Special Session Proposal

Special Session Basic Information:

专栏题目 Session Title	中文：先进绿色民航技术与经济性分析 英文：Advanced sustainable aviation technologies and economic analysis

专栏介绍和征稿主题 Introduction and topics

中文：

全球航空业正面临“双碳”目标的严峻挑战。为在 2050 年实现净零排放的目标，《目的地 2050》报告估计仅欧洲就需要 2.4 万亿欧元的投资。国际航空运输协会（IATA）呼吁，全球民航业从降低飞行能耗、使用清洁能源、重新捕集所释放二氧化碳等三个层面进行努力。预计 2025 年可持续航空燃料（SAF）产量将达到 200 万吨（25 亿升），占航空公司总燃料消耗量的0.7%。与此同时，氢能与电推进技术成为突破关键，氢动力、全电、混合动力飞机相继首飞。在此背景下，“先进绿色民航技术与经济分析”聚焦燃料革新、动力系统升级、经济性优化与政策协同，推动亚洲智慧引领全球航空绿色转型。

征稿主题（包括但不限于）：

1. 绿色动力系统与燃料创新

SAF 生产技术：生物质/电制/太阳能燃料规模化制备、催化工艺优化、全生命周期分析；

氢能航空应用：液氢储运技术、航空燃料电池技术、氢发动机技术、航空适航认证标准、机场加氢基础设施设计；

电能与混合动力系统：航空锂电池技术、电-油/电-氢/氢-油混合动力系统设计、多能源协同控制与能量管理。

电动推进器设计与电力电子系统：高功率密度电机、高效能电机驱动技术、电机系统集成、机载电力系统、电磁兼容性设计。

2. 新能源航空材料与安全系统

新能源航空材料：航空锂离子电池材料、SAF 合成催化剂、液氢储运保温材料；

电池热安全：航空级锂电本征安全设计、热失控传播阻断技术、多参数耦合预警模型；

氢安全工程：泄漏监测与定位、防爆抑爆设计、氢脆失效预防；

适航验证方法：极端工况仿真、故障树分析与功能危险性评估框架、基于数字孪生的安全边界动态推演、动态适航验证方法。

3. 低碳运行与经济性

- 全生命周期分析：绿色民航技术的减碳潜力分析、减碳成本估计、路线图分析；
- 智能航路规划：低空绿色走廊、eVTOL 城市空域集成、动态流量管理、航线优化；
- 数字孪生平台：适航审定数字化平台；
- 市场机制设计：SAF 补贴机制、碳信用交易。

英文：

The global aviation industry is facing significant challenges in achieving its emission goals. To realize net-zero emissions by 2050, the "Destination 2050" report estimates that Europe alone will need an investment of 2.4 trillion euros. The International Air Transport Association (IATA) calls for actions from three aspects - reduce in-flight energy use, change the fuel, and recapture the emitted CO_2. IATA anticipates that the production of sustainable aviation fuel (SAF) will reach 2 million tons (2.5 billion liters) by 2025, accounting for approximately 0.7% of the total fuel consumption of airlines. Meanwhile, hydrogen energy and electric propulsion technologies have become the keys to breakthroughs, with hydrogen-powered, all-electric, and hybrid aircraft making their maiden flights. The session on

"Advanced sustainable aviation technologies and economic analysis" focuses on fuel innovation, power system upgrades, economic optimization, and policy coordination to promote Asia's leadership in driving the global green transformation of the aviation industry.

Thematic areas for manuscript submission (including but not limited to):

1. Sustainable Power Systems and Fuel Innovation

SAF production technologies: Large-scale production of biomass/electro-synthetic/solar fuels, optimization of catalytic processes, and life-cycle analysis;

Hydrogen energy applications in aviation: Liquid hydrogen storage and transportation technologies, aviation fuel cell technologies, hydrogen engine technologies, aviation airworthiness certification standards, and design of airport hydrogen refueling infrastructure;

Electric and hybrid power systems: Aviation lithium battery technologies, design of electric-oil/electric-hydrogen/hydrogen-oil hybrid power systems, multi-energy coordinated control, and energy management.

Electric propulsion system design and electronics systems: High-power density motors, high-efficiency motor technologies, motor system integration, airborne power systems, and electromagnetic compatibility design.

2. Sustainable Aviation Materials and Safety Systems

Sustainable Aviation Materials: new materials for aviation batteries, catalysts for SAF, thermal insulation materials for liquid hydrogen storage and transportation;

Battery thermal safety: Intrinsic safety design of aviation-grade lithium batteries, thermal runaway propagation blocking technologies, and multi-parameter coupled early-warning models;

Hydrogen safety engineering: Leakage monitoring and location, explosion-proof and suppression design, and prevention of hydrogen embrittlement failure;

Airworthiness verification methods: Extreme condition simulation, fault tree analysis and functional hazard assessment frameworks, dynamic deduction of safety boundaries based on digital twins, and dynamic airworthiness verification methods.

3. Low-Carbon Operation and Economic Analysis

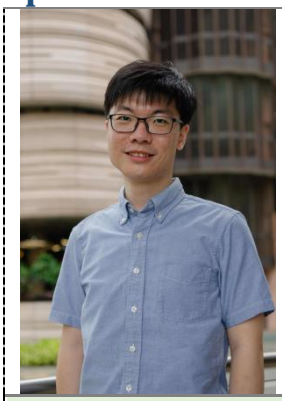
Life-cycle analysis: emission reduction potential and cost analysis of sustainable aviation technologies;

Intelligent route planning: Low-altitude green corridors, integration of e-VTOLs in urban airspace, dynamic traffic management, and route optimization;

Digital twin platforms: Digital platforms for airworthiness certification;

Market mechanism design: SAF subsidy mechanisms, carbon credit trading.

Special Session Chair(s):



姓名 **Name**	杨立中 Lizhong Yang
称谓 **Prefix**	副教授 Assoc. Prof.
部门 **Department**	民航学院 College of Civil Aviation
单位 **Organization**	南京航空航天大学 Nanjing University of Aeronautics and Astronautics
城市/地区 **City/Region**	南京，中国 Nanjing, China

Organizer's Brief Biography

中文：

杨立中，南京航空航天大学副研究员，新加坡南洋理工大学访问科学家，博士生导师，国家级青年人才。主要从事绿色民航、低温能源系统及其关键技术（蓄冷、碳捕集、电池热管理、氢能储运等）的研发与咨询工作。发表/参与编写高水平学术论文/专著章节 30 余篇，拥有国际/国内专利 10 余项。担任能源基金会、世界银行、亚洲开发银行、中国制冷空调工业协会、中关村储能产业联盟等机构项目专家、专业委员会委员等职。

英文：

Lizhong Yang, Associate Professor at Nanjing University of Aeronautics and Astronautics, visiting scientist at Nanyang Technological University in Singapore. He is mainly engaged in the R&D and consulting work of sustainable aviation, low-temperature energy systems, and their key technologies (such as cold thermal energy storage, carbon capture, battery thermal management, hydrogen energy storage and transportation). He has published/participated in writing more than 30 high-level academic papers/monograph chapters and holds more than 10 patents. He serves as the project expert or a member of expert committees for institutions such as the Energy Foundation, the World Bank, the Asian Development Bank, the China Refrigeration and Air-Conditioning Industry Association, and the China Energy Storage Alliance.

姓名 **Name**	何梓睿 Zirui He
称谓 **Prefix**	资深工程师 Senior Engineer
部门 **Department**	技术研发中心 Technology Research and Development Center
单位 **Organization**	中海石油气电集团 CNOOC Gas·& Power Group
城市/地区 **City/Region**	北京，中国 Beijig China

Organizer's Brief Biography

中文：

何梓睿，中海石油气电集团资深工程师，中国海油集团公司海外高层次人才、国家级青年人才。主要从事二氧化碳捕集及利用、可再生航空燃料、储氢制氢、储能系统及其关键技术的研发工作。发表高水平论文 30 余篇，拥有发明专利 1 项。以骨干身份参与比利时 FNRS 化学链、ZoneFlowTM 结构化反应器示范、新加坡 A*STAR 有机化合物储氢项目等。现主持中海油集团公司级储能、碳捕集相关课题多项。

英文：

Zirui He, senior engineer at CNOOC Gas and Power Group, is a high-level overseas talent of CNOOC Group and an outstanding young talent for the national youth talent program. His research focuses on the development of carbon dioxide capture and utilization, sustainable aviation fuel, hydrogen storage and production, energy storage systems, and their key technologies. He has published more than 30 high-level papers and holds one invention patent. He has participated as a core member in projects such as the chemical looping (FNRS), structured reactor SMR demonstration (ZoneFlowTM), and LOHCs for Singapore (Singapore A*STAR). He currently leads several projects on energy storage and carbon capture.