



# IEEE FOOTHILL

## JUNE MONTHLY NEWSLETTER

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## IEEE Foothill June 2024 ExCom/OpCom Monthly Hybrid Meeting

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The IEEE Foothill Section held its June ExCom/OpCom monthly hybrid meeting at DeVry University and virtually through Zoom. The chair reviewed the minutes, and the secretary is still working on the approved minutes from last year. The chair said that the section had already received its rebate. However, he was somewhat disappointed regarding the student's branch submissions, which resulted in fewer rebates to the student branches. As far as the vTools reporting, everyone is up-to-date with their event reports. The chair noted that the section just added a TikTok account.

### **Membership Development**

Kim Mosley was able to report. We had 29 additional members. WIE will celebrate its WIE Day(s) from June 23 to July 12. Melissa Castro of CSUSB is interested in attending a Region 6 WIE Event, and the chair encouraged her to look for a colleague to attend with it. The section will reimburse their expenses.

### **Technical Committee**

Nanotechnology, Dr. Jenny Yu, is working on SETC 2024. So far, they have had registrants from the USA (17) and India (14). They have three categories: High School, Inter-High School, and Domestic College. Hyperloop may no longer handle the workshop series, but Banshee UAV might handle it since it has 100 members. The chair is interested in being a judge of the SETC 2024.

PES had an event last May 15, which was an Overview of an R&D Project for System Stability aimed at mass Introduction of Renewable Energy and a joint event with the Pikes Peak Section titled Utility-Scale Solar Generation at Colorado Springs Utilities. Koji has future topics already lined up for PES webinar.

### **Affinity Group**

Kim Mosley said they have no upcoming events except for the IEEE WiE Day. She's also looking for some active members around Hesperia and hopes to engage them in more volunteering.

Consultants Network had their monthly meeting for this month and there will be no meeting for the month of July.

# PES Chapter: Overview of Demonstration Projects aimed at Harnessing Renewable Energy on Remote Islands

Reported by: Koji Yamashita

The IEEE Pes Foothill Seminar, titled "Overview of NEDO Stream R&D Project for System Stability Aimed at Mass Introduction of Renewable energy," was held online on May 15, 2024. Mr. Ruichi Ogahara from the New Energy and Industrial Technology Development Organization (NEDO) and Dr. Jun Hashimoto from the National Institute of Advanced Industrial Science and Technology (AIST) presented an overview of a national demonstration project in Japan, highlighting preliminary results.

### Potential Future Stability Challenge

Challenge	Example of New Countermeasures
Short-circuit capacity drop	<ul style="list-style-type: none"> <li>Revisiting and revising protection coordination, if any</li> <li><b>Short-circuit current supply function</b></li> </ul>
Low system inertia	<ul style="list-style-type: none"> <li>Establishment of real-time inertia estimation method</li> <li><b>Synthetic inertia response by IBRs</b></li> </ul>
Short-term oscillation	<ul style="list-style-type: none"> <li>Improvement of frequency response (Storage battery, FGMO, LFC control)</li> </ul>
Long-term oscillation	<ul style="list-style-type: none"> <li><b>Improvement of downward reserve (PV output control, energy storage)</b></li> <li><b>Renewable energy output and lamp forecast</b></li> <li>Supply/demand operation simulation</li> </ul>
Transmission capacity shortage	<ul style="list-style-type: none"> <li><b>Connect &amp; Manage</b></li> <li>HVDC</li> <li>Conductor temperature control by dynamic rating</li> <li>Utilization of resources</li> </ul>
Voltage flicker	<ul style="list-style-type: none"> <li><b>Improvement of anti-islanding function</b></li> </ul>
Voltage fluctuations in distribution line	<ul style="list-style-type: none"> <li>Smart inverter development with enhancing reactive support capability</li> </ul>

### Countermeasure for Curtailment to Ensure Stability -Grid Reinforcement: Focus on Tie-Line and Critical Transmission

#### Outline of the Master-plan

**Necessary investment (estimate): 6-7 trillion yen**

- FC (reinforcement): +2.7 million kW, 400-430 billion yen
- Hokkaido area reinforcement: 1.1 trillion yen
- Hokkaido-Tohoku-Tokyo (new): +6 to 8 million kW, 2.5-3.4 trillion yen
- Tohoku-Tokyo (reinforcement): 200 billion yen
- Middle region reinforcement: 52 billion yen
- Chubu area reinforcement: 3 billion yen
- Shikoku area reinforcement: 180 billion yen
- Kyushu-Chugoku (reinforcement): +2.8 million kW, 420 billion yen
- Tokai area reinforcement: 650 billion yen
- Kyushu area reinforcement: 13 billion yen
- Kyushu-Shikoku (new): 480-540 billion yen
- Chugoku area reinforcement: 100 billion yen
- Tenryo area reinforcement: 670 billion yen

The first speaker discussed the current status and future goals of inverter-based resource (IBR) integration in Japan, specifically emphasizing the decreasing grid inertia due to the increasing use of IBRs. The second speaker explored projects involving grid-forming converters and motor-driven synchronous generators powered by renewable energy sources with batteries. He presented new findings regarding a unique current feature of grid-forming converters during a system fault, which will be leveraged for the upcoming update of Japan's grid interconnection code.

### Project Overview

- WP1 Development of Inverter-based Countermeasures for Low System Inertia**
  - Requirement and specification study.
  - Design & development of Prototype.
  - 3+ GFM inverter for battery storage and one GFM inverter for PV
- WP2 Validation and testing**
  - Equipment-based study, e.g., Lab/Field testing and conformance of GFM inverter.
- WP3 Power System Stability Analysis**
  - Simulation-based impact analysis study for system stability
- Output**
  - Accumulation of new findings and lessons learned to inform grid code updates
  - Recommendation for updating the grid code

### Validation and Testing of GFM Inverter (WP2)

- The laboratory testing comprises two main components: basic testing and PHIL testing.
- The basic test aims to assess the fundamental and maximum performance of the GFM inverter.
- Conversely, the PHIL test examines interactions with the external grid and identifies any potential issues.
- The laboratory test has been conducted in an environment similar to a typical grid interconnection test for the domestic market.
- The control parameters have been generalized as much as possible to highlight the differences in the characteristics of each inverter vendor.
- Different setting parameter testing. E.g., Inertia constant, governor gain, damping coefficient, etc.
- Various test conditions.
  - Frequency ramp tests with  $\pm 0.1 \sim \pm 5$  Hz/sec
  - FRT tests with varying voltage levels, phase angles of fault, fault clear time, etc.

A total of 13 participants attended this webinar. During the discussion segment, speakers and the audience elaborated on the limitations of synthetic inertia and fault current provision provided by IBRs, contrasting these functionalities with those of conventional synchronous generators, including grid-forming converters. The seminar was not recorded. But presentation slides are available in PDF format upon request. Interested individuals can contact Dr Koji Yamashita at [kyamashita@ucr.edu](mailto:kyamashita@ucr.edu) To acquire the presentation material.



*UCR Students had a tour at TAE with the help of YP interim chair, Pankaj Bhowmik.*

## UPCOMING EVENTS

**IEEE Foothill July ExCom/OpCom  
Monthly Hybrid Meeting**  
July 09, 2024

**IEEE Foothill Consultants Network  
August Meeting**  
August 07, 2024



If you want to be part of our growing section, email us at [sec.foothill@ieee.org](mailto:sec.foothill@ieee.org), or check our social media accounts below.

