

LINKS
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Wind energy generating capacity reached nearly 32,000 megawatts by the end of 2002, an increase of 27 percent over 2001.¹ (See Figure 1.) Spurred on by falling costs, concern about climate change, and new government policies, wind remains the fastest-growing energy source in the world. Global wind capacity has tripled since 1998.² In early 2002, wind power provided enough electricity to meet the residential electricity needs of 35 million people worldwide.³ Many more people get at least some of their electricity from the wind.

Global capacity net additions in 2002 totaled approximately 6,720 megawatts—a new record.⁴ (See Figure 2.) Yet the rate of growth was slower than expected due to a slump in the U.S. market, which continues to swing widely in response to short-term extensions of a federal wind energy tax credit. The United States installed only 410 megawatts of new capacity in 2002, compared with 1,714 megawatts in 2001, bringing its total to 4,685 megawatts.⁵ But up to 1,800 more megawatts are expected in 2003 as developers rush to install projects before the tax credit expires at year's end.⁶

Europe installed an estimated 5,870 megawatts of capacity in 2002, 31 percent more than in 2001.⁷ Europe has nearly 73 percent of global wind capacity—thanks to strong, consistent policies driving demand for renewable energy technologies, particularly in Germany, Spain, and Denmark, which accounted for 90 percent of the capacity installed in Europe during 2002.⁸

In fact, more than half of Europe's and 38 percent of the world's wind capacity is found in Germany.⁹ In 2002, Germany set another record, adding 3,250 megawatts to end the year with just over 12,000 megawatts of total capacity—enough to provide 4.7 percent of the nation's electricity.¹⁰ In October, Chancellor Schröder announced plans to reduce Germany's greenhouse gas emissions 40 percent by 2020.¹¹ Wind power will play a large role in this plan.

Spain experienced another strong growth year as well, adding 1,490 megawatts for a total of 4,830 megawatts, surpassing the United States to rank second worldwide.¹² This is an

impressive accomplishment, given that Spain's wind industry is not yet a decade old.

Denmark, a nation of just 5 million people, also installed more wind capacity than the United States. With the addition of nearly 500 megawatts, Denmark ended 2002 with about 2,880 megawatts, enough to generate 21 percent of the country's electricity.¹³ Much of this new capacity is operating offshore, thanks to completion of the Horns Rev 160-megawatts project, the world's largest offshore wind farm.¹⁴

The United Kingdom, despite having the best wind resources in Europe, continues to experience slow growth. It ended 2002 with about 556 megawatts of wind capacity, a 31-megawatt increase.¹⁵ The future looks brighter, however, as planning permission has been granted for the next 450 turbines onshore and the first 90 for offshore use.¹⁶

Italy added 100 megawatts to maintain its position of sixth overall, ending the year with about 800 megawatts.¹⁷ The Netherlands added 217 megawatts, for a total of 740 megawatts.¹⁸ And three new markets emerged—in Norway (added 80 megawatts), Poland (30 megawatts), and Latvia (21 megawatts).¹⁹

Beyond Europe and the United States, the most significant growth was in Asia. India added 250 megawatts, keeping it in fifth place with 1,702 megawatts, while Japan's capacity rose 36 percent to 486 megawatts.²⁰ Although China's market appears to have slowed in 2002, rising by 16 percent to about 470 megawatts, that country has more than 1,800 megawatts of wind capacity in the development pipeline.²¹ Future growth in Japan and China is expected to be rapid, as even offshore wind is now cost-competitive with many conventional energy options.²²

The global wind industry currently employs about 100,000 people.²³ Most of the jobs are in Europe, and European companies manufacture 80 percent of all wind turbines sold worldwide.²⁴ The global large-turbine market is expected to surpass \$16 billion annually by 2007.²⁵ The investment firm Merrill Lynch projects that wind power will grow 15-fold over the next 20 years.²⁶

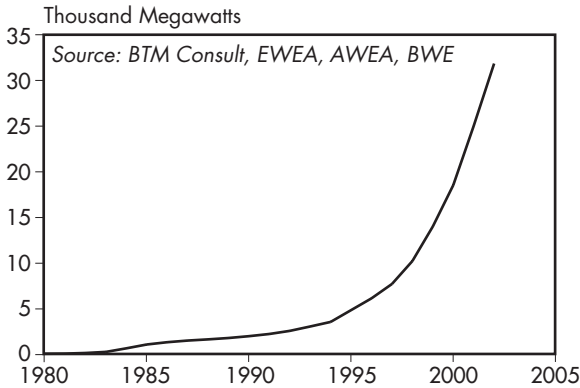


Figure 1: World Wind Energy Generating Capacity, 1980–2002

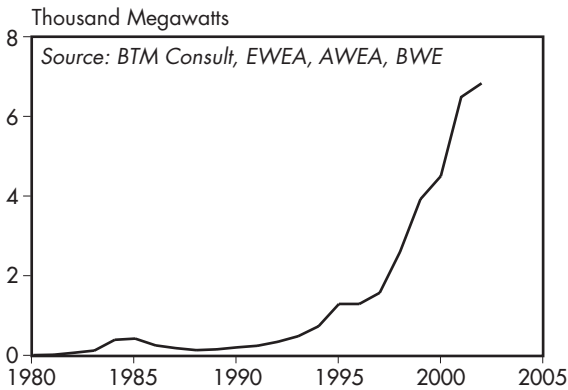


Figure 2: Annual Addition to World Wind Energy Generating Capacity, 1980–2002

World Wind Energy Generating Capacity, Total and Net Annual Additions, 1980–2002

Year	Total	Annual Addition
	(megawatts)	
1980	10	5
1981	25	15
1982	90	65
1983	210	120
1984	600	390
1985	1,020	420
1986	1,270	250
1987	1,450	180
1988	1,580	130
1989	1,730	150
1990	1,930	200
1991	2,170	240
1992	2,510	340
1993	2,990	500
1994	3,490	730
1995	4,780	1,290
1996	6,070	1,290
1997	7,640	1,570
1998	10,150	2,510
1999	13,930	3,780
2000	18,450	4,520
2001	24,930	6,480
2002 (prel)	31,650	6,720

Source: BTM Consult, EWEA, AWEA, and BWE.

WIND POWER'S RAPID GROWTH CONTINUES (pages 38–39)

1. Worldwatch Institute preliminary estimate based on figures from Birger T. Madsen, BTM Consult, e-mails to author, 23 January and 26 February 2003, on European Wind Energy Association (EWEA), "European Wind Industry; Another Record Year," press release (Brussels: 6 February 2003), on American Wind Energy Association (AWEA), "U.S. Wind Industry Turns in Another Solid Year of Growth," press release (Washington, DC: 23 January 2003), and on Bundesverband WindEnergie e.V. (BWE), "Erneutes Rekordjahr für die Windbranche—12.000 Megawatt überschritten," press release (Berlin: 22 January 2003). Historical data from BTM Consult, *International Wind Energy Development: World Market Update 2001* (Ringkøbing, Denmark: March 2002); historical numbers have been adjusted to incorporate more recent BTM Consult estimates.
2. Worldwatch Institute estimate based on sources in note 1.
3. Figure of 35 million from EWEA, "Wind Energy—Clean Power for Generations," brochure (Brussels: 2002).
4. Addition in 2002 is Worldwatch Institute preliminary estimate based on sources in note 1.
5. Additions in 2002 and year-end capacity from AWEA, op. cit. note 1; capacity in 2001 from AWEA, "U.S. Wind Industry Ends Most Productive Year, More than Doubling Previous Record for New Installations," press release (Washington, DC: 15 January 2002).
6. AWEA, op. cit. note 1.
7. EWEA, op. cit. note 1.
8. Worldwatch Institute estimates based on sources in note 1.
9. Ibid.
10. BWE, op. cit. note 1.
11. Reductions are relative to 1990 levels and assume that the European Union will agree to reductions of 30 percent overall; German Environment Minister Jürgen Trittin, "The Success Story of Climate Protection in Germany," speech, New Delhi, India, 1 November 2002.
12. According to Spain's Association of Renewable Energy Producers, cited in "Spanish Wind Power Capacity rises 44 pct in 2002," *Reuters*, 4 February 2003.
13. Capacity figures from EWEA, op. cit. note 1; generating potential from Charles P. Wallace, "Is It a Breeze?" *TIME Europe*, 22 July 2002.
14. Madsen, op. cit. note 1.
15. Matthew Jones, "UK to Accelerate Pace for Renewable Energy Target," *Reuters*, 14 February 2002.
16. Ibid.
17. Capacity additions from EWEA, op. cit. note 1; total calculated with 2001 data from BTM Consult, op. cit. note 1, p. 10.
18. Madsen, op. cit. note 1; BTM Consult, op. cit. note 1, p. 10.
19. Madsen, op. cit. note 1.
20. Madsen, op. cit. note 1; BTM Consult, op. cit. note 1, p. 10.
21. China capacity from Madsen, op. cit. note 1; expected growth from Tim Sharp, "Asian Wind Market Shows Eastern Promise," *Platts Renewable Energy Report*, August 2002, pp. 37–39.
22. Sharp, op. cit. note 21.
23. Worldwatch estimate based on Andreas Wagner, GE Wind Energy and EWEA, e-mail to author, 18 September 2002, and on EWEA, Forum for Energy and Development, and Greenpeace, *Wind Force 10* (London: 1999).
24. EWEA, op. cit. note 3.
25. "Wind Turbine Report Available," SolarAccess.com, Norwalk, CT, 23 January 2003, at <www.solaraccess.com/news/story?storyid=3495&rp=1>, viewed 31 January 2003.
26. Merrill Lynch cited in Wallace, op. cit. note 13.