NREL
NATIONAL RENEWABLE ENERGY LABORATORY

CLEMSON UNIVERSITY

ENERGY SYSTEMS INTEGRATION

ESI optimizes the design and performance of electrical, thermal, fuel, and water pathways at all scales.

4th International Workshop on Grid Simulator Testing of Wind Turbine Drivetrains

Hosted by the National Renewable Energy Laboratory (NREL) and Clemson University

April 25 – 26, 2017

NREL's Energy Systems Integration Facility (ESIF), Golden, Colorado, USA

Day 1: April 25, 2017 (8 a.m. – 5 p.m.)

8:00 a.m. Arrival at NREL and Badging

8:30 a.m. Breakfast and Welcome to NREL's ESIF

9:00 a.m. Session 1—Introductory Session

V. Gevorgian, NREL: Status of Grid Integration Testing Projects

J.C. Fox, Clemson University: Update on Duke Energy EGRID Testing Projects

M. Steurer, Florida State University: Update on CAPS PHIL and MVDC Projects and IEEE WG P4004 Discussion

M. Mohanpurkar, Idaho National Laboratory (INL): Real-time Super-Lab Concept

10:30 a.m. Break

10:45 a.m. Session 2—Grid Simulator Testing Experience

C. Leisten, RWTH Aachen University: "Mechanical Hardware-in-the-Loop Systems for a Wind Turbine System Test Bench"

C. Mehler, IWES Fraunhofer: "Overview of IWES Grid Simulator Testing Activities"

E. Guillo-Sansano, University of Strathclyde, UK: "Overview of Power Networks Demonstration Centre"

R. Salcedo, MIT: "Overview of Microgrid HIL Laboratory Testbed and Open Platform (HILLTOP)"

Group Discussion: Improvement Needs, Capability Gaps, and the Future of MW-scale Grid Simulators

12:00 p.m. Lunch

1:00 p.m. Session 3—Grid Simulator and PHIL Testing Experience

A. Pratt, NREL: "Smart Home HIL Testing Experience"

O. Tremblay, IREQ: "IREQ HIL Testing Experience"

K. Jennett, University of Strathclyde, UK: **"**Characterising LV PV Inverter Response during Fault Transients and Voltage Disturbances"

2:00 p.m. Break

2:10 p.m. Session 3 (Continued)

M. Panwar, INL: "Smart Reconfiguration and Protection in Advanced Electric Distribution Grids"

J. Hashimoto, AIST: "Overview of Smart System Research Facility at AIST"

E. De Jong, DNV GL: "Overview of Flex Power Grid Laboratory"

R. Averous; A. Berthold, RWTH Aachen: "Grid Emulator for Wind Turbine Drivetrain Testing"

N. Wrathall, Kinectrics, Canada: "Development of Grid Simulator Capabilities in Kinectrics"

Group Discussion: Future of PHIL Testing for Grid Integration of Renewables

3:30 p.m. Break

3:45 p.m. Tour of the ESIF

5:00 p.m. End of Day 1

Day 2: April 26, 2017 (8 a.m. – 12:30 p.m.)

8:30 a.m. Arrival at NREL and Breakfast

9:00 a.m. Session 4—Advanced Grid Emulation Methods

P. Koralewicz, NREL: "Advanced PHIL Interface for Multi-MW Scale Inverter Testing"

C. Jegues, RTDS: "Advanced HIL Applications for RTDS"

A. Hoke, NREL: "PHIL Testing System for Integrating Distributed PV in Hawaii"

K. Schoder, FSU: "Controls HIL Infrastructure Upgrade at FSU to Support Advanced Evaluation Framework for Distributed Control of Emerging Power and Energy Systems"

10:30 a.m. Break

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10:45 a.m.	Session 4 (Continued)
	J. Leonard, Clemson University: "Asymmetrical Fault Generation with Clemson's Grid Simulator"
	M. Belanger; J.N. Paquin, OPAL-RT: "Advanced HIL Applications Utilizing OPAL-RT"
	K. Prabakar, NREL: "Modeling and Compensation Design for a PHIL Simulation of an AC Distribution System"
	E. Guidi; W. Van Der Merwe, ABB: "Discussion on Testing Method Improvements, Capability Gaps, and the Future of MW-scale Grid Simulators"
	Group Discussion: Final Discussion and Closing Remarks
12:15 p.m.	Lunch
1:00 p.m.	Optional Tour of the National Wind Technology Center in Boulder, Colorado (shuttle buses provided by NREL)
4:00 p.m.	Return to NREL Main Campus and Adjourn