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## Energy

Volume 32, Issue 10, October 2007, Pages 1996-2005

# A centurial history of technological change and learning curves for pulverized coal-fired utility boilers

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<https://doi.org/10.1016/j.energy.2007.03.004>

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## Abstract

Recent study of the history of technological change has provided better understanding of the driving forces for technological innovation, as well as quantitative estimates of historical rates of technical change. Although such results are widely used in long-term energy models to estimate future costs over time periods of up to a century, most studies of technological learning for major energy technologies are based on historical trends over time periods not longer than 20–30 years (often because of data limitations). Relatively few studies quantify longer-term (century-scale) trends. This study helps fill that gap by reviewing the history of pulverized-coal (PC) power plants, with a specific focus on the technological progress of PC boiler technology over the last century. Historical data for U.S. plants are used to develop long-term experience curves for the overall thermal efficiency of PC power plants, as well as the capital cost of PC

boilers and non-fuel operating and maintenance (O&M) costs of PC plants. Despite a technology plateau experienced by PC power plants two decades ago, recent developments indicate that such plants will continue to improve and remain a competitive and important part of power generation technology portfolios.



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## Keywords

Pulverized-coal boilers; Experience curve; Thermal efficiency; Coal-fired power plant; Learning-by-doing; Technological change; Steam plant; Steam turbine; Electricity

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