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Editorial

Green Energy Technology

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1. Introduction

Our environment is facing several serious challenges from energy utilization, such as fossil fuel exhaustion, air pollution, deteriorated atmospheric greenhouse effect, global warming, climate change, etc. To solve these problems derived from nonrenewable fuel consumption, a variety of countermeasures, such as the establishment of the RE100 campaign and the target of net zero emissions by 2050, have been launched. To achieve these targets, the development of green energy technology plays a pivotal role. Green Energy Technology (GET) covers technologies, products, equipment, and devices as well as energy services based on software and data protected by patents and/or trademarks. Recent trends underline the principles of a circular economy such as sustainable product design, extending the product lifecycle, reusability, and recycling. Climate change, environmental impact, and limited natural resources require scientific research and novel technical solutions. This Special Issue on Green Energy Technology in *Energies* serves as a publishing platform for scientific and technological approaches to "green"—i.e., environmentally friendly and sustainable—technologies. While a focus lies on energy and bioenergy, it also covers "green" solutions in all aspects of industrial engineering. This Special Issue publishes a comprehensive overview and in-depth technical research paper addressing recent progress in Green Energy Technology. Studies of advanced techniques and methods involving experimental and numerical studies, recent developments, and the current state-of-the-art and emerging technologies in Green Energy Technology are also covered.

This Special Issue of *Energies* on the subject of "Green Energy Technology" contains the successful invited submissions [1–17]. A total of 17 technical papers that cover diversified green energy technology-related research have shown critical results and contributed significant findings in biofuel production [1], energy-saving in buildings [2], wind energy [3], energy policy [4], electricity supply [5], a thermal–hydraulic system [6], fluidized bed reactor [7], green-supply chains [8], SI engine [9], renewable energy grid [10], kinetic energy harvest [11], green hydrogen utilization [12], water conservation [13], hydraulic power [14], Illumination Performance in buildings [15], community renewable energy [16], and heat transfer [17].

The response to our call had the following statistics:

- Submissions (26);
- Publications (17);

- Rejections (9);
- Article types: research articles (17); review articles (0).

Published submissions are related to the most important techniques and analyses applied to green energy technology. In summary, the edition and selections of papers for this Special Issue are very inspiring and rewarding. We thank the editorial staff and reviewers for their efforts and help during the process.

2. Brief Overview of the Contributions to This Special Issue

Most of the published papers focus on providing green energy technology solutions toward environmental sustainability. The following discussion highlights the research findings in accordance with the corresponding research field or work in this Special Issue.

Biofuel is one of the solutions for energy shortage and environmental threats. Nguyen et al. [1] developed microwave-assisted noncatalytic oleic acid esterification for biodiesel production. The highest reaction conversion (97.62%) was achieved by the microwave-assisted esterification process. The study also established a second-order reaction model for the reaction and proven that microwave power greatly influenced the reaction due to nonthermal effects. Moreover, the implementation of poly-ethylene terephthalate (PET)-based waste plastic oil (WPO) at varying engine speed conditions is conducted by Khairil et al. [9]. The properties of WPO were also found to be within the limits mandated in ASTM standard, and the engine performance for different WPO–gasoline blends were close to that of pure gasoline. Pellegrini et al. [12] analyzed the potential of green hydrogen blending in the Italian natural gas network. This work shows how to inject 8100 tons/year of green hydrogen blending in the existing natural gas network with a proper location and sizing of renewable power-to-hydrogen plants. This green hydrogen potential corresponds to an installed capacity of about 78 MW of electrolyzers and about EUR 488 million of investment.

Building energy consumption has risen and will continuously increase with the rise in population, the growth of modern society, and quality of life improvements. The utilization of natural lighting can significantly reduce thermal accumulation in buildings. Thongtha and Boontham [2] designed the application of natural light integrated by using the novel glass units, which provided adequate and efficient daylight illuminance into its interior and decreased heat transmission through the building frames. This led to the conservation of energy consumption from the cooling load of air conditioners and lighting systems. Hence, a significant decline in yearly peak cooling and lighting energy consumption. Jintanawan et al. [11] designed an energy harvesting floor that could convert mechanical energy from people's footsteps to electrical energy. Their outcome showed that the lead-screw model with 45° lead angles coupled with a Genpath prototype-II with a 12-V-DC generator can generate up to 702 mJ which more average energy than others. The efficiency of the EM-generator system is 26% based on the power generation from the heel strike of a human's walk of 2 W per step. The power management and storage circuit were developed to harvested energy into the batteries and to supply other parts to specific loads such as a wireless sensor and Internet of Thing applications. Another building energy analyzed the illumination performance of hollow light pipe which is made from commercial aluminum alloy sheets and commercial zinc alloy sheets [15] aims to reduce electricity consumption for the lighting system. The average illuminance performance of both material types increased with an increase in the incidence angle. The commercial aluminum alloy tube promotes greater light transmission and daylight factor when compared with the commercial zinc alloy tube in each condition. This illuminance measurement demonstrates that the light tube could be included in the lighting systems of some deeper or windowless areas of buildings to decrease the demand for energy consumption in the lighting of buildings.

Many developing countries suffer from high energy-import dependency and inadequate electrification of rural areas. Thus, community renewable energy (CRE) is one of the effective policy tools to provide sustainable energy in a community. Tani and Morone [4] investigated the transition to clean energy technologies in the Boston area, and the outcome showed that the clean energy niche is generally perceived as strong and dynamic in the

Boston area. However, the public de-legitimizing narrative identified gaps such as limited engagement of the local and federal government in breaking through well-established practices and regulatory frameworks, funding, and infrastructure at the policy level. These gaps are likely to delay the market uptake of clean energies in that area. The Philippines' and Singapore's experience in liberalizing their electricity supply industry is presented by Aris et al. [5]. Moreover, Al-Ghussain et al. [10] proposed 100% renewable energy electricity for remote areas in Jordan (Al-Tafilah). The optimal system in Al-Tafilah comprises a 28 MW wind system, 75.4 MW PV, and 1 MW hydropower, with a 259 MWh energy storage system, which is able to provide 99% of energy consumption and reduce up to 47,160 $MtCO_2$ annually. This model can be easily utilized in other rural cities in Jordan. Luangchosiri et al. [16] analyzed the characteristics of community renewable energy in Thailand to identify the key factors affecting its implementation. They revealed that the primary motivation for implementing CRE is a sustainable development of a community. The internal success factors are intention and vision, human resources, management skills, and community participation, while the external success factors are renewable energy potential, mature technology, financial support, appropriate consultation, and support from the national and local government. It is strongly suggested that external factors, such as financial policy and network support, should be promoted to further facilitate CRE implementation.

Thermal energy also gains much attention recently. Lee and Kim [6] studied the influence of two-phase crossflow for void prediction in bundles using thermal–hydraulic system codes. The outcome of the investigation shown an improvement should be employed a turbulent mixing model based on the Equal Volume and Void Drift to simulate the direct net mass and energy interchanges between channels under two-phase flow conditions. Chang et al. [17] designed the novel printed circuit heat exchanger (PCHE) to enhance the waste heat recovery technology and improve energy efficiency. The PCHE's effectiveness is up to 97.9% for an inlet flow temperature of 95 °C which is better than the others that have fewer layers of PCHE fins.

Other types of green technology such as passive vortex generators, wave energy, floating photovoltaics, liquid-solid circulating fluidized bed, etc. are also presented for this Special Issue. Zhu et al. [3] investigated the effect of passive vortex generators (VGs) on the deep dynamic stall of a wind turbine airfoil. They found that both single-row and double-row VGs effectively suppress the flow separation and reduce the fluctuations in aerodynamic forces. The maximum lift coefficient is therefore increased beyond 40% and suggests that deep dynamic-stall behaviors can be properly controlled by VGs. This study provides the understanding of deep dynamic stall controlled by single-row and double-row VGs. Sureshkumar et al. [7] developed the activated-carbon-coated glass bead adsorbents and applied them for phenol removal from synthetic wastewater which can absorb up to 80% of phenol. Thus, this is an innovative method for effective treatment for toxic phenol contaminant elimination from aqueous solutions. Jusoh et al. [14] applied two major kinds of optimization algorithms (Quadratic Lagrangian (NLPQL) and evolutionary Genetic Algorithm (GA)) on the hydraulic power take-off (HPTO) model for the wave energy converters (WECs). The optimal simulation results showed that the performance of HPTO units has significantly improved up to 96% and 97%, respectively, in regular wave conditions. Both optimal HPTO units were capable of generating electricity up to 62% and 77%, respectively, of their rated capacity in irregular wave circumstances.

Heyibo et al. [13] investigated a new approach of floating photovoltaics or floatovoltaics (FPV) using a flexible crystalline silicon-based photovoltaic module, which is less expensive than conventional pontoon-based FPV. The results show that the foam-backed FPV had a lower operating temperature with a 3.5% higher energy output per unit power. At 50% coverage of Lake Mead, the foam-backed FPV would provide up to127 TWh of clean solar electricity and 633.22 million m^3 of water savings, which would provide enough electricity to retire 11% of the polluting coal-fired plants in the U.S. and provide water for over five million people yearly. The high cost and low profit of green investment are concerns for the government and enterprises deterred from their implementation of green investment. Shi et al. [8] suggested that value co-creation has become a key measure to solve this problem. The green supply chain strategy can promote a high level of firms' value co-creation with their supply chain partners, and different value co-creation modes have different effects on firm performance. Thus, by integrating green supply chain strategies and value co-creation strategies, providing confidence to the firms and their supply chain partners in value co-creation, thus helping them to better implement a green supply chain strategy.

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