

Special Session XI

Special Session Basic Information:

专栏题目
Session Title

中文：“双碳”目标下新型电力系统多能协同互补与灵活调控运行
英文：Multi-Energy Complementation and Flexible Operational Dispatch of the New-Type Power System for the Carbon Peaking and Neutrality Goals

专栏介绍和征稿主题
Introduction and topics

中文：构建以新能源为主体的新型电力系统是实现“双碳”战略目标的核心路径，然而随着高比例可再生能源大规模并网，其固有的间歇性、波动性使电力系统面临运行波动加剧、动态调节能力不足、安全稳定边界收窄等挑战。在此背景下，化石能源灵活低碳发电系统及压缩空气、卡诺电池等储能技术将为系统灵活调节、电力系统安全稳定运行提供战略性支撑，其集成优化、多能互补及动态调控与正推动电力系统向低碳灵活清洁方向深度变革。本 Special Session 聚焦于“双碳”目标下新型电力系统多能协同互补与灵活调控运行，旨在探讨化石能源发电循环的灵活性和捕碳技术、储能系统快速响应与多时间尺度调控策略、多能互补系统的优化与协同运行等领域，

- 征稿主题包括但不限于：
- 1) 新型储能系统结构与特性分析

2) 储能技术参与电网调峰调频技术

3) 储能系统运行优化与调度策

4) 新能源发电系统多目标优化调度与实时控制

5) 化石能源高效低碳灵活发电技术

6) 新能源发电与储能配置优化与调控。

7) 新型电力系统多类型储能协同规划与动态配置技术

8) 新型电力系统源网荷储一体化协调控制技术

英文： Constructing the new-type power system dominated by renewable energy is the key support technology to achieve the strategic carbon peak and carbon neutrality goals. However, the large-scale integration of a high proportion of renewable energy leading to increased operational fluctuations, insufficient dynamic regulation capacity and narrowed security and stability margins for the power system due to the inherent intermittency and volatility of renewable sources. Against this backdrop, flexible and low-carbon fossil-fuel power generation systems, along with energy storage technologies like compressed air energy storage and carnot battery, will provide strategic support for the flexible regulation and stable operation of power grid systems. The integration and optimization, multi-energy complementation and dynamic regulation of these technologies are promoting the transformation of the power system towards the low carbon, flexible and clean future. The Special Session focuses on “Multi-Energy Complementation and Flexible Operational Dispatch of the New-Type Power System for the Carbon Peaking and Neutrality goals”, aiming to explore areas, including Flexibility and carbon capture technologies of fossil-fuel power systems, Rapid response and multi-time scale regulation strategies of energy storage systems, Optimization and coordinated operation of multi-energy complementary systems.

- Topics of interest:
- 1) Design and Performance Analysis of Novel Energy Storage Systems.

2) Applications of Energy Storage Technologies in Grid Peak Shaving and Frequency Regulation.

3) Operation Optimization and Dispatch Strategies of Energy Storage System.

4) Multi-objective Optimal Scheduling and Real-time Control of Renewable Energy Generation Systems.

5) Efficient Utilization of Fossil Fuels for Power Generation Systems with Flexibility and Low Carbon

6) Configuration Optimization and Control of Integrated Renewable Energy Generation and Energy Storage Systems.

7) Collaborative Planning and Dynamic Allocation Technologies for Multi-type Energy Storage in New-type Power Systems.

8) Integrated Coordination Control Technologies for Source-Grid-Load-Storage in New-type Power Systems.

Special Session Chair(s):

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Organizer's Brief Biography

中文：孙杨，工学博士，助理教授，硕士生导师，华北电力大学与洛桑联邦理工学院（EPFL）联合培养博士。从事能源动力系统分析与优化理论、卡诺电池技术、燃煤电站灵活低碳转型研究。主持青岛市自然科学基金等科研项目 4 项，发表 SCI、EI 收录论文 17 篇（其中中科院大类一区 11 篇、中国科技期刊卓越行动计划中文领军期刊 2 篇），获国家专利授权十余项。曾获山东省青教赛二等奖、青岛大学青教赛一等奖等奖项；指导本科生/研究生获得教育部 A 类竞赛国家级/省级奖项 6 项，获批山东省大学生创新创业项目 2 项；指导的学位论文获评校级优秀 2 次。

英文：Yang Sun, Ph.D., Assistant Professor and Master's Supervisor at Qingdao University, specializing in energy system analysis, Carnot battery, and low-carbon transition of coal-fired power plants. Led 4 research projects as Principal Investigator including the Qingdao Natural Science Foundation. Published 17 SCI/EI-indexed papers (11 in CAS JCR Q1 journals and 2 in "leading Chinese journals" under the Excellence Action Plan for Chinese ST Journals) and holds over 10 authorized national patents. Awarded the Second Prize in the Shandong Teaching Competition for Young College Teachers and the First Prize in the Qingdao University Teaching Competition. Guided students to win 6 awards in national/provincial scientific and technologic competitions. Serves as a reviewer and guest editor for several SCI top journals.

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Organizer's Brief Biography

中文：许宏宇，工学博士，讲师，研究领域为超临界 CO₂ 循环构建及优化、系统变工况运行动态控制策略。育部集成攻关大平台及国家重点研发计划骨干成员，中国科协青年人才托举博士生专项计划入选者，发表 SCI、EI 收录论文 9 篇。

英文：Xu Hongyu, Ph.D, Lecturer, specializing in the construction and optimization of supercritical CO₂ cycles and dynamic control strategies for system operation under off-design conditions. A key member of the MOE Integrated Research Platform for Key Issues and the National Key R&D Program. The recipient of the Doctoral Program of the Young Talent Support Project of China Association for Science and Technology (CAST). Published 9 SCI/EI-indexed papers

