

Biomass Energy Data Book

Edition 1



U.S. Department of Energy
Energy Efficiency and Renewable Energy

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable



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EDITION 1**

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September 2006

Prepared for the
Office of Planning, Budget and Analysis
Energy Efficiency and Renewable Energy
U.S. Department of Energy

Prepared by the
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Oak Ridge, Tennessee 37831-6073
managed by
UT-BATTELLE, LLC
for the
U.S. DEPARTMENT OF ENERGY
under Contract No. DE-AC05-00OR22725

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The *Biomass Energy Data Book*
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ACKNOWLEDGEMENTS

The authors would like to express their gratitude to the many individuals who assisted in the preparation of this document. First, we would like to thank the U.S. Department of Energy's Energy Efficiency and Renewable Energy (EERE) staff in the Office of Planning, Budget and Analysis, and the Biomass Program for their support of the first edition of the Biomass Energy Data Book project. Our team of thorough reviewers include Tien Nguyen and Phil Patterson of the EERE Office of Planning, Budget and Analysis, Zia Haq of the EERE Biomass Program, and David Andress of David Andress and Associates. We would like to thank Alex Farrell of the University of California, Berkeley, for allowing us to publish material from his article in *Science*. We would also like to thank Jamie Payne of Oak Ridge National Laboratory (ORNL), who designed the cover. Finally, this book would not have been possible without the dedication of Debbie Bain (ORNL), who masterfully prepared the manuscript.

ACRONYMS

AEO	Annual Energy Outlook
ASABE	American Society of Agricultural and Biological Engineers
Btu	British thermal units
CO ₂	Carbon dioxide
CRP	Conservation Reserve Program
d.b.h.	Diameter at breast height
DOE	Department of Energy
EERE	Office of Energy Efficiency and Renewable Energy
EIA	Energy Information Administration
EPA	Environmental Protection Agency
EPAct	Energy Policy Act
ERS	Economic Research Service
FTE	Fuel Treatment Evaluator
FY	Fiscal Year
GHG	Greenhouse Gas
GPRA	Government Performance Results Act
GW	Gigawatt
IEA	International Energy Agency
LFG	Landfill Gas
MJ	Megajoule
MMBtu	Million British thermal units
MW	Megawatt
MSW	Municipal Solid Waste
NASS	National Agricultural Statistics Service
NEMS	National Energy Modeling System
NREL	National Renewable Energy Laboratory
NRCS	National Resources Conservation Service
ORNL	Oak Ridge National Laboratory
RPS	Renewable Portfolio Standard
SRIC	Short Rotation Intensive Culture
TBD	To Be Determined
TVA	Tennessee Valley Authority
USDA	United States Department of Agriculture

PREFACE

The Department of Energy, through the Office of Planning, Budget, and Analysis in the Office of Energy Efficiency and Renewable Energy, has contracted with Oak Ridge National Laboratory to prepare this Biomass Energy Data Book. The purpose of this data book is to draw together, under one cover, biomass data from diverse sources to produce a comprehensive document that supports anyone with an interest or stake in the biomass industry. Given the increasing demand for energy, policymakers and analysts need to be well-informed about current biomass energy production activity and the potential contribution biomass resources and technologies can make toward meeting the nation's energy demands. This is the first edition of the Biomass Energy Data Book and it is currently only available online in electronic format. This first edition focuses on biomass conversion technologies and commercially utilized biomass resources.

Biomass energy technologies used in the United States include an extremely diverse array of technologies - from wood or pellet stoves used in homes to large, sophisticated biorefineries producing multiple products. For some types of biomass energy production, there are no annual inventories or surveys on which to base statistical data. For some technology areas there are industry advocacy groups that track and publish annual statistics on energy production capacity, though not necessarily actual production or utilization. The Department of Energy's Energy Information Administration (EIA) produces annual estimates of biomass energy utilization and those estimates are included in this data book. Information from industry groups are also provided to give additional detail. An effort has been made to identify the best sources of information on capacity, production and utilization of many of the types of biomass energy being produced in this country. It is certain, however, that not all biomass energy contributions have been identified. The information may not be available, or may be proprietary.

It is even more difficult to track the diverse array of biomass resources being used as feedstocks for biomass energy production. Since most of the biomass resources currently being used for energy or bioproducts are residuals from industrial, agricultural or forestry activities, there is no way to systematically inventory biomass feedstock collection and use and report it in standard units. All biomass resource availability and utilization information available in the literature are estimates, not inventories of actual collection and utilization. Biomass utilization information is derived from biomass energy production data, but relies on assumptions about energy content and conversion efficiencies for each biomass type and conversion technology. Biomass availability data relies on understanding how much of a given biomass type (e.g., corn grain) is produced, alternate demands for that biomass type, economic profitability associated with each of those alternate demands, environmental impacts of collection of the biomass, and other factors such as incentives. This book presents some of the information needed for deriving those estimates, as well as providing biomass resource estimates that have been estimated by either ORNL staff or other scientists. For estimates derived from ORNL analysis, the methodology has been documented in Appendix C and additional references have been provided. In all cases it should be recognized that estimates are not precise and different assumptions will change the results.

ABSTRACT

The *Biomass Energy Data Book* is a statistical compendium prepared and published by Oak Ridge National Laboratory (ORNL) under contract with the Office of Planning, Budget, and Analysis in the Energy Efficiency and Renewable Energy (EERE) program of the Department of Energy (DOE). Designed for use as a convenient reference, the book represents an assembly and display of statistics and information that characterize the biomass industry, from the production of biomass feedstocks to their end use.

This is the first edition of the Biomass Energy Data Book and is currently only available online in electronic format. There are five main sections to this book. The first section is an introduction which provides an overview of biomass resources and consumption. Following the introduction to biomass, is a section on biofuels which covers ethanol, biodiesel and BioOil. The biopower section focuses on the use of biomass for electrical power generation and heating. The fourth section is on the developing area of biorefineries, and the fifth section covers feedstocks that are produced and used in the biomass industry. The sources used represent the latest available data. There are also three appendices which include measures of conversions, biomass characteristics and assumptions for selected tables and figures. A glossary of terms and a list of acronyms are also included for the reader's convenience.

