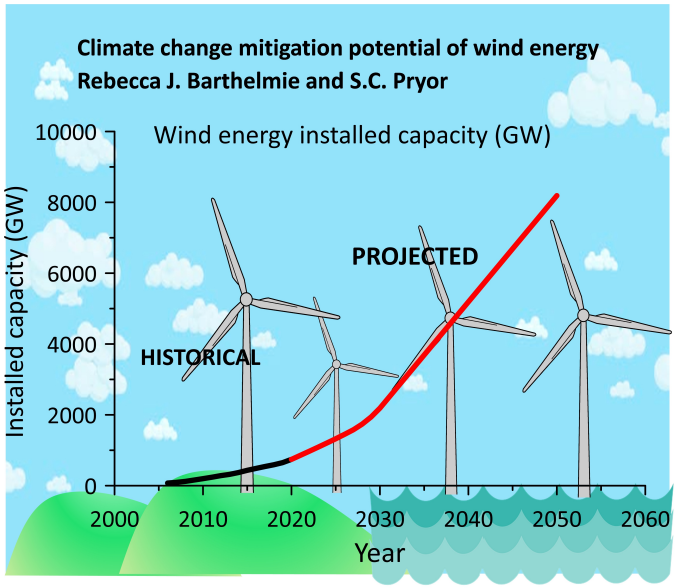
Climate Change Mitigation Potential of Wind Energy

U.S. Department of Energy | Office of Science
HYPERFACETS
A Framework for Improving Analysis and Modeling of Earth System and Intersectoral Dynamics at Regional Scales



The historical rise of global wind energy installed capacity (black) and projections for future growth (red).

Scientific Achievement

If wind energy installed capacity continues to expand at current rates (14%/yr over last decade) or twice current rates, it can reduce the global temperature increase at 2100 by 0.3-0.8℃. If rapid (but technologically feasible) expansion of wind energy installed capacity is coupled with the IPCC RCP4.5 scenario then passing the $\Delta T = 2$ °C threshold could be entirely avoided.

Significance and Impact

44 counties, including the USA, plus the European Union have pledged to meet net-zero emissions by 2050. In the USA the goal is net-zero from the energy sector by 2035. Here we examine how wind energy can contribute to achieving these goals and indeed how large-scale deployment of this technology can 'bend the curve' of global temperatures.

Research Details

IPCC RCP scenarios are combined with country-specific energy transformation goals and wind energy expansion projections from international energy agencies to derive estimates of the resulting climate change mitigation potential.

Barthelmie R.J., Pryor S.C. (2021): Climate Change Mitigation Potential of Wind Energy. *Climate*. 9:136. doi: 10.3390/cli9090136.