Special Session VIII

Special Session Basic Information:

专栏题目 **Session Title**	中文：高比例新能源电力系统的低碳调度运行 英文：Low-Carbon Dispatch and Operation of High-Penetration Renewable Power Systems

专栏介绍和征稿主题
Introduction and topics

中文： 在“双碳”目标驱动下，电力系统的调度运行正面临深刻变革。一方面，新能源的大规模接入打破了传统调度模式下的确定性平衡，新能源的强波动性强、弱可控性等特点给电力系统的安全稳定运行带来了严峻挑战。另一方面，碳排放约束的引入使得调度决策从传统的“安全-经济”二元平衡转向了“安全-经济-低碳”三元协同优化，带来了“能源不可能三角”问题难题。为此，本专栏聚焦高比例新能源电力系统在低碳调度与运行领域的前沿问题，征集理论创新、关键技术及应用实践等方面的研究成果，旨在推动电力系统向更安全、更经济、更低碳的方向发展。

征稿方向（主题包括但不限于）：

1. 高比例新能源电力系统安全稳定规则提取
2. 内嵌安全稳定约束的系统调度运行方法
3. 电力系统低碳优化运行方法
4. 用户侧低碳互动与源荷协同优化运行
5. 低碳运行领域的政策与应用实践研究

英文： Driven by the goals of carbon peaking and carbon neutrality, the dispatching and operation of power systems are undergoing profound transformation. On one hand, the large-scale integration of renewable energy has disrupted the deterministic balance under traditional dispatch models. The strong volatility and weak controllability of renewable energy pose severe challenges to the secure and stable operation of power systems. On the other hand, the introduction of carbon emission constraints has shifted dispatch decision-making from the traditional "security-economy" dual balance to a "security-economy-low carbon" ternary collaborative optimization, intensifying the difficulty of balancing the "energy impossible trinity." This session focuses on cutting-edge issues in low-carbon dispatching and operation for high-proportion renewable power systems, inviting research contributions on theoretical innovations, key technologies, and practical applications, aiming to promote the development of power systems towards greater security, economy, and low-carbon performance.

Call for Papers (Topics Include but are not limited to) :

1. Security and Stability Rule Extraction for High-Proportion Renewable Power Systems
2. System Dispatching and Operation Methods Embedding Security and Stability Constraints
3. Low-Carbon Optimization Operation Methods for Power Systems
4. Low-Carbon Interaction on the User Side and Source-Load Collaborative Optimization Operation
5. Policy and Application Practice Research in the Field of Low-Carbon Operation

Special Session Chair(s):

姓名 **Name**	杜尔顺
称谓 **Prefix**	副教授
部门 **Department**	低碳能源实验室
单位 **Organization**	清华大学

	城市/地区 **City/Region**	北京

Organizer's Brief Biography

中文：杜尔顺，清华大学低碳能源实验室副教授，清华大学气候变化与可持续发展研究院能源转型研究主任，清华四川能源互联网研究院低碳城市能源系统研究所副所长，国家级青年人才。主要研究方向包括新型电力系统规划、复杂大电网模拟、高比例新能源消纳、低碳能源与电力政策等。

2013 年 7 月获清华大学工学学士学位，获并免试推荐直博，2018 年 7 月获清华大学工学博士学位，2016~2017 年赴美国国家可再生能源实验室做访问学者。2020 年 7 月聘为清华大学低碳能源实验室研究系列助理教授，2023 年 3 月起任清华大学气候变化与可持续发展研究院能源低碳转型研究主任，2023 年 12 月晋升研究系列副教授。累计发表论文 100 余篇，SCI 论文 50 余篇，中英文论著多本，授权 10 余项国内外发明专利与软件著作权。主持国家自然科学基金面上基金、青年基金、博士后科学基金、国家重点实验室开放基金、清华大学自主科研计划等一系列纵向课题，作为技术骨干参与国家重点研发计划、国家自然科学基金重点基金项目，以及多项企事业科技项目等课题。政策建议多次获中央领导、科技部、能源局、生态部等批示或感谢信，被《国参建言》采纳。作为技术核心研发的新型电力系统模拟与规划软件已广泛应用于我国十余个省级电网，研究成果被国内外媒体多次报道。荣获日内瓦国际发明展金奖、青海省科技进步一等奖、北京市科技进步二等奖、江苏省电力科学技术进步一等奖等奖励。入选四川省天府峨眉人才支持计划、全国博士后创新人才支持计划、北京市科协青年人才托举计划等。研究成果受到国外广泛关注和认可，被美国科学促进会（AAAS，Science 杂志主办方）科技新闻平台、国际能源署 IEA SolarPACES 项目网站等做专题报道。作为执行负责人主持与参与多项国际项目合作，比如：清华-剑桥的能源转型风险分析项目、清华-哈佛深度脱碳技术创新与政策比较研究项目、美国国家可再生能源实验室(NREL)的储能效益分析项目、全球能源互联网发展合作组织(GEIDCO)的未来储能体系研究项目、国际大电网组织(CIGRE)的 C1.44 工作组合作研究等。

IEEE Member, CIGRE Member, CIGRE C1.44 工作组专家成员，担任国际 SCI 期刊 IET Renewable Power Generation 编委，Processes 编委，担任 IEEE Trans. Power Systems、IEEE Trans. Smart Grid、IEEE Trans. Sustainable Energy、IET Generation Transmission & Distribution 等多个国际期刊审稿人，同时担任国内期刊《中国电机工程学报》、《电力系统自动化》、《电网技术》等审稿人。多次担任国际学术会议的技术委员会成员以及分会场主持人。

英文：Dr. Ershun Du is an Associate Professor at the Laboratory of Low Carbon Energy, Tsinghua University, Director of Energy Transition Research at the Institute of Climate Change and Sustainable Development, Tsinghua University, and Deputy Director of the Low-Carbon Urban Energy System Research Institute at Tsinghua Sichuan Energy Internet Research Institute. He has been recognized as a National-Level Young Talent. His primary research interests include new-type power system planning, large-scale complex power grid simulation, high-proportion renewable energy integration, and low-carbon energy and electricity policies.

In July 2013, he received his B.Eng. degree in Electrical Engineering from Tsinghua University and was recommended for admission to the Ph.D. program without examination. He obtained his Ph.D. degree in Electrical Engineering from Tsinghua University in July 2018. From 2016 to 2017, he was a Visiting Scholar at the National Renewable Energy Laboratory (NREL), USA. In July 2020, he was appointed as an Assistant Professor (Research Series) at the Laboratory of Low Carbon Energy, Tsinghua University. Since March 2023, he has served as the Director of Energy Low-Carbon Transition Research at the Institute of Climate Change and Sustainable Development, Tsinghua University. In December 2023, he was promoted to Associate Professor (Research Series). He has published over 100 papers, including more than 50 SCI-indexed papers, and multiple books and book chapters in both Chinese and English. He holds over 10 authorized invention patents and software copyrights in China and internationally. He has served as Principal Investigator for the General Program and Young Scientists Fund of the National Natural Science Foundation of China (NSFC), the China Postdoctoral Science Foundation, open funds from State Key Laboratories, and the Independent Research Program of Tsinghua University. He has also participated as a key technical member in National Key R&D Programs of China, Key Programs of the NSFC, and numerous industry-funded science and technology projects. His policy recommendations have received multiple approvals or acknowledgment letters from central government leadership, the Ministry of Science and Technology, the National Energy Administration, and the Ministry of Ecology and Environment, and have been adopted by the National Counselor's Suggestions. The new-type power system simulation and planning software, for which he served as a core technical developer, has been widely applied in more than ten provincial power grids across China. His research findings have been repeatedly reported by domestic and international media. He has received numerous awards, including the Gold Medal at the Geneva International Exhibition of Inventions, the First Prize of Science and Technology Progress Award from Qinghai Province, the Second Prize of Science and Technology Progress Award from Beijing Municipality, and the First Prize of Science and Technology Progress Award

from Jiangsu Electric Power. He has been recognized through prestigious talent programs, including the Sichuan Tianfu Talent Program, the National Postdoctoral Program for Innovative Talents, and the Beijing Association for Science and Technology Young Talent Support Program. His research has garnered significant international attention and recognition, with feature reports by the American Association for the Advancement of Science (AAAS, publisher of Science magazine) news platform and the International Energy Agency's IEA SolarPACES project website. As an executive lead or key participant, he has been involved in numerous international collaborative projects, including the Tsinghua-Cambridge Energy Transition Risk Analysis Project, the Tsinghua-Harvard Deep Decarbonization Technology Innovation and Policy Comparative Study Project, the Energy Storage Benefit Analysis Project with the National Renewable Energy Laboratory (NREL), the Future Energy Storage System Research Project with the Global Energy Interconnection Development and Cooperation Organization (GEIDCO), and collaborative research within CIGRE Working Group C1.44.

He is a Member of IEEE and CIGRE, and an Expert Member of CIGRE Working Group C1.44. He serves as an Editorial Board Member for the international SCI-indexed journals IET Renewable Power Generation and Processes. He is also a reviewer for numerous international journals, including IEEE Transactions on Power Systems, IEEE Transactions on Smart Grid, IEEE Transactions on Sustainable Energy, and IET Generation, Transmission & Distribution, as well as leading domestic journals such as Proceedings of the CSEE, Automation of Electric Power Systems, and Power System Technology. He has repeatedly served as a Technical Program Committee member and session chair at international academic conferences.

姓名 Name	李姚旺
称谓 Prefix	副研究员
部门 Department	低碳城市能源系统研究所
单位 Organization	清华四川能源互联网研究院
城市/地区 City/Region	四川成都

Organizer's Brief Biography

中文：李姚旺，副研究员，现为清华四川能源互联网研究院低碳所执行所长。分别于 2015 年和 2020 年获得华中科技大学电气工程学士、博士学位，2020~2023 年于清华大学电机系从事博士后研究。2024 年全职加入清华四川能源互联网研究院。主要从事低碳电力技术、电力系统优化运行等领域研究。入选中国电机工程学会“青年人才托举”工程、四川省“天府峨眉人才”支持计划，获得 IEEE PCCC 协会“杰出青年工程师”称号。已主持国家自然科学基金面上、青年等纵向项目 3 项，参与国家重点研发计划项目、国家自然科学基金联合基金项目等纵向项目 7 项，主持企事业单位横向项目 10 余项。已发表 SCI 或 EI 期刊论文 70 余篇，6 篇入选领跑者 5000（F5000），1 篇入选 ESI 热点论文（引用量前 0.1%），10 余篇入选期刊年度优秀论文。入选“中国知网最具影响力学者”（领域前 1%），Scopus 中 H 指数 28。已获得授权美国发明专利 1 项，授权中国发明专利 20 余项。以前 3 完成人获得山东省科技进步二等奖、中国科促会科技进步一等奖、中国发明协会创新一等奖、日内瓦发明展金奖。参与起草和发布团体标准 2 项，立项国际标准 1 项。作为主笔人撰写报送中办信息综合室的智库报告 1 篇，4 次接受《中国能源报》、《南方能源观察》采访并发表智库观点。为 10 余本期刊审稿人，获得《IEEE Trans Power systems》、《电网技术》优秀审稿人。

英文： Dr. Yaowang Li is an Associate Research Fellow and currently serves as the Executive Director of the Low Carbon Institute at Tsinghua Sichuan Energy Internet Research Institute. He received his B.E. and Ph.D. degrees in Electrical Engineering from Huazhong University of Science and Technology in 2015 and 2020, respectively. From 2020 to 2023, he conducted postdoctoral research at the Department of Electrical Engineering, Tsinghua University. In 2024, he joined the Tsinghua Sichuan Energy Internet Research Institute full-time. His main research areas include low-carbon power technologies and power system optimization operations. He has been selected for the Young Talent Support Program of the Chinese Society for Electrical Engineering (CSEE) and the Sichuan Tianfu Talent Program, and has received the "Outstanding Young Engineer" Award from the IEEE PCCC. He has presided over three vertically-funded projects, including the General Program and Young Scientists Fund of the National Natural Science Foundation of China

(NSFC). He has participated in seven vertically-funded projects, including the National Key R&D Program of China and the Joint Fund Program of NSFC, and has led over 10 horizontally-funded projects from enterprises and institutions. He has published over 70 papers in SCI/EI-indexed journals, with six papers selected as F5000 (Frontrunner 5000) and one paper selected as an ESI Hot Paper (top 0.1% by citations). More than ten papers have been selected as annual excellent papers by their respective journals. He has been named among the "Most Influential Scholars" on CNKI (top 1% in his field) and has an H-index of 28 on Scopus. He holds one authorized U.S. invention patent and over 20 authorized Chinese invention patents. As one of the top three contributors, he has received the Second Prize of Science and Technology Progress Award from Shandong Province, the First Prize of Science and Technology Progress Award from the China Association for the Advancement of Science and Technology, the First Prize of Innovation Award from the China Invention Association, and the Gold Medal at the Geneva International Exhibition of Inventions. He has participated in the drafting and release of two group standards and has initiated the development of one international standard. As the lead author, he has drafted one think tank report submitted to the Information Office of the General Office of the Communist Party of China Central Committee. He has been interviewed four times by China Energy News and Southern Energy Observer, providing think tank perspectives. He serves as a reviewer for over ten academic journals and has been recognized as an Outstanding Reviewer by IEEE Transactions on Power Systems and Power System Technology.