

# **2023 7th International Conference on Smart Grid and Smart Cities (ICSGSC 2023)**

**Lanzhou, China  
22-24 September 2023**



**IEEE Catalog Number: CFP23URA-POD  
ISBN: 979-8-3503-0592-0**

**Copyright © 2023 by the Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP23URA-POD
ISBN (Print-On-Demand):	979-8-3503-0592-0
ISBN (Online):	979-8-3503-0591-3
ISSN:	2768-007X

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# 2023 the 7th International Conference on Smart Grid and Smart Cities (ICSGSC 2023)

## Table of Contents

Preface .....	xiii
Conference Committee.....	xiv

---

---

### ❖ High Voltage Direct Current Transmission System and Line Protection

Analysis of the Effect of an Active Current Limiter on a DC Circuit Breaker's Breaking Characteristics .....	1
<i>Weidong Wang, Yucheng Chen, Xudong Wu, Feng Zheng</i>	
Exploration and practice of guarding against icing on distribution network lines in southern region .....	7
<i>Lyuzerui Yuan, Wei Huang, Xinhao Lin, Yue Li, Shuyin Duan, Bing Gao</i>	
Analysis Model of Cascading Faults in AC-DC Hybrid Transmission System with Multiple Types of DC Lines ...	13
<i>Zhifei Guo, Zhuoming Deng, Wenfeng Yao, Ruolan Cui</i>	
DC Transformation Scheme for Low-Voltage Management in AC Distribution Network .....	20
<i>Weiming Chen, Xiaochun Weng, Shichuan Chen, Han Wu, Yuanliang Fan, Zewen Li</i>	
Aging Performance of DC-Link Capacitors Under Alternating Humid and Thermal Environment .....	25
<i>Quanyi Gao, Shuaibing Li, Yongqiang Kang, Hongwei Li</i>	
DC Fault Ride-through Strategy for Modified Series Single Chain-link Modular Multilevel Converter .....	30
<i>Dongye Li, Junwei Yang, Shuzheng Wang, Cheng Jin</i>	
Evaluation of Wind-solar Trusted Capacity for Desert UHVDC Transmission Base .....	36
<i>Pengcheng Yuan, Kun Ding, Yalu Sun, Haiying Dong</i>	

### ❖ Safety and Preventive Maintenance of Electric Power Transmission Lines

Instantaneous Frequency Measurement and Tracking under Out of Step Oscillation .....	42
<i>Ke Su Cai, Gan Feng Zhang, Rong Rong Ji, Sui Sheng Zheng, Cheng Lin Xia, Tian Yu Lan</i>	
Ultrasonic Direct Detection Method for Ice Thickness Monitoring of Distribution Lines .....	47
<i>Yinliang Liu, Xiaobing Xiao, Yue Li, Xinhao Lin, Haochen He, Qi Yang, Wei Huang, Shuyin Duan, Qianyi Chen</i>	

Research on Terahertz Detection Method for Layered Defects in Vehicle Cable Terminals Based on FDTD ..... 54  
*Jiahao Dan, Shuaibing Li, Yongqiang Kang*

Performance Evaluation of Steel Grounding Grid Considering Service Life Corrosion..... 59  
*Ji Wangwei, Lin Yi, Hong Haicheng, Li Guocheng, Zheng Fuli*

Power systems under extreme weather conditions of dust storms and sandstorms Research on resilience assessment methodology ..... 64  
*Jinyan Wang, Kun Ding, Yalu Sun, Haiying Dong*

### ❖ **Fault Analysis and Protection in Power Systems**

An energy router with current-limiting function structure ..... 70  
*Yucheng Chen, Weidong Wang, Xudong Wu, Hao Wang, Feng Zheng*

Research and Verification of Local Thermal Fault Simulation Test Platform in Power Transformer Oil..... 76  
*Jiantao Zhang, Lingzhi Gao, Lin Yang, Ying Jin, Zhijun Zhang, Liyuan Zhu, Yongxia Han, Yong Ding*

Low equivalent capacity 12 pulse rectifier diode open circuit fault location study..... 82  
*Jiaxin Wang, Ziyun Jiang, Ying Wang, Xiaoqiang Chen, Jiahao Li*

Dynamic risk assessment of thermal fault in distribution station by online analysis of cloud model ..... 88  
*Yifang Su, Dongqi Wu, Kai Wang, Zijie Wu, Junyi Li, Qiangqiang Xie*

Feature Fusion Based on Locally Linear Embedding in Fault Diagnosis of A Single-Phase PWM Rectifier..... 94  
*Xiangde Mao, Haiying Dong*

Network Topology Transformation Method Suitable for Complex Fault Simulation .....101  
*Li Peng, Hongying Peng, Xing Zhang, Min Liu, Qing Mu, Dechao Xu, Zhuang Li, Xiaomeng Li*

### ❖ **Control Models, Parameter Optimization, and Performance Evaluation in Power Systems**

Detection of Dissolved Acetylene in Transformer Oil Based on Single-Fiber Photoacoustic Sensor .....107  
*Zhengyuan Zhang, Wei Chen, Honggang Chen, Yongqi Wang, Xinhong Fan, Ling Ma*

The Configuration of Medium Voltage Distribution Transformer for Extremely High Voltage Laboratory.....112  
*Zemin Duan, Xiaoliang Si, Song Zhang, Xining Zhang, Hua Li*

EdgeGNN-Transformer: Extract the change edge signal In Power Grid Management.....117  
*Weijiang qiu, Jilin chen, Nana Liu, Guanqi Zeng*

Day-ahead Optimal Scheduling of Flexibly Interconnected Low-voltage Distribution Transformer Areas .....124  
*Zhigang Ye, Yubo Yuan, Lei Gao, Qiangsheng Bu, Wenfi Yi, Chenqing Wang, Mingzhong Zheng, FeiLuo*

Research on Control Strategy of Three-phase PWM Rectifier Based on Soft Computing .....131  
*Qian Xiaodong, Liu Hui, Xie Xiaomin, Li Jun*

A System Configuration description Language (SCL) Complied File Based Configuration Method for Bridges in Smart Substation .....136  
*Qin LI, Dehui WANG, Xin HUANG, Hao ZHANG*

Control strategy of EMA servo drive system based on PID neural network .....142  
*Qixuan Zuo, Jingbo Chen, Haiying Dong*

### ❖ **Electrical Equipment Operation Safety and Heating Analysis**

Diagnosis and Warning Method for Internal Overheating Defects of GIS Isolating Switches on the Basis of Multi-point Temperature Monitoring .....148  
*Zhengyong Hu, Peng Xu, Guliang Zhou, Zhihao Lu, Min Ding, Zhenyu Shao, Huiling Dou*

Design of Multistage Auxiliary Thermal Anaerobic Digestion Device in Cold Area .....155  
*Ruonan Jiao, Xiaofei Zhen, Ruoyu Jiao, Wenbing Wu, Shange Li, Yuanhe Yang*

Effect of working fluid on super-long gravity heat pipe geothermal power generation system .....161  
*Qingshan Ma, Juanwen Chen, Wenbo Huang, Zhibin Li, Ang Li, Fangming Jiang*

Review of Stability Analysis of High-Speed Rail Traction Power Supply System .....166  
*Guoxue Shangguan, Xin Li*

### ❖ **Load Calculation, Operation Mode, and Safety Management in Distribution Networks**

Evaluation of Distribution Network Response Potential Superiority for Transmission and Distribution Coordination .....172  
*Yaming Ge, Yulin Zhao, Shuai Cao, Chaojie Ding, Yuyang Wang*

Edge Load Prediction Method of Distribution Network Based On K-Nearest Neighbor Mutual Information Feature Simplification .....177  
*Xuanda Lai, Yuxin Dai*

A novel approach for assessing the operational status of a regional intelligent distribution network .....183  
*Hao Mengru, Song Jiancheng, Wu Ruochen, Guan Shaoping*

Design of Situation Awareness Terminal for Distribution Network .....187  
*Lin Xinhao, Duan Shuyin, Yu Lei, Liu Yinliang, Liu Tong, Chen Qianyi, Cen Baoyi, Yang Donghai*

Short term load forecasting method for regional intelligent distribution network based on deep learning .....194  
*Wu Ruochen, Song Jiancheng, Hao Mengru, Li Zhibiao, Zheng Junqi*

Research on the influence of Multi-HVDC power coordinated control strategy on frequency stability in multi partitioned power grid .....199

*Mingkang Wu, Yihua Zhu, Dongxu Chang, Binjiang Hu, Yukun Zhu, Wencong Wu*

Sensitivity analysis of power quality factors on additional losses of distribution network lines based on Sobol' method .....205

*Yongshun Li, Guo Wang, Yongzhi Min, Xinpeng Li*

## ❖ **Digital Grid Control and Security Assessment**

IoT-Based Sustainable Parking Lot .....210

*Abdullah Binmahfooz, Ibrahim Mohammed, Khalfan Alshamsi, Marwan Alshaali, Salam Dhou, Ahmad Alnabulsi, A. R. Al-Ali*

Negative Sequence Current Compensation and Energy Management Optimization Of Traction Network Based On Series Energy Storage Railway Power Regulation Equipment.....216

*Ying Chen Li, Xiao Qiang Chen, Ying Wang, Xia Zhao, Ya Guo, Zhan Ning Chang*

Research on Analysis Method of Demand Response Potential of Typical Users in Low Carbon Park .....225

*Yun Dong, Xiqiao Lin, Chengyu He, Jinlong Zong, Peng Zhang*

Research on network intrusion detection based on Whitening PCA and CNN.....232

*Peiqing Zhang, Guangke Tian, Haiying Dong*

Research on Channel Modeling and Topology Performance Analysis of PLC Network.....238

*Qiang Shang, Ying Zhang*

The improvement of YOLOv5s algorithm for realtime detection of vehicle targets.....244

*Zhuye Xu, Xiao Tang, Changxi Ma, Haijun Li*

Echos, Suggestions, and Directions on New Energy Development in China under the Grid Parity .....250

*Qiang Zhou, Jianmei Zhang, Ruixiao Zhang, Jialin Zhang, Sheng Wang, Jin Li*

## ❖ **Modern Power Electronics and Transmission Technology**

Design of High-performance Hybrid Supercapacitors Based on MOF Derived Cobalt Sulfide.....256

*Feitian Ran, Meijie Hu, Jifei Liu, Kai Wang, Wanjun Sun*

Multi-sensor Detection and Estimation Fusion by Minimizing Improved Minkowski Distance .....261

*Wenyan Zhu, Yong Chang, Peng Chen, Qingfang Teng*

An Improved Quick Design for Axial Flux Permanent Magnet Synchronous Machine .....267

*Hongwei Lan, Na Wang*

Design and Performance Analysis of Solar Solenoid Valve .....	273
<i>Xiaolin Ma, Xiaofei Zhen, Mengling Xiong</i>	
Effect of Dielectric Barrier Discharge Plasma actuator on the Wake Region of Tandem Double Cylinders .....	278
<i>Linbo Geng, Yongqiang Kang, Yu Meng, Xuhong Pu, Jialin Zhang, Shuaibing Li</i>	
Study on the characteristics of space charge in welded IGBT .....	284
<i>Yu Meng, Kai Yang, Qingping Zhang, Xiuguang Li, Jinpeng Hao, Yongqiang Kang</i>	
<b>❖ Novel Battery Design and Energy Storage Technology</b>	
Optimal allocation strategy of energy storage under carbon trading mechanism counting and demand response .....	290
<i>Na Sun, Qinggen Li, Haiying Dong</i>	
Sizing and Energy Management Method of Energy Storage System in Urban Rail Transit .....	296
<i>Hongzhi Dong, Zhongbei Tian, Haiying Dong</i>	
Fast Prediction of Thermal Behaviour of Lithium-ion Battery Energy Storage Systems Based on Meshless Surrogate Model .....	302
<i>Beibei Wang, Wenjiong Cao, Ti Dong, Xiaofei Zhen, Jia Liu, Yiming Sun, Zhou Li</i>	
Research on Battery Body Modeling of Electrochemical Energy Storage Power Station .....	308
<i>Cheng Wang, Mingdian Wang, Haiying Dong</i>	
Research on Data-driven Remaining Useful Life Prediction Method for Lithium-ion Batteries .....	314
<i>Ti Dong, Yiming Sun, Jia Liu, Beibei Wang, Xiaofei Zhen, Xin Li, Wenjiong Cao</i>	
Research on Output Characteristics of the Proton Exchange Membrane Fuel Cell Based on Model Reference Adaptive Control .....	320
<i>Jingfeng Zhang, Wenhui Huang, Jun Wang, Haiying Dong</i>	
Modeling the Impact of Electrode Material Structure on the Performance of Lithium-Ion Batteries: Effects of Porosity and Particle Size .....	326
<i>Yongzhi Wan, JiFei Liu, Zheng Wang, Zida Di, Yang Yuan, Yajie Zhu, Yan Zhang</i>	
Temperature Control of Proton Exchange Membrane Fuel Cell Based on Fuzzy PID .....	332
<i>Zenghui Liu, Jun Wang, Wenhui Huang, Haiying Dong</i>	
Comparison of PEMFC performance with parallelserpentine flow field under various geometrical conditions .....	338
<i>Mengyuan Lei, Kai Wang, Jifei Liu, Feitian Ran, Wanjun Sun</i>	

Fuzzy Adaptive Algorithm Controls Oxygen Excess Coefficient of Air Blower and System Net Power of Proton Exchange Membrane Fuel Cell .....343

*Xiaoning Li, Jun Wang, Wenhui Huang, Haiying Dong*

❖ **Power System and Microgrid Operation and Reliability Analysis**

Study on Hybrid Control Strategy of DC Microgrid Bus Voltage Considering Additional Inertia Adjustment ...349

*Xudong Wu, Huiyu Huang, Weidong Wang, Yucheng Chen, Feng Zheng*

Analysis of main influencing factors on braking energy of metro trains in high latitude and perennial low temperature area .....356

*Yan Zhao, Meiyu Shi, Ming Wang, Wenting Li, Ruixin Guan, Yan Meng*

Comprehensive evaluation method for power supply quality of power companies based on two-dimension indexes .....364

*Shuaibin Shi, Guo Lu, Yongli Liu, Yitao Sun*

Review of the Application of Deep Reinforcement Learning in Multi-Component Coordinated Control of Microgrids .....369

*Jijun Ma, Mingche Li, Xiaolin Zhang*

Multiobjective Decisions on Microgrid Interconnection Location Based on Fuzzy Clustering .....378

*Changyun Wang, Xiaohu Guan, Haiying Dong, Siyuan Zheng*

MILP Algorithm Based Control Method for Microgrid Energy Supply Equipment .....384

*Jiuding Tan, Shuaibing Li, Yongqiang Kang, Hongwei Li*

Virtual Inertial Control Strategy of DC Microgrid Based on Improved Model Prediction Control .....390

*Minghong Su, Feng Zheng, Baojin Liu, Wanling Liu*

Parameter Identification and Optimization of PI Controllers for Islanded DC Micro-grids .....396

*Xiaolin Zhang, Mingche Li, Jijun Ma*

❖ **Electric Vehicle and Power Supply Equipment Configuration**

Energy Management Strategy: Microgrid Integrated with Hybrid PV-T, EV, and Battery .....402

*Mina Valikhany, Pasi Peltoniemi*

The influence of electric vehicle access on highway optical storage DC microgrid .....408

*Meng Chen, Yongqiang Kang, Xinglong Li, Gang Lu, Shuaibing Li, Yuchen Zhu*

Optimal Scheduling Strategy of Microgrid with Electric Vehicles Based on Demand Response Guidance .....414

*Zhimin Wu, Yang Zou, Feng Zheng*



Analysis of DC Microgrid Stability impedance method considering the State of Charge of Electric Vehicle Batteries.....	420
<i>Xinglong Li, Guangru Zhang, Jiawu Zhang, Zhenqi Ma, Gang Lu, Yongqiang Kang</i>	
Analysis of the effect of electrical vehicles charging load on utility grid based on the residential behaviour characteristics.....	426
<i>Manjia Liu, wei Bi, Ming Liu, Chen Jin, Haozhe Xiong, Ning Li, Hanshi Qin, Youmin Hou</i>	
Review of Bidirectional DC-DC Converters for Electric Vehicle Energy Management Systems.....	432
<i>Chunyu Wei, Xin Li</i>	
Modeling and Simulation Analysis of Typical Series Parallel Hybrid Electric Vehicles.....	437
<i>Wei Wang, Fufan Qu, Wenbo Li, Jiawen Cai, Penglong Wang</i>	
Impact of Electric Vehicles Access to Distribution Network under V2G Mode.....	444
<i>Gang Lu, Guangru Zhang, Jiawu Zhang, Zhenqi Ma, Xinglong Li, Yongqiang Kang</i>	
Robust Optimal Charging Scheduling for Electric Vehicles Considering the Uncertainty of Renewable Energy Output.....	449
<i>Qian Zhen, Boqiang Ren, Hang Chi, Weitao Wang, Shan Gao</i>	
Optimization study of electric vehicle charging station load model prediction based on Kalman filtering.....	456
<i>Xi Guo, Minan Tang, Jinping Li, Bo An</i>	
<b>❖ Photovoltaic Grid Connected Systems and Novel Power Generation Technologies</b>	
Probabilistic Prediction of PV Ramp Events Based on LSTM-Bootstrap.....	462
<i>Yangjue Huang, Tong Liu, Bin Tai, Kaicheng Shen, Lyuzerui Yuan, Yin Wang, Shuyin Duan, Qianyi Chen, Shisheng Liu, Min Gu</i>	
Research on MPPT Strategy of Bifacial Photovoltaic Power Generation System Based on PSO.....	468
<i>Jinping Li, Minan Tang, Bo An, Xi Guo</i>	
Power prediction of photovoltaic power generation based on LSTM model with additive Attention mechanism.....	474
<i>Bin Tai, Lei Yu, Yangjue Huang, Jinfeng Wang, Yin Wang, Yuanzhe Zhu, Shuyin Duan, Shisheng Liu, Qianyi Chen, Min Gu</i>	
Photovoltaic Power Prediction Considering Direct and Scattered Radiation Effect.....	481
<i>Siyu Chen, Junxia Jiang, Shuaibing Li, Hongwei Li</i>	

Distributed PV Power Forecasting Considering Spatio-temporal Dependence.....	487
<i>Xinyang Zhang, Ming Wen, Jiayi Li, Hongyi Huang</i>	
The Impact of Photovoltaic Power Stations on the Ecological Environment.....	494
<i>Qingquan Lv, Zhenzhen Zhang, Pengfei Gao, Jin Li</i>	
Design of Net Zero Energy Building Photovoltaic Power Generation and Energy Storage System in Lanzhou .....	501
<i>Chuanxi Tan, Xiaofei Zhen, Xu Zhang, Shange Li, Wenbing Wu, Ruonan Jiao</i>	
Time-scale-based Analysis of Off-site and On-site Albedo of A Photovoltaic Power Plant.....	507
<i>Qingquan Lv, Zhenzhen Zhang, Jin Li, Pengfei Gao</i>	
<b>❖ Wind Farm Simulation and Power Generation Prediction</b>	
Effects of Hillside Slopes on the Flow Field of Wind Farms.....	512
<i>Yiping Shang, Zhuoqun Li, Rui Mao, Chengxi Wang</i>	
Analysis of junction temperature characteristics of IGBT module in wind power converter.....	517
<i>Kai Yang, Yu Meng, Qingping Zhang, Xiuguang Li, Jinpeng Hao, Yongqiang Kang</i>	
Layout of Wind Turbines on a Trapezoidal Hill.....	523
<i>Ruixue Zhang, Zhuoqun Li, Rui Mao, Yiping Shang, Jiali Xin, Yumei Qian</i>	
Wind Power Forecasting Based on Adaptive Spatio-Temporal Graph Neural Network.....	528
<i>Ning Hu, Gonglin Wang, Yongbiao Yang</i>	
A review of wind farm wake characteristics under complex terrain conditions.....	534
<i>Lihong Zhang, Xuyao Zhang, Qianyu Wang</i>	
Multi-wind Farm Output Scenario Generation Method Based on Copula Function.....	540
<i>Shengyong Ye, Chuan Long, Xinting Yang, Ting Li, Xuna Liu, Yuqi Han, Liyang Liu, Da Li</i>	
A Series-connected 24-pulse Rectifier for Directdrive Wind Power Generation System.....	545
<i>Chungui Ma, Xiaoqiang Chen, Ying Wang, Qianxiao Liu</i>	
Comprehensive Assessment Method for Power Quality Based on Rough AHP and Improved TOPSIS.....	552
<i>Guo Bingyao, Song Jiancheng, Li Zhibiao, Peng Chuan</i>	
<b>❖ Hybrid Energy Systems and Power Load Forecasting</b>	
ICSGSC-Clean energy storage and release system with multiple time scales and variable capacity.....	557
<i>Wen Xian-kui, Wu Chao, Zhong Jing-liang, Zhang Jun-wei, Yang Di, Li Xiang</i>	

Joint low-carbon economic dispatch of power system considering reward-penalty ladder carbon trading and demand response .....	561
<i>Shengting Qiang, Guo Wang, Yongzhi Min, Pengfei Su</i>	
Low-carbon Economic Scheduling of Park Integrated Energy System Considering User-side Shared Energy Storage .....	567
<i>Ankang Miao, Yue Yuan, Chao Feng, Yuhan Hou, Anyu Wang, Yi Huang</i>	
Highway Load Forecasting Method Based on BP Neural Network and Monte Carlo Simulation.....	573
<i>Yuchen Zhu, Shuaibing Li, Yufeng Song, Yongqiang Kang</i>	
Graph Based Quantitative Analysis of Distributed Generation Impact on Regional Carbon Emissions.....	579
<i>Wenqi Huang, Yachen Tang, Zhen Dai, Guangyi Liu, Jiakuan Hou, Xuanang Li</i>	
Feasibility analysis of biogas cogeneration ecological toilet.....	585
<i>Xu Zhang, Xiaofei Zhen, Chenglong Wang, Chuanxi Tan, Wenbing Wu, Zuxiong Li</i>	
Research on the feasibility of realization for "West-to-East Hydrogen Transmission" with green ammonia.....	591
<i>WANG Yiqiang, LIU-Luqiang, HUI-Ruonan, CHEN-Fanglei</i>	
Optimal scheduling of agricultural park integrated energy system considering adjustable load.....	596
<i>Yanru Liu, Ruiping Zhang, Haiying Dong</i>	
Study on the failure prediction method of urban building materials based on the wavelength variation rule of rare earth ions.....	602
<i>Chao Ma, Yuhong Li, Shipeng Xu, Weiqian Chen, Jun Xu, Yaming Li</i>	
<b>❖ New Energy Power System Operation and Optimization Management</b>	
Deployment Scheme for Source-Grid-Load-Storage Integrated System Based on OS2 .....	608
<i>Zhenyi Wang, Yigong Xie, Bin Hu, Li Lin, Yihan Hu, Hua Xie, Pei Zhang</i>	
A comprehensive energy service evaluation method based on AHP-entropy weight method and comprehensive fuzzy evaluation method.....	613
<i>Jiaqi Zhang, Linghan Xu</i>	
Technology Architecture for Source-Grid-Load-Storage Collaborative Control .....	619
<i>Xuegang Lu, Daochun Gao, Xi Mo, Benxing Ge, Xinhao Li, Hua Xie, Pei Zhang</i>	
Study on the influence of interior design temperature on energy consumption and carbon emission of large space buildings in cold regions.....	624
<i>Ruilin Zhu, Jieyuan Yang, Jingbo Yang, Hao Yuan</i>	

Allocation Method of Daily Carbon Emission Quota and Dispatch Strategies in Parks Considering Typical Operating Scenarios.....	629
<i>Yunfang Sun, Jian Wang, Wei Xue, Jianbo Huang, Chen Zhang</i>	
Feasibility analysis of thermal and electrical multigeneration energy supply system for existing single building .....	635
<i>Wenbing Wu, Xiaofei Zhen, Ruonan Jiao, Liang Han, Shange Li, Yinan Mao</i>	
Capacity Planning of Park Integrated Energy System Considering Ladder-Type Carbon Trading .....	641
<i>Yihuan Wei, Zheng Gong, Xifei Xie, Hanbo Zhu, Min Pan</i>	
Review of Research on optimal scheduling method of virtual power plant .....	647
<i>Jinjin Song, Xin Li</i>	
Optimization Operation Strategy of Distributed Energy Aggregator in VPP .....	653
<i>Xuying Yang, Xinwen Zhang, Chunyan Zhou</i>	
Day-ahead Multi-stage Reserve Procurement Method for Power System with High Penetration Renewables Considering Nonanticipativity Constraints .....	659
<i>Kai Kang, Zijiao Han, Wenlei Dou, Yongji Tong, Sichen Lu, Feng Liu</i>	
Carbon emission effect of new power system with new energy as the main component in Gansu Province, China .....	669
<i>Shiming Kang, Songbing Zou, Wenyong Zhang, Fei Song, Zhenqing Ji, Tenggong Yuan, Ying Dong, Weizhe Du</i>	
Challenges and Suggestions for Building a High Resilience Green Power Grid in Northwest China under the Background of "Dual Carbon" .....	676
<i>Ji'en Niu, Qiang Zhou, Pengfei Gao, Yongrui Zhang, Jinping Zhang, Lijuan Liu</i>	

**Author Index**