

Preface

This book is prepared with the expectation of achieving the comprehensive methods to produce more convenient and economical primary energy from non-conventional energy sources and to improve the energy conversion processes.

Approaches to finding new sources of energy, evaluation of unused waste energy, inactive and unconventional energy sources to be put into operation recently has become inevitable. Production of energy from these sources and optimization of the new systems is becoming increasingly important.

Unconventional energy sources cover unusually unconventional energy, with little or no unused, inactive cases and the energy resources available in waste form. Waste energy covers unused or used with low efficient energy resources.

This text material was prepared for postgraduates, fuel engineers, scientists, energy researches, industrialists, policy makers and agricultural engineers. Energy demand, energy production and cost have always been a concern for researchers as well as policy makers.

The first chapter on “Introduction” already comprises one tenth of the book; in these pages emphasis is laid in detail on energy concept, global energy sources, especially renewables, i.e. biomass, hydro, wind, solar, geothermal and world’s present energy situation. The second chapter is entitled “Future Energy Sources” including main renewable energy scenarios, research and development of biomass energy, water energy and power; hydrogen energy, biogas energy, algae energy and the next generation of hybrid transportation vehicles are addressed in detail. The third chapter already comprises 50 % of the book; in these pages emphasis is laid in detail on “Unconventional Energy Sources” covers the waste energy, energy use, shaking energy, squeezing energy, water energy, inactive energy sources and promising energy systems. The fourth chapter covers wind power generation using shaking energy, compressed air energy, water forces and water energy, gas hydrates as a potential future energy resource, biofuels from high quality microalgae, thermochemical conversion processes of biomass to hydrogen-rich gas mixtures, biofuels from sewage sludge, biodiesel and bioethanol from unconventional resources, gasoline-like products from plastic and tire wastes, conversion of oil shale to liquid

fuels, conversion of used oils to gasoline-like products, conversion of heavy oil to light products, upgrading of crude oil and heavy oil and gasoline and diesel range hydrocarbons from waste vegetable oils. Furthermore, processing conditions are discussed briefly as well as alternative applications of unconventional energy sources. The fifth chapter covers optimization of energy conversion processes, waste heat utilization facilities, importance of unconventional energy sources and energy economics and energy policy and barriers.

Experts suggest that current oil and gas reserves would suffice to last only a few more decades. To exceed the rising energy demand and reducing petroleum reserves, unconventional energy sources, are in the forefront of the alternative technologies. It is well known that transport is almost totally dependent on fossil particularly petroleum-based fuels such as gasoline, diesel fuel, liquefied petroleum gas and natural gas. An alternative energy sources must be technically feasible, economically competitive, environmentally acceptable and easily available.

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