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**Energy Efficiency and Renewable Energy**

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**Wind Energy Program Technology Portfolio**

**Low Wind Speed Technology Phase II: Development of an Operations and Maintenance Cost Model for LWST**

**Global Energy Concepts**

**Project Description:** Operations and maintenance (O&M) costs have long been an uncertain but significant component of the cost of energy (COE) from wind power facilities. Much of the current understanding of O&M costs is based on limited knowledge of short-term operations expenses from existing wind farms, many of which are using earlier turbines not representative of current designs and machine sizes. Because of the inexact nature of the input data, the estimates of O&M costs are imprecise, ranging from about 0.5 to 1.0 ¢/kWh for wind energy facilities in the United States.

The purpose of this project is to evaluate real-world data on O&M costs and to develop a working model to describe these costs for low wind speed sites. A sensitivity analysis will then be performed on the model, and specific parameters contributing significantly to the O&M costs will be identified. The final report will document specific items that can be improved to lower O&M costs in order to meet the LWST project COE goal. Factors evaluated in this study will include:

- Changes in costs as turbine and tower sizes change
- Cost and frequency of major component replacements
- Cost of O&M versus cost of extended warranties or insurance
- Changes in cost associated with differing O&M strategies.

An addendum to the work will be the development of a bearing failure atlas for wind turbines. Wind turbine bearings have been shown to be a major element of component failure. This work will identify, characterize, and provide photographs of bearing failure modes, to assist wind turbine designers and maintenance staff with improved diagnostic information.

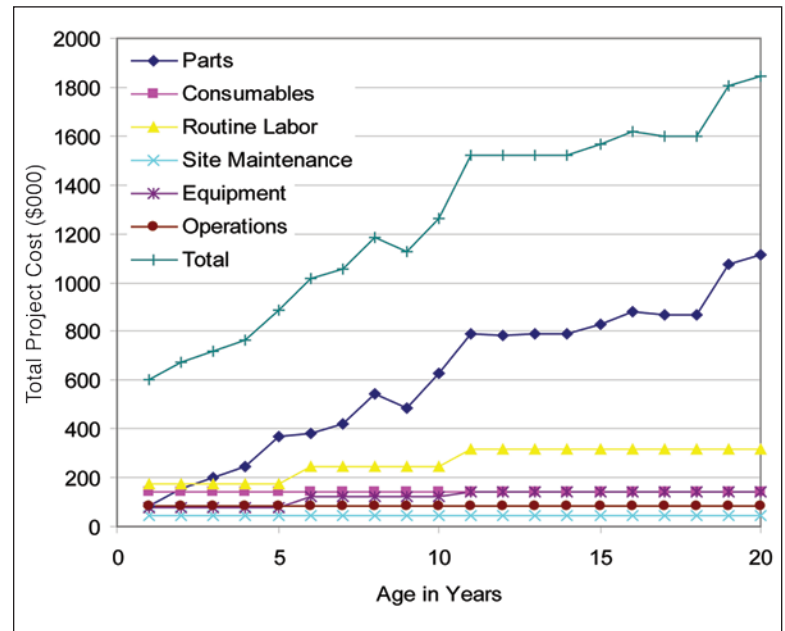
**Project Type:** Conceptual Design Study  
**Total Project Budget:** \$172,136  
**Industry Cost Share:** \$0  
**DOE Cost Share:** \$172,136  
**Planned Project Duration:** August 2004–June 2006

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**Current Status:** Project Underway



Project O&M cost graphs help evaluate real-world data.

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