UNIVERSITY OF NORTH CAROLINA CHARLOTTE | THE WILLIAM STATES LEE COLLEGE OF ENGINEERING
ELECTRICAL AND COMPUTER ENGINEERING

Date: Nov 14, 2022
Attn to: Dr. Kevin Chen
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Subject: Scope Expansion Statement of Work

for **UNCC - SOW No. 31** – Reliability Assessment for Utility PV Inverter System

1. Scope

The University of North Carolina at Charlotte (UNCC) will work with Duke Energy to expand the existing research project (UNCC - SOW No. 31) of Reliability Assessment for Utility PV Inverter System. The focus of the additional scope is to investigate the Arc Safety and Fire Resilience for PV and Utility Energy Storage Systems. The goal of this project extension is to continue the research on PV and battery arc safety and fire resilience to support the development of safe and reliable utility PV and energy storage systems.

The extended project will conduct technology and standard (UL and NFPA) reviews on PV and utility battery arc fault and fire prevention, evaluate the current arc fault detection and arc flash prevention methods, research real-time arc fault detection and battery fire detection technology, and provide technical recommendations to **reduce fire hazards, enhance electrical safety,** and **increase the PV and utility energy storage system fire resilience**.

2. Budget

The proposed project period extension is from **Jan 1st, 2023 to Dec 31, 2023**. The cost is **$100,000** and the deliverables are provided in Section 3 below.

3. Deliverables and Timelines (detailed subtasks will be refined after the project starts)

1. Conduct a literature review on arc fault and battery fire for utility energy storage systems. – M2
2. Conduct UL and NFPA standard reviews on battery fire and arc flash protection. – M4
3. Evaluate the existing arc fault detection and arc flash prevention methods – M6

4. Feasibility study and validation on real-time arc fault detection and battery fire detection technology – M10
5. Technology recommendations on arc safety and fire resilience for utility energy storage systems – M12

4. Data Needed

The team will work closely with Duke Energy to collect available data from existing energy storage systems for arc safety and fire resilience assessment.

Data that can be used in this project include: energy storage system electrical specs (power and voltage rating), battery rating, battery type and manufacturer, battery inverter data (manufacturer part number), and environment data (temperature, humidity) if available.

5. Project Team

Dr. Tiefu Zhao will lead this project and direct the team activities for the successful execution of the project. Dr. Zhao has over 15 years of academic and industry R&D experience in power electronics, solar and energy storage systems, arc detection, and electrical safety. He has a proven track record of successfully leading project teams to advance innovation ideas into commercialization. Dr. Zhao will be responsible for UNCC's overall project execution and supervise the graduate students or postdoctoral researchers to execute the project.

The team plans to have conference calls between UNCC and Duke Energy industry advisors to define detailed project deliverables, and discuss progress and recommendations.

Please contact Dr. Tiefu Zhao with any questions. Thank you.

Sincerely,

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