ADVANCES IN SUSTAINABLE TECHNOLOGIES: EMERGING TRENDS AND APPLICATIONS

Edited by

Dr. Ranjan Kumar

Head of the Department & Associate Professor Department of Mechanical Engineering Swami Vivekananda University, Kolkata

Dr. Ashes Banerjee

Assistant Professor Department of Civil Engineering Swami Vivekananda University, Kolkata

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Preface

The global shift toward sustainable energy solutions and smart technologies has led to significant advancements in renewable energy, electric vehicles, smart grids, and emerging energy storage systems. The integration of these technologies is crucial for achieving energy efficiency, reducing carbon emissions, and ensuring a resilient and sustainable future. This compilation of research chapters presents a comprehensive exploration of recent developments in these fields, covering theoretical frameworks, technological innovations, and practical applications.

This volume brings together contributions from experts and researchers who delve into various aspects of renewable energy integration, energy management in smart grids, advancements in electric vehicle technology, and the role of artificial intelligence in optimizing energy systems. Special attention is given to key challenges such as grid stability, energy storage limitations, and the intermittency of renewable energy sources. The discussions also highlight cutting-edge solutions, including artificial intelligence, machine learning, blockchain, and advanced power electronics, which are shaping the next generation of energy systems.

In addition to technological advancements, this book also examines the economic, policy, and regulatory perspectives essential for the widespread adoption of sustainable energy solutions. Case studies from different parts of the world illustrate the real-world applications and the impact of these technologies on the energy sector.

We hope this volume serves as a valuable resource for researchers, academicians, industry professionals, and policymakers working toward a cleaner, smarter, and more sustainable energy future. The insights provided herein aim to contribute to the ongoing discourse on renewable energy and its integration into modern power systems, inspiring further innovation and collaboration in this critical domain.

Dr. Ranjan Kumar Dr. Ashes Banerjee Advances in Sustainable Technologies: Emerging....: ISBN: 978-81-974962-2-6 RGRF

Acknowledgement

The successful compilation of this volume, *Advances in Sustainable Technologies: Emerging Trends and Applications*, would not have been possible without the contributions, support, and dedication of numerous individuals and institutions. We extend our heartfelt gratitude to all the authors whose research and insights have enriched this collection. Their expertise and commitment to advancing knowledge in renewable energy, smart grids, electric vehicles, and emerging sustainable technologies have made this book a valuable resource.

We sincerely appreciate the support and encouragement provided by **Swami Vivekananda University** and other collaborating institutions. Their continuous efforts in promoting research and innovation have played a pivotal role in shaping this work. Special thanks to the **Department of Electrical Engineering** and all faculty members who have contributed their knowledge and guidance throughout this endeavor. Our gratitude also goes to the reviewers and editorial team, whose constructive feedback and meticulous attention to detail have helped refine and enhance the quality of the chapters included in this volume. Their expertise has ensured that the content meets the highest academic and technical standards.

We also wish to acknowledge the unwavering support of our families, friends, and colleagues, whose encouragement and patience have been invaluable throughout the editing and publishing process.

Finally, we express our sincere appreciation to the publishers for their cooperation and assistance in bringing this book to completion. We hope that this volume will serve as a meaningful contribution to the ongoing discourse on sustainable energy and inspire further research and innovation in this vital field.

Dr. Ranjan Kumar Dr. Ashes Banerjee

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