

Renewable Energy Technology Characterizations

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REPORT SUMMARY

Renewable energy technologies span the range from developmental to commercially available. Some can make significant contributions now to electricity supply with zero or reduced environmental emissions. This report describes the technical and economic status of the major emerging renewable options and offers projections for their future performance and cost.

Background

Since 1989, the U.S. Department of Energy (DOE) has been developing descriptions of the renewable power technologies for internal program planning and support purposes. Similarly, EPRI has maintained an ongoing perspective on these technologies, and has addressed status and projections for a number of them in its Technical Assessment Guide, TAG™. In late 1996, EPRI and DOE's Office of Utility Technologies embarked on an effort to develop a consensus document on the status, developmental needs, and outlook for these technologies. This effort has been carried out through most of 1997, culminating in this jointly prepared document.

Objective

To provide an objective assessment and description of the renewable power technologies, including current capabilities and future potential, for use by the electricity industry and energy and policy analysts and planners.

Approach

Building on the best available information and experience from many years of direct involvement in the development and assessment of renewable energy technologies, experts from DOE, its national laboratories, and support organizations prepared characterizations of the major renewable technologies. EPRI technical staff in the area of renewables and selected outside reviewers subjected these characterizations to an in-depth review and discussed them at length in two technical workshops. The characterizations were then revised to reflect discussions at and subsequent to the workshops, resulting in this consensus document. In some cases, EPRI staff contributed material for introductory sections.

Results

These technology characterizations provide descriptions of the leading renewable technologies and discussions of current capabilities in terms of system performance and cost. The report provides projections of future performance and costs based on the assumption of continuing development support and the successful resolution of unresolved issues. It also discusses the issues and activities necessary to address these unresolved issues. Costs and cost estimates are presented in terms that allow individuals to perform their own financial analyses using methods appropriate to their own situations and needs. In addition, levelized energy cost estimates are offered.

EPRI Perspective

A great deal of marketing and promotional material is available on the renewable energy technologies. Credible, objective descriptions have been difficult to obtain. For the first time, this document offers descriptions representing consensus among technology development managers and knowledgeable individuals who are not involved directly in the commercial promotion of renewables. Collectively, the DOE and EPRI staff involved believe the information presented in this document provides a sound basis for deployment, development, program planning, and policy analysis for the next several years. EPRI and DOE plan to update and add to this information base on a periodic basis.

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Interest Categories

Wind

Solar

Biomass

Energy storage

Key Words

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Technology assessment

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ABSTRACT

An increasing national interest in the use of renewable energy for electricity generation has stimulated a need for carefully prepared data on present and projected costs and performance of current and emerging renewable technology options. This document was prepared jointly by the U.S. Department of Energy and EPRI to address this need. It represents a consensus perspective on 12 different configurations of biomass, geothermal, photovoltaic, solar thermal, and wind technologies. It also provides data on battery storage systems for use in conjunction with renewable energy systems. In addition, various approaches to analyzing project financial attractiveness are presented. This document is designed for use by electric-utility and power-project planners, energy policy analysts, and technology R&D planners.

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