TECHNICAL ENHANCEMENT FOR RENEWABLE ENERGY UTILISATION

EDITOR
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UTM
UNIVERSITI TEKNOLOGI MALAYSIA

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With the aim to make the upscale of renewable energy utilisation becomes reality, performance enhancement of the current renewable energy system is a must. This book reveals various technical measures that have been discovered for stimulating the development of various renewable energies such as biomass-based energy, including solid biochar, biodiesel and bioethanol, as well as wave energy.

Ideal for researchers, students and professionals in energy engineering, mechanical engineering and related fields, this book discusses in details numerous upgrading strategies for increasing the potential to upscale the renewable energies utilisation.

Besides stimulating interest among readers on the topic of upgrading strategies for efficiency improvement, the awareness about the importance of transformation from sole dependence on fossil fuels to diversification of energy sources (including renewable energy) can be enhanced.

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CONTENTS

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PREFACE

With the increasing energy demand throughout the world, a transformation from sole dependence on fossil fuels to diversification of renewable energy sources for electricity generation is necessary to cope with the high energy demand scenario while protecting our environment. However, upgrading strategies are still needed to enhance the current performance. The *Technical Enhancement for Renewable Energy Utilisation* book comprehensively covers various strategies for utilizing renewable energies to increase the practicality as well as the potential for upscaling the existing renewable energy system.

This book consists of six chapters, discussing in detail about the strategies introduced for solid biochar production, combustion of duel-fuel biodiesel and natural gas, combustion of diesel-ethanol blend in compression ignition engine and electricity generation based on wave energy.

Chapter 1 is an introduction for this book, which emphasise the importance of transformation from sole dependence on fossil fuels to expansion of renewable energy usage. Renewable energy technology and energy efficiency improvement are important elements in sustainable energy and could beneficial environment, economy as well as community.

Chapter 2 is related to the modelling of one of the biomass pretreatments, namely as torrefaction. The modelling elucidates the role of heat and mass transport during torrefaction especially the effect of torrefaction temperature on mass yield.

Chapter 3 is related to a strategy to increase the biofuel produced for the same amount of nitrogen gas used, thus saving the cost in terms

of nitrogen consumption. The concept of multilevel torrefaction is to use the mixture of nitrogen and torrefied gases from the lower level as torrefaction medium.

Chapter 4 focuses on the combustion of dual-fuel, in which are biodiesel and natural gas. In this chapter, dual-fuel combustion strategy was introduced to enhance the combustion of biofuels by injecting small amount of secondary fuel with higher reactivity into the biofuels.

Chapter 5 discusses the effect of methyl ester addition on various criteria of performances for a diesel/ethanol fuelled compression ignition engine. The criteria evaluated include brake specific fuel consumption (BSFC), brake thermal efficiency (BTE), emission as well as development of in-cylinder pressure.

The final chapter (Chapter 6) is related to a wave energy system. In this chapter, the effect of the geometry of a Backward Bent Duct Buoy (BBDB), which is known as a wave energy converter on the performance of the BBDB is discussed.

Finally, I specifically want to thank all contributors in this book, titled *Technical Enhancement for Renewable Energy Utilisation*.

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