

1. Record Nr.	UNINA9910830736903321
Autore	Xu Jiuping
Titolo	Sustainable Hybrid Energy Systems : Carbon Neutral Approaches, Modeling, and Case Studies
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2024 ©2024
ISBN	3-527-84325-6 3-527-84326-4 3-527-84327-2
Edizione	[1st ed.]
Descrizione fisica	1 online resource (433 pages)
Altri autori (Persone)	WangFengjuan
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright -- Contents -- List of Figures -- List of Tables -- Preface -- Chapter 1 Introduction -- 1.1 Background -- 1.1.1 Global Mission of Achieving Carbon Neutrality -- 1.1.2 Global Passion for Promoting Energy Transition -- 1.1.3 Global Status of Developing Hybrid Energy Systems -- 1.2 Hybrid Energy Systems -- 1.2.1 Definition -- 1.2.2 Classification -- 1.2.3 Advantages -- 1.3 Chapter Organization -- References -- Chapter 2 Industrial DecarbonizationOriented Deployment of Hybrid Wind-SolarStorage System -- 2.1 Background Review -- 2.2 Main Issue Description -- 2.2.1 System Schematic -- 2.2.2 Decarbonization Datasets -- 2.2.3 Optimization Scheme -- 2.3 Mathematical Modeling -- 2.3.1 Notations -- 2.3.2 Decarbonized Deployment -- 2.3.2.1 To Reduce the Total Electricity Utilization Costs -- 2.3.2.2 To Promote the Installed Capacity of Wind and Solar Power -- 2.3.2.3 To Accelerate Decarbonization and Control Pollution Emissions -- 2.3.2.4 Wind Power Output -- 2.3.2.5 Solar Power Output -- 2.3.2.6 Operation of Battery Storage System -- 2.3.2.7 Compensation of Wind, Solar, and Storage Resources -- 2.3.2.8 Electricity Supply and Demand Balance -- 2.3.2.9 Available Area for New Energy Installation -- 2.3.3 Global Model -- 2.3.4 Model Solving -- 2.4 Case Study -- 2.4.1 Case Description -- 2.4.2 Data Collection -- 2.4.3 Calculation Results and Analysis -- 2.4.3.1 Optimal

Configurations Results -- 2.4.3.2 Economic Performance and Self Sufficiency Ratio -- 2.4.3.3 Regional Decarbonization Potential -- 2.5 Comprehensive Discussions -- 2.5.1 Scenario Simulation -- 2.5.2 Management Recommendations -- References -- Chapter 3 Sustainable OperationOriented Deployment of Hybrid Wind-Solar Storage System -- 3.1 Background Review -- 3.2 Main Issue Description -- 3.2.1 System Schematic -- 3.2.2 Operation Strategy. 3.2.3 Optimization Scheme -- 3.3 Mathematical Modeling -- 3.3.1 Notations -- 3.3.2 Sustainable Deployment -- 3.3.2.1 Economic Sustainability: Minimize the Levelized Cost of Electricity -- 3.3.2.2 Technical Sustainability: Maximize SelfSufficiency Ratio -- 3.3.2.3 Environmental Sustainability: Minimize Carbon Emissions -- 3.3.2.4 Social Sustainability: Maximize Job Creation -- 3.3.2.5 Output of Solar Power -- 3.3.2.6 Output of Wind Power -- 3.3.2.7 Balance of Battery Storage System -- 3.3.2.8 Balance of Demand and Supply -- 3.3.2.9 Key Operation Constraints -- 3.3.3 Global Model -- 3.3.4 Model Solving -- 3.4 Case Study -- 3.4.1 Case Description -- 3.4.2 Data Collection -- 3.4.3 Calculation Results and Analysis -- 3.4.3.1 Results Under Different Scenarios -- 3.4.4 Results of Energy Balance -- 3.4.4.1 Influence of Electricity Price -- 3.4.4.2 Influence of Natural Resources -- 3.5 Comprehensive Discussion -- 3.5.1 Related Propositions -- 3.5.2 Management Recommendations -- References -- Chapter 4 Disaster ResilienceOriented Deployment of Hybrid Wind-SolarStorage Gas System -- 4.1 Background Review -- 4.2 Main Issue Description -- 4.2.1 System Schematic -- 4.2.2 Resilience Characterization -- 4.2.3 Optimization Scheme -- 4.3 Mathematical Modeling -- 4.3.1 Notations -- 4.3.2 Resilient Deployment -- 4.3.2.1 The UpperLevel Decision Maker: To Maximize the Use of Clean Energy -- 4.3.2.2 To Minimize the Total Annual Power Costs -- 4.3.2.3 To Minimize Carbon Emissions -- 4.3.2.4 To Maximize Power System Resilience -- 4.3.2.5 Clean Energy Use Restrictions -- 4.3.2.6 Installation Area Restriction -- 4.3.2.7 PV Panel Operation -- 4.3.2.8 Energy Storage System Operation -- 4.3.2.9 Battery State Restrictions -- 4.3.2.10 Gas Turbine Operation -- 4.3.2.11 Power Supply and Demand Balance -- 4.3.3 Global Model -- 4.3.4 Model Solving -- 4.4 Case Study. 4.4.1 Case Description -- 4.4.2 Data Collection -- 4.4.3 Calculation Results and Analysis -- 4.4.3.1 Maximum Resilience Emission Results -- 4.4.3.2 Comparison of Different Scenarios -- 4.4.3.3 Operation Under Normal Modes -- 4.4.3.4 Operation Under Extreme Disasters -- 4.4.3.5 Influence of Changing Market Prices -- 4.5 Comprehensive Discussion -- 4.5.1 Related Propositions -- 4.5.2 Management Recommendations -- References -- Chapter 5 Bilevel Emission Quota Allocation Toward Coal and Biomass Cocombustion -- 5.1 Background Review -- 5.2 Main Issues' Description -- 5.2.1 System Schematic -- 5.2.2 Uncertain DecisionMaking Environment -- 5.2.3 Bilevel DecisionMaking Structure -- 5.3 Modeling -- 5.3.1 Notations -- 5.3.2 Perspective from the Local Authority -- 5.3.2.1 To Maximize the Revenue -- 5.3.2.2 To Minimize the Total Carbon Emissions -- 5.3.2.3 Limitations on Each CPP's Carbon Emissions -- 5.3.2.4 Guarantee of Power Supply -- 5.3.2.5 Gap Between the Assigned Emission Quota and the Actual Emissions -- 5.3.3 Perspective from the CPPs -- 5.3.3.1 To Maximize Profits of Electricity Generation -- 5.3.3.2 Combustion Efficiency -- 5.3.3.3 Fuel Quantity Requirements -- 5.3.3.4 Fuel Qualities' Requirements -- 5.3.3.5 Blending Ratio Limitation of Biomass -- 5.3.3.6 Responsibility to Ensure Power Supply -- 5.3.3.7 Emissions Quota Constraints -- 5.3.3.8 Dynamic Fuel Storage -- 5.3.3.9 Logistic Constraint on Fuel Storage -- 5.3.3.10 Limitation of Warehousing Ability -- 5.3.4 Global Model -- 5.3.5 Model Solving -- 5.4 Case Study

-- 5.4.1 Case Description -- 5.4.2 Data Collection -- 5.4.3 Results Under Different Scenarios -- 5.5 Discussion -- 5.5.1 Propositions and Analyses -- 5.5.2 Policy Implications -- References -- Chapter 6 Bi Level Emission Quota Allocation Toward Coal and Municipal Solid Waste Cocombustion -- 6.1 Background Review.
6.2 Main Issue Description -- 6.2.1 System Schematic -- 6.2.2 Uncertain DecisionMaking -- 6.2.3 BiLevel Relationship -- 6.3 Modeling -- 6.3.1 Notations -- 6.3.2 Modeling Description for Regional Authority -- 6.3.2.1 To Maximize Revenue -- 6.3.2.2 Emission Quota Limitation -- 6.3.2.3 Total Emissions Limitation -- 6.3.2.4 Power Supply and Demand Risk -- 6.3.3 Modeling Description for Each IPP -- 6.3.3.1 To Maximize Profits -- 6.3.3.2 Available Capacity Limitations of Power Plants -- 6.3.3.3 Quality Requirements of Fuels -- 6.3.3.4 Combustion Technical Requirements -- 6.3.4 Global Model -- 6.3.5 Solution Approach -- 6.4 Case Study -- 6.4.1 Case Presentation -- 6.4.2 Data Collection -- 6.4.3 Calculation Results -- 6.4.4 Results of Different Scenarios -- 6.4.4.1 S0: Baseline Scenario, & equals -- 1 -- 6.4.4.2 S1: Initial Curb Scenario, & equals -- 0.9 -- 6.4.4.3 S2: Moderate Curb Scenario, & equals -- 0.9 -- 6.4.4.4 S3: Serious Curb Scenario, & equals -- 0.85 -- 6.4.4.5 S4: Vigorous Curb Scenario, & equals -- 0.8 -- 6.4.4.6 S5: Maximal Limitation Scenario, & equals -- 0.75 -- 6.4.5 Scenario Results Comparison -- 6.4.5.1 Comparison of Total Carbon Emissions at Each Power Plant -- 6.4.5.2 Carbon Emissions from Different Fuels at Each Power Plant -- 6.4.5.3 Comparison of Revenue, Costs, and Profits at Each Power Plant -- 6.4.5.4 Influence of Subsidy Variation on Profits Trend -- 6.5 Comprehensive Discussion -- 6.5.1 Policy Implications -- 6.5.2 Industrial Management Recommendations -- References -- Chapter 7 Bilevel Multiobjective Emission Quota Allocation Toward Coal and Sewage Cocombustion -- 7.1 Background Review -- 7.2 Main Issue Description -- 7.2.1 System Schematic -- 7.2.2 Uncertain Decision Environment -- 7.2.3 Optimization Scheme -- 7.3 Modeling -- 7.3.1 Notations.
7.3.2 Allocation Scheme for the Authority -- 7.3.2.1 Maximizing Economic Benefits -- 7.3.2.2 Minimizing Carbon Emission Intensity -- 7.3.2.3 Maximizing Sludge Utilization -- 7.3.2.4 Benchmark Allocation Method -- 7.3.2.5 The Control of Carbon Emission -- 7.3.2.6 Power Supply and Demand Balance -- 7.3.2.7 Bounds of Quotas -- 7.3.3 Strategy for CoalFired Plants -- 7.3.3.1 Maximizing Profits -- 7.3.3.2 Quality Requirements on Fuel -- 7.3.3.3 Restrictions on Pollutant Emission -- 7.3.3.4 Available Quantities of Fuel -- 7.3.4 Global Model -- 7.3.5 Model Solving -- 7.4 Case Study -- 7.4.1 Case Description -- 7.4.2 Data Collection -- 7.4.3 Calculation Results -- 7.4.3.1 Analysis Under Different Objective Weights -- 7.4.4 Scenario Analysis -- 7.4.4.1 Scenario 1: Results Under Different Levels of Carbon Emission Reductions -- 7.4.4.2 Scenario 2: Results Under Different Carbon Emission Intensity Reduction Targets -- 7.5 Comprehensive Discussion -- 7.5.1 Model Comparison -- 7.5.2 Policy Implications -- References -- Chapter 8 Reliable-Economical Scheduling of Hybrid Solar-Hydro System -- 8.1 Background Review -- 8.2 Key Problem Statement -- 8.2.1 System Description -- 8.2.2 TradeOff Between Reliable and Economical Power Supply -- 8.2.3 Handling Renewable Energy Uncertainties -- 8.3 Modeling -- 8.3.1 Notations -- 8.3.2 Hybrid System's Reliability and Economy Equilibrium -- 8.3.2.1 Maximize Power Supply Reliability -- 8.3.2.2 Maximize Electricity Sales Revenue -- 8.3.3 Constraints of the Hybrid System -- 8.3.3.1 Photovoltaic Power Plant's Output -- 8.3.3.2 Accessible Photovoltaic Arrays -- 8.3.3.3 Solar Power Output Limitation -- 8.3.3.4 Hydro Turbine Output

-- 8.3.3.5 Limitation on Available Water -- 8.3.3.6 Dynamic Water Inventory -- 8.3.3.7 Limit on the Ability of Power Transmission -- 8.3.3.8 Limit on the Stability of Power Transmission.
8.3.4 Global Model.
