

1. Record Nr.	UNINA9910877460903321
Autore	Kumar Adesh
Titolo	Clean and Renewable Energy Production
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2024 ©2024
ISBN	1-394-17480-2 1-394-17479-9
Edizione	[1st ed.]
Descrizione fisica	1 online resource (555 pages)
Altri autori (Persone)	PachauriRupendra Kumar MondalAmit Kumar SinghVishal Kumar SharmaAmit Kumar
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Preface -- Chapter 1 Vegetable Seed Oils as Biofuel: Need, Motivation, and Research Identifications -- 1.1 Introduction to Vegetable Oils -- 1.2 Motivation -- 1.3 Need of Research -- 1.3.1 Biodiesel Considerations -- 1.3.2 Energy Balance and Security -- 1.3.3 Air Quality -- 1.3.4 Engine Function -- 1.3.5 Safety -- 1.4 Detailed Survey -- 1.5 Identification of the Research Gaps -- 1.5.1 Toxicity -- 1.5.2 Biodegradability -- 1.6 Conclusions -- References -- Chapter 2 Methodology and Instrumentation for Biofuel with Study on Cashew Nut Shell Liquid -- 2.1 Methodology -- 2.2 Procedure -- 2.2.1 Common Points -- 2.3 Fourier Transform Infrared Spectroscopy -- 2.4 Gas Chromatography-Mass Spectrometry -- 2.5 Nuclear Magnetic Resonance -- 2.6 CNSL Study -- 2.7 Conclusions -- References -- Chapter 3 Emerging Technologies for Sustainable Energy Applications -- 3.1 Introduction -- 3.2 Carbon Dioxide Sequestration -- 3.2.1 Biological Carbon Sequestration -- 3.2.2 Geological Carbon Sequestration -- 3.2.3 Technological Carbon Sequestration -- 3.2.4 Hydrate-Based CO2 Sequestration Technology -- 3.2.5 Carbon Sinks and Types -- 3.2.5.1 Estuarine Ecology as Sediment Carbon -- 3.2.5.2

Mangroves and Mudflat Soils as Carbon Sink -- 3.2.5.3 Tidal Marsh Soils as Carbon Sink -- 3.2.5.4 Soils of Coastal Agroecosystem as Carbon Sink -- 3.2.5.5 Sediments of Marine Coastal Ecologies as Carbon Sink -- 3.2.6 CO₂ Sequestration Utilization in Enhanced Oil Recovery -- 3.3 Carbon Capture, Utilization, and Storage -- 3.3.1 Global CCUS Development -- 3.3.2 Risk Analysis of CCUS -- 3.4 Renewable Energy -- 3.4.1 Solar Energy -- 3.4.2 Hydro Energy -- 3.4.3 Geothermal Energy -- 3.4.4 Biomass Energy -- 3.4.5 Wind Energy -- 3.5 Conclusion -- References -- Chapter 4 Affordable and Clean Energy: Natural Gas Hydrates and Hydrogen Storage. 4.1 Introduction -- 4.2 Gas Hydrates -- 4.2.1 Extraction Methodologies -- 4.2.1.1 Thermal Stimulation Method -- 4.2.1.2 Depressurization Method -- 4.2.1.3 Inhibitor Injection Method -- 4.2.1.4 Gas Exchange Method -- 4.2.2 Geological Hazards -- 4.2.2.1 Hydrate-Associated Risks for Oil and Gas Exploitation -- 4.2.3 Sustainable Applications -- 4.2.4 Solidified Natural Gas -- 4.2.5 Seawater Desalination -- 4.2.6 CO₂ Sequestration and Methane Recovery -- 4.2.7 Gas Separation -- 4.3 Hydrogen Energy -- 4.3.1 Types of H₂ -- 4.3.2 Hydrogen Storage -- 4.3.2.1 Compressed Gas -- 4.3.2.2 Underground Hydrogen Storage -- 4.3.2.3 Liquid Hydrogen -- 4.3.2.4 Solid Storage -- 4.3.3 H₂ as Fuel -- 4.3.4 Industrial Applications of H₂ -- 4.4 Recent Advancement Toward Clean Energy Applications -- 4.5 Conclusion -- References -- Chapter 5 Wind and Solar PV System-Based Power Generation: Imperative Role of Hybrid Renewable Energy Technology -- 5.1 Introduction -- 5.2 Renewable Energy for Sustainable Development -- 5.3 Global Energy Scenario -- 5.4 Solar Energy Potential -- 5.5 Wind Potential for Power Generation -- 5.6 Hybrid Renewable Energy Systems -- 5.7 Pros and Cons of the Hybrid Renewable Energy System -- 5.7.1 Pros of the Hybrid Renewable Energy System -- 5.7.2 Cons of the Hybrid Renewable Energy System -- 5.8 Conclusion -- References -- Chapter 6 A Systematic Review of the Last Decade for Advances in Photosynthetic Microbial Fuel Cells with Bioelectricity Generation -- 6.1 Introduction -- 6.2 Background -- 6.3 Methodology -- 6.4 Study Selection Criteria -- 6.5 Configurations and Performance Evaluation of Photosynthetic Microbial Fuel Cells -- 6.5.1 Algal-Based p-MFC -- 6.5.2 Plant-Microbial Fuel Cells or P-MFCs -- 6.6 Outlook -- Data Availability Statement -- Funding -- Conflict of Interest -- References. Chapter 7 Hydrothermal Liquefaction as a Sustainable Strategy for Integral Valorization of Agricultural Waste -- 7.1 Introduction -- 7.2 Generation of Biofuels -- 7.3 Biomass Conversion Routes -- 7.4 HTL Reaction Mechanism -- 7.5 HTL Process Yield Calculations -- 7.6 HTL Advantage Over Pyrolysis -- 7.6.1 Energy Content from the Biomass -- 7.6.2 Bio-Oil and Bio-Coal Yields -- 7.6.3 Oxygen Content in Bio-Oil -- 7.6.4 Carbon Content Utilization -- 7.6.5 No Pretreatment and Drying -- 7.6.6 Energy Saving -- 7.7 Types of Reactors for the Hydrothermal Liquefaction Process -- 7.7.1 Batch Reactor -- 7.7.2 Continuous Reactor -- 7.7.2.1 Continuous Plug Flow Reactor -- 7.7.2.2 Continuous Stirred Tank Reactor -- 7.8 Influence of Operating Parameters -- 7.8.1 Biomass Type -- 7.8.2 Operating Temperature -- 7.8.3 Heating Rate -- 7.8.4 Residence Time -- 7.8.5 Pressure -- 7.8.6 Type of Catalyst -- 7.9 Product Distribution and Evaluation -- 7.9.1 Liquid (Bio-Oil) -- 7.9.2 Solid (Hydrochar) -- 7.9.3 Aqueous Water and Gases -- 7.10 Potential Applications of HTL Products -- 7.11 Challenges and Limitations of the HTL Process -- 7.12 Techno-Economic and Environmental Analysis -- 7.13 Conclusions -- References -- Chapter 8 Imperative Role of Proton Exchange Membrane Fuel Cell System and Hydrogen Energy Storage for Modern Electric Vehicle Transportation: Challenges and Future Perspectives -- 8.1

Introduction -- 8.2 Modeling of the PEMFC System -- 8.3 Electrical Vehicle Categories -- 8.4 Hydrogen Energy Storage -- 8.4.1 Hydrogen Energy Production: Approaches with Challenges -- 8.4.2 Methods of Hydrogen Energy Storage: Approaches and Challenges -- 8.5 Future Scope, Challenges, and Benefits of FCEVs -- 8.6 Pros and Cons of Electric Vehicles in the Aspect of Modern Transportation System -- 8.7 MATLAB/Simulink Study of FC-Powered Electric Drive System -- 8.8 Conclusion.

References -- Chapter 9 Ocean Energy-A Myriad of Opportunities in the Renewable Energy Sector -- 9.1 Introduction -- 9.2 International Agencies Promoting Ocean Energy Projects -- 9.3 Ocean Energy Potential -- 9.4 Types of Ocean Energy -- 9.5 Tidal Energy -- 9.5.1 Tidal Stream Generator -- 9.5.2 Tidal Stream Barrage -- 9.5.3 Tidal Lagoon -- 9.5.4 Dynamic Tidal Power -- 9.6 Tidal Currents -- 9.7 Wave Energy -- 9.8 Ocean Thermal Energy Conversion -- 9.9 Salinity Gradient -- 9.10 Marine Energy Projects in India -- 9.10.1 Case Study 1 -- 9.10.2 Case Study 2 -- 9.11 Conclusion -- Author Contributions -- References -- Chapter 10 Performance of 5 Years of ESE Lightning Protection System: A Review -- Sachin Kumar, Gagan Singh and Nafees Ahamad Introduction -- Theoretical Background -- External Lightning Protection Structure for the PV Power Plant -- Results and Analysis -- Conclusion -- References -- Chapter 11 Solar Photovoltaic System-Based Power Generation: Imperative Role of Artificial Intelligence and Machine Learning -- 11.1 Introduction -- 11.2 Solar Energy Power Generation Scenario in the Indian Context -- 11.3 Applications of AI and ML in Solar PV Systems -- 11.3.1 Maintenance Prediction -- 11.3.2 Optimization of Orientation of the Solar Panels to Maximize Energy Generation -- 11.3.3 Weather Forecasting for PV System Power Assessment -- 11.3.4 Forecasting of PV System Performance During Dust Accumulation -- 11.3.5 Solar Parameter Prediction -- 11.3.6 Fault Detection Using Artificial Intelligence -- 11.4 Pros and Cons of AI and ML Techniques in Solar PV System -- 11.5 Application of GA-Based Optimal Placement of PV Modules in an Array to Reduce PSCs -- 11.5.1 Modeling of PV System -- 11.5.2 Genetic Algorithm-Based PV Array Reconfiguration -- 11.5.3 Shading Scenarios and Electrical Performance -- 11.6 Conclusion -- References.

Chapter 12 Waste to Energy Technologies for Energy Recovery -- 12.1 Introduction -- 12.2 Preparation Methods -- 12.3 Carbonization and Activation -- 12.3.1 Uses of Carbonization -- 12.3.2 Uses of Activation -- 12.3.2.1 Phosphoric Acid Activation -- 12.3.2.2 Zinc Chloride Activation -- 12.3.2.3 Potassium Hydroxide Activation -- 12.3.2.4 Potassium Carbonate Activation -- 12.3.2.5 Nitric Acid Activation -- 12.4 Electrode Materials Extracted from Biowastes -- 12.4.1 Carbon Nanotube -- 12.4.2 Graphene Oxide -- 12.4.3 Carbon Aerogel -- 12.4.4 Activated Carbon -- 12.5 Energy Storage Applications -- 12.6 Importance of Electrolyte -- 12.7 Conclusions -- References --

Chapter 13 A Review of Electrolysis Techniques to Produce Hydrogen for a Futuristic Hydrogen Economy -- 13.1 Introduction -- 13.1.1 Chemistry Behind Electrolysis -- 13.1.2 Step 1 -- 13.1.3 Step 2 -- 13.1.4 Anion Exchange Membrane Water Electrolysis -- 13.2 Methodology -- 13.2.1 Search Strategy -- 13.2.2 Search Scope -- 13.2.3 Search Method -- 13.2.4 Search String -- 13.2.5 Study Selection Criteria -- 13.3 Configurations and Performance Evaluation of AEM Electrolyzer -- 13.4 Scope for Improvements -- 13.5 Conclusion -- References -- Chapter 14 Prospects of Sustainability for Carbon Footprint Reduction -- 14.1 Introduction -- 14.2 Context and Outcomes of the United Nations Climate Change Framework -- 14.3 Monitoring Direct and Indirect Carbon Emissions -- 14.4 Sustainable

Alternatives to Reduce Carbon Footprints -- 14.4.1 Policies for Reducing Carbon Footprints -- 14.4.2 Technologies and Strategies Designed for Specific Sectors -- 14.4.3 Innovative Carbon Reduction Strategies and Technologies -- 14.4.3.1 Buildings and Cities -- 14.4.3.2 Transportation -- 14.4.4 Societal Contribution Toward Carbon Reduction -- 14.5 Carbon Elimination from the Atmosphere -- 14.6 Outlook -- Conflict of Interest.
References.
