

# **The Asian Biomass Handbook**

**A Guide for Biomass Production and Utilization**

**Support Project for Building Asian-Partnership for  
Environmentally Conscious Agriculture, Entrusted by  
Ministry of Agriculture, Forestry, and Fisheries**

**The Japan Institute of Energy**

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## Preface

It is a great pleasure and honor for me to give some words for this Biomass Handbook. In 2002 we had already published Biomass Handbook in Japanese edition with the help of more than 60 contributors who are distinguished specialists in this field. This time English version has been issued with the cooperation of scientists and engineers of Asian countries in addition to domestic contributors.

As we are aware, negative impacts of global warming has been remarkably coming out. Carbon dioxide discharged from fossil fuel combustion has been accumulated in the atmosphere as far as we consume coal, petroleum, and natural gas. On the other hand, it is clear that the life of fossil fuels is limited, for example, the life, the ratio of reserve divided by the production, of petroleum, coal, and natural gas will be about 41, 160, 65 years, respectively. I believe that we are at the gateway to the new age independent on the fossil fuels and biomass is a key resource to open up a new vista of the future.

Biomass means, in general, a substantial amount of bioorigin resources which can be utilized in the form of energy and materials. Wood, grass, marine algae, micro algae, agricultural wastes, forestry wastes, and municipal wastes fall into this category. Energy crops are one of promising biomass which could make energy plantation possible in a large scale, though it has not yet been commercialized at the present.

One of the strong countermeasures to suppress carbon dioxide emission is the introduction of renewable energies. Renewable energies mean biomass, photovoltaics, geothermal, wind, hydro, tidal, and wave energies. How does differ biomass from other renewable energy?

Biomass forms own body by photosynthesis. The concentration of carbon dioxide in the atmosphere remains unchanged as far as carbon dioxide, which is emitted by combustion of biomass after energy utilization, is refixed by, for example, reforestation. It is called the carbon neutrality of biomass. Energy which replaces fossil fuels can be derived from the cycle, that is, biomass combustion, carbon dioxide emission, and carbon dioxide refixation. Thus, the carbon dioxide emission can be reduced by replacing fossil fuels by biomass.

Biomass is only organic or carbonaceous among renewable energies. In other words, ethanol, methanol, dimethyl ether, and hydrocarbons can be produced only from biomass among renewable energies. It has the same meaning that biomass can be transportable and storable in the form of material. It should be emphasized that wind, photovoltaic, tidal, wave, and geothermal energy can produce heat and power but not chemicals and fuels. However, carbon dioxide emitted from biomass utilization will be accumulated irreversibly into the atmosphere in a similar manner with fossil fuel utilization unless otherwise reforestation is made. Sustainable forestry management is essential to the long and stable supply of bioenergy.

This Biomass Handbook deals with the characteristics and resources of biomass, thermochemical and biochemical conversion of biomass, and system development of sustainability. However, the most important aspect is the contribution of many specialists of Asian countries, that is, Brunei, Cambodia, China, India, Indonesia, Korea Malaysia, Myanmar, Philippines, Singapore, Taipei Chinese, Thailand, Viet Nam. I should like to appreciate all the people who contributed this Handbook. Also I appreciate the Ministry of Agriculture, Forestry and Fisheries which gave an opportunity to enable us to issue this Handbook by financial support.

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