

Workshop on Fault-Induced Delayed Voltage Recovery (FIDVR) & Dynamic Load Modeling

Joint U.S. DOE-NERC Workshop

September 30, 2015 | 8:30AM – 5:30PM Eastern Time Zone

October 1, 2015 | 8:30AM – 12:30PM Eastern Time Zone

[Hilton Alexandria Mark Center](#)

5000 Seminary Road
Alexandria, VA 22311

Workshop Overview

The physical circumstances that cause Fault Induced Delayed Voltage Recovery (FIDVR) are now much more understood — thanks, in part, to technical information provided by the residential air conditioning industry. Production-grade dynamic simulation models used by the electric utility industry for transmission planning studies (e.g., PSLF, PSS/E, PowerWorld, etc.) can now accurately reproduce the evolution of a FIDVR event once the initiating incident is known and modeled based on recorded data.

Further enhancement of the transmission planning models is necessary to improve their ability to determine the extent to which a set of transmission events will trigger delayed voltage recovery. These enhancements must be based on detailed records of actual FIDVR events, involving monitoring both transmission and distribution system behavior.

This effort is now recognized as the first major step in a larger, on-going undertaking to better understand and update modeling of “non-traditional” loads such as power electronics, including variable frequency drives, LEDs, electric vehicle battery chargers, among others.

The workshop seeks to bring together the power system and end-use manufacturing communities to review jointly what is now known about FIDVR and the related activities currently underway to ensure the reliability of the U.S. electric power system.

Workshop Objectives

1. Increase understanding of FIDVR fundamentals for utilities and manufacturing communities
2. Present findings from DOE- and industry-sponsored efforts to better understand and address FIDVR:
 - a. End-use equipment testing
 - b. Distribution system monitoring
 - c. Distribution and transmission system modeling studies
 - d. Enhanced load models and load modeling tools
 - e. Utility-led planning studies using enhanced load models
 - f. Sensitivities studies to address uncertainty

Workshop Agenda

Wednesday, September 30, 2015

8:30-9:00	<p>Welcome & Opening Remarks David Meyer, <i>U.S. Department of Energy, Office of Electricity Delivery and Energy Reliability</i> David Till, <i>North American Electric Reliability Corporation</i></p>
9:00-9:15	<p>Workshop Overview & Objectives Joe Eto, <i>Lawrence Berkeley National Laboratory</i></p>
9:15-9:45	<p>Current State of Load Modeling <i>A landscape overview of dynamic load modeling and FIDVR – where we are today, how we got here, and where we’re going.</i> Dmitry Kosterev, <i>Bonneville Power Administration</i></p>
9:45-10:00	<p>Break</p>
10:00-12:00	<p>Fundamentals, Testing & Modelings of Air-Conditioners <i>A deep dive into the fundamentals of motors, laboratory testing of end-use loads, and modeling efforts. Development of single-phase and equivalent models using field testing and detailed modeling.</i> John Undrill, <i>Independent Consultant</i> Dmitry Kosterev, <i>Bonneville Power Administration</i> Steven Robles, <i>Southern California Edison</i> Bernie Leseiutre, <i>University of Wisconsin</i></p>
12:00-1:00	<p>Lunch – provided</p>
1:00-2:30	<p>Manufacturing Perspective, Future Trends & Technologies (Panel Session) <i>Perspectives from the manufacturing community focusing on current and future trends in control design and engineering, end-use requirements, and future technologies.</i> John Halliwell, <i>Electric Power Research Institute</i> John Berdner, <i>Enphase Energy</i> Tim Hawkins, <i>Rheem</i> Hung Pham, <i>Emerson Climate Technologies</i></p>
2:30-2:45	<p>Break</p>

2:45 – 4:30	Load Model Data <i>The composite load model for transmission planning studies – development, parameter selection, model structure, and data management.</i> Ryan Quint, <i>North American Electric Reliability Corporation</i> John Kueck, <i>Independent Consultant</i> Donald Davies, <i>Western Electricity Coordinating Council</i> Dmitry Kosterev, <i>Bonneville Power Administration</i>
4:30-5:30	Field Measurements <i>Gathering data at the distribution level to better understand the phenomena of FIDVR and load dynamics.</i> Kyle Thomas, <i>Dominion Virginia Power</i> Richard Bravo, <i>Southern California Edison</i> John Undrill, <i>Independent Consultant</i>
5:30	Adjourn

Workshop Agenda (Cont.)

Thursday, October 1, 2015

8:30-10:00	<p>Composite Load Modeling & System Studies (<i>Panel Session</i>) <i>Experience using the composite load model for bulk transmission planning studies – lessons learned, technical challenges, identified problems, and solutions. A focus on the development of the model, utilization of the model, and planning around a more detailed load model.</i></p> <p>Noah Badayos, <i>Southern California Edison</i> Dmitry Kosterev, <i>Bonneville Power Administration</i> Rob O’Keefe, <i>American Electric Power</i> Dean LaTulipe, <i>National Grid</i> Scott Ghiocel, <i>Mitsubishi Electric Power Products, Inc.</i></p>
10:00-10:15	<p>Break</p>
10:15-11:30	<p>Reliability Focus (<i>Panel Session</i>) <i>A broad look at reliability aspects related to load modeling and FIDVR, including regulations and policies, system level impacts, history in planning around load-related issues, and fundamental drivers behind reliability of end-use technology changes.</i></p> <p>Bob Cummings, <i>North American Reliability Corporation</i> Dmitry Kosterev, <i>Bonneville Power Administration</i> John Undrill, <i>Independent Consultant</i> David Till, <i>North American Electric Reliability Corporation</i></p>
11:30-12:30	<p>Roundtable Discussion, Summary & Next Steps Joe Eto, <i>Lawrence Berkeley National Laboratory</i> – Moderator</p>
12:30	<p>Adjourn</p>