	52	53	40	26
Geothermal energy, biogas, other energy sources [6]	135	128	118	115	93	73	70	74	73	70

[1] Applications published by the DPMA and the EPO avoiding double counts.
[2] IPC classes valid at the time of retrieval counted proportionately. Without claim to completeness. Results may also include other uses.
[3] C02F 1/14, E04D 13/18, F03G 6, F24J 2, F24S, G05F 1/67, H01L 31/04 to H01L 31/078, H02J 7/35, H02N 6, H02S.
[4] F03D.
[5] F03B 7, F03B 13/10 to F03B 13/26.
[6] C12M 1/107, C12M 1/113, F03G 3, F03G 4, F03G 7/00 to F03G 7/08, F24J 3, F24T 10, F24T 50, F24V 40, F24V 50, F24V 99.



German Patent and Trade Mark Office

Renewable energy

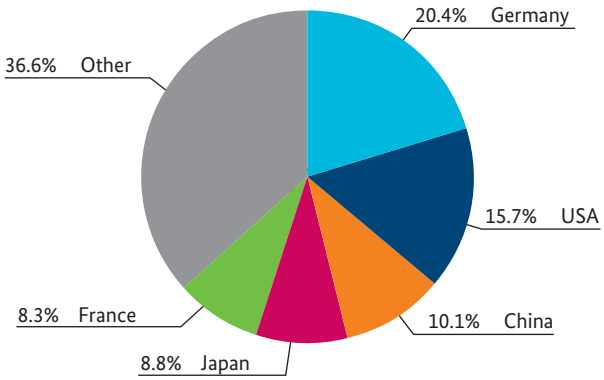
(as of February 2022)

Patent applications effective in Germany [1] by country 2019 to 2021

(residence or principal place of business of the first applicant)

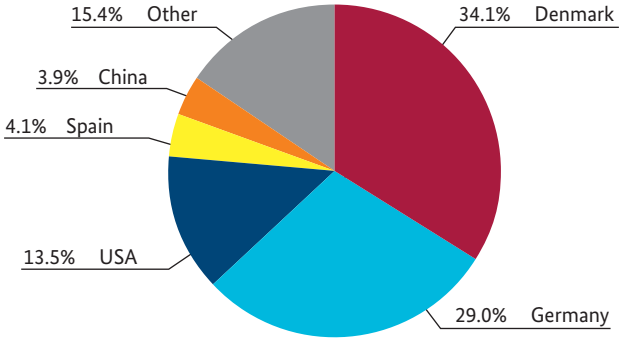
Solar technology

Country	Publication years 2019 to 2021	
	Number	Percentage
Germany	265	20.4%
USA	203	15.7%
China	131	10.1%
Japan	114	8.8%
France	108	8.3%
Other	474	36.6%
Total [2]	**1,296**	**100%**



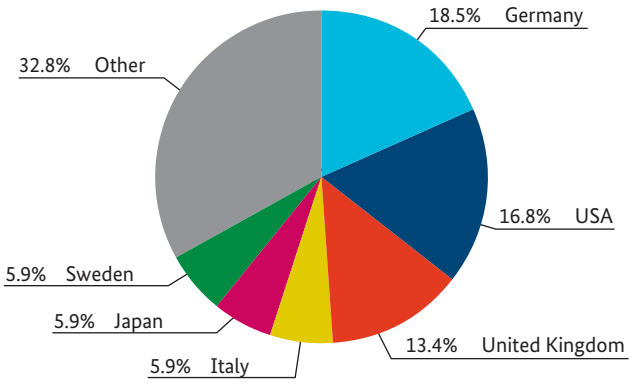
Wind generators

Country	Publication years 2019 to 2021	
	Number	Percentage
Denmark	623	34.1%
Germany	531	29.0%
USA	247	13.5%
Spain	75	4.1%
China	71	3.9%
Other	281	15.4%
Total [2]	**1,828**	**100%**



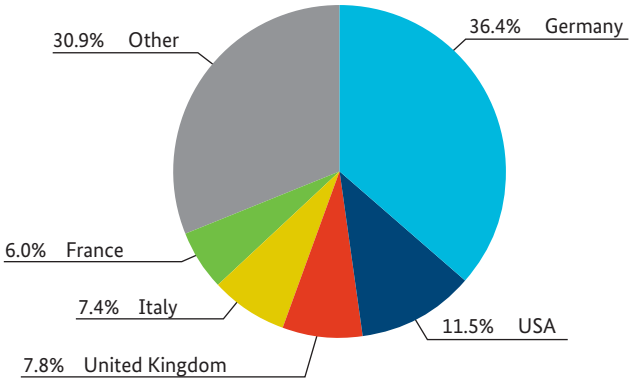
Hydro power, waves, tidal power

Country	Publication years 2019 to 2021	
	Number	Percentage
Germany	22	18.5%
USA	20	16.8%
United Kingdom	16	13.4%
Italy	7	5.9%
Japan	7	5.9%
Sweden	7	5.9%
Other	39	32.8%
Total [2]	**119**	**100%**



Geothermal energy, biogas, other energy sources

Country	Publication years 2019 to 2021	
	Number	Percentage
Germany	79	36.4%
USA	25	11.5%
United Kingdom	17	7.8%
Italy	16	7.4%
France	13	6.0%
Other	67	30.9%
Total [2]	**217**	**100%**



[1] Applications published by the DPMA and the EPO avoiding double counts.
[2] Due to rounding differences, summed values may deviate from the total number.

German Patent and Trade Mark Office

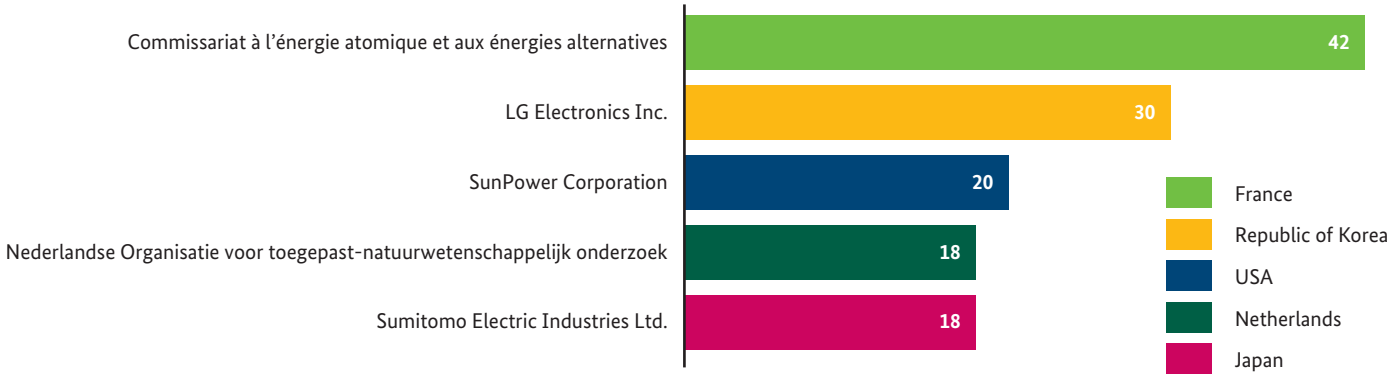
Renewable energy

(as of February 2022)

Patent applications effective in Germany[1]: TOP 5 applicants 2019 to 2021

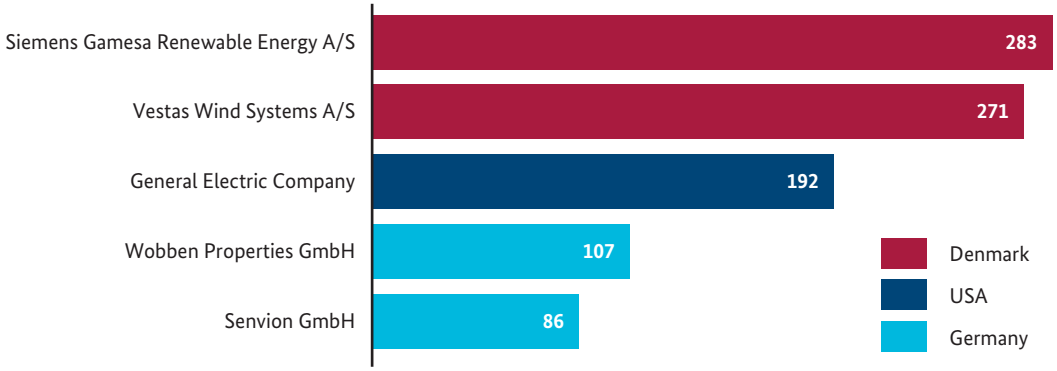
Solar technology

Rank	Applicant[2]	Principal place of business	Applications
1	Commissariat à l'énergie atomique et aux énergies alternatives	FR	42
2	LG Electronics Inc.	KR	30
3	SunPower Corporation	US	20
4	Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek	NL	18
4	Sumitomo Electric Industries Ltd.	JP	18



Wind generators

Rank	Applicant[2]	Principal place of business	Applications
1	Siemens Gamesa Renewable Energy A/S	DK	283
2	Vestas Wind Systems A/S	DK	271
3	General Electric Company	US	192
4	Wobben Properties GmbH	DE	107
5	Senvion GmbH	DE	86



[1] Applications published by the DPMA and the EPO avoiding double counts.
[2] Applicant indicated first; without considering possible intra-group affiliations.