

Call for Papers for the Special Session on

DC–DC Converters for Renewable-to-X (R2X) Applications: Power Circuits, Control, and Reliability

Organized and co-chaired by

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Technical Outline of the Session and Topics

Renewable-to-X (R2X) pathways—such as green hydrogen, e-fuels, ammonia, and electrified industrial processes—depend on efficient and robust DC power conversion to interface renewable generation, DC collection networks, energy storage, and electrochemical/industrial loads. DC–DC converters play a critical role in shaping current ripple, regulating DC bus dynamics under intermittent renewables, enabling galvanic isolation when required, and ensuring safe operation under abnormal and fault conditions. This Special Issue focuses on DC–DC converter power circuits, control, and reliability for R2X ecosystems, recent converter topology innovation and high-power-density design, advanced control and modulation for fast dynamics and grid/renewable variability, and reliability-oriented engineering including condition monitoring, diagnostics, and fault-tolerant operation. Contributions with strong simulation and experimental validation, application-driven design constraints, and lifetime-aware operation under realistic mission profiles are especially welcome. This Special Issue also aligns with UN SDG 7 (Affordable and Clean Energy) by advancing high-efficiency, reliable DC power conversion that enables scalable integration of renewables into clean fuel and electrified industrial value chains.

Topics of the session include, but are not limited to:

- Electrolyzer DC Power Supplies: high-current low-voltage, low-ripple, fast dynamics
- Isolated High-Power DC–DC Topologies for R2X: DAB, LLC/CLLC, active-clamp, resonant
- Wide-Bandgap (SiC/GaN) DC–DC Converters: high-frequency design, gate drive
- Scalable DC-DC Module: interleaved, parallel modules, redundancy, current sharing
- Advanced Control for Renewable Intermittency: MPC/robust/adaptive control for DC-DC
- Ripple Shaping for Electrochemical Loads: ripple minimize, spectrum shaping, lifetime impact
- Reliability-Oriented Design and Lifetime Modelling: mission profiles, thermal cycling, derating
- Condition Monitoring and Prognostics: health indicators for devices, capacitors, magnetics
- Fault Detection and Fault-Tolerant Operation: protection, reconfiguration, graceful degradation
- DC Microgrid Integration for R2X: PV–storage–DC bus–electrolyzer interfacing, interaction stability
- Other related Topics

Timeline for Authors

All the instructions for paper submission are available on the conference website. Please visit www.iecon2026.org or scan the QR code for the timeline.

