

## **Special Compendium on Advancement on Experimental Testing Laboratories and Measurement Systems for Power and Energy Systems**

**Deadline for Manuscript Submissions: October 2023**

**Scheduled Publication Time: 05.2024**

Testing new technologies to shape the future power and energy systems before their field deployment, particularly when they are supported by power electronics converters, has gained attention in the past years. The need to bring innovations quickly in the market has pushed industry and academia to develop innovative experimental testing approaches that allow flexibility in testing conditions with high testing fidelity retained.

This special compendium aims at gathering academic and industrial experiences in developing large testing laboratories and exploring new experimental testing approaches that can facilitate introducing new energy technologies in the field. Particular attention will be given to papers that describe high-power / high-voltage testing solutions, distributed simulation environment, novel and more accurate component measurement approaches, and innovative sensors developments. On the opposite of classical research papers, it is requested that the special compendium papers describe the uniqueness of the proposed laboratory infrastructure, highlighting constructive aspects, applied methodologies and applications that cannot be satisfactorily hosted in conventional transaction papers. Participation of industrial partners and laboratories is highly encouraged for this special compendium, considering the criticality of their contributions in testing at scale and seamless connection to field deployment.

Topics of interest include, but are not limited to:

- High-power/high-voltage experimental testing labs: novel and advanced testbed approaches for comprehensive validation before field deployment, flexible testbed constructions, and safety protocols.
- Power Hardware-In-the-Loop (PHIL) frontiers: stability assessment for higher-power (>100 kW) and/or high-voltage (>1kV) testing, multiple point of common couplings PHIL testing, hybrid PHIL testing approaches with single-phase and three-phase power electronics harmonized.
- Novel power amplifiers concept with faster dynamic capabilities for PHIL evaluations, novel voltage-source/current-source approaches for versatile testing capability, e.g., covering dynamic interactions with grid-forming and grid-following.
- Distributed co-simulations laboratories approaches, interface algorithms, and applications.
- Beyond power electronics: extending the Hardware-In-the-Loop concepts to other control and/or energy layers, including microgrids with multiple energy sources (e.g., electricity and gas energy grids), cyber-physical layer integration for system operation emulations in distribution and/or transmission systems, grid-edge device and/or internet-of-things device involvement for decentralized control.
- Novel measurement approaches for characterizing semiconductor technologies.
- Advancement in sensors for power electronics applications.

We will be accepting full journal articles, which are expected to include a literature review to establish its relationship to prior work, and present sufficient results to prove the validity and viability of proposed concept. The submitted manuscript shall reply to several of the following points:

- How does your research infrastructure differ from the existing laboratories? An overview of existing infrastructures shall be provided, highlighting the advancement with respect to the state of the art.
- Define the main applications and research goals of your testing infrastructure.

- Define possible business cases that can be performed in the presented laboratory, and estimate a return of investment.
- Provide a power / data schematic of the introduced laboratories and approaches, including connected facilities and components.

All manuscripts must be submitted through Manuscript Central at <https://mc.manuscriptcentral.com/ojpel>. Submission must be clearly marked “Advancement on Experimental Testing Laboratories and Measurement Systems for Power and Energy Systems” on the cover page. When uploading your paper, please select your manuscript type “Special Compendium”. Refer to <https://www.ieee-pels.org/> for general information about electronic submission through Manuscript Central. The guest editorial board noted below will review and handle manuscripts submitted for this special compendium.

<b>Guest Editors</b>	<b>Guest Associate Editors</b>	<b>Proposed Timeline</b>
<b>Giovanni De Carne</b> , Karlsruhe Institute of Technology, Germany  <b>Gab-Su Seo</b> , National Renewable Energy Laboratory, USA	<b>Sebastian Hubschneider</b> , OPAL-RT, Germany  <b>George Lauss</b> , AIT, Austria  <b>Antonello Monti</b> , RWTH Aachen, Germany  <b>Johan Enslin</b> , Clemson University, USA  <b>Chris Farnell</b> , University of Arkansas, USA  <b>YoungJong Ko</b> , Pukyong National University, South Korea	<b>10.01.2023</b> : Submission Deadline <b>11.15.2023</b> : First-Round Notification <b>01.01.2024</b> : Major Revision Deadline <b>02.01.2024</b> : Second-Round Notification <b>04.01.2024</b> : Forwarded to IEEE for Publication <b>05.2024</b> : Articles appear in OJ-PEL