U.S. DEPARTMENT OF ENERGY | Office of Cybersecurity, Energy Security, and Emergency Response

SEQCESS: ScaleablE Quantum Cybersecurity for Energy Storage Systems

OAK RIDGE National Laboratory

Integrating quantum communications protocols with distributed energy storage technology

The project team is developing a quantum communication interface to interact with existing distributed energy storage (DES) technologies – small, grid-connected, or distribution system-connected devices. The threat of an adversary issuing malicious commands to DES resources could lead to significant damage to energy delivery infrastructure, incur substantial financial loss, and may lead to the loss of life through the deliberate release of stored energy. This interface allows for both current and future quantum communications hardware to communicate securely with DES systems using quantum key distribution (QKD) technologies. Communications tasks necessary for the safe and secure operation of DES resources – including authentication, encryption/decryption, and key management – are included to provide for seamless and interoperable functionality. This technology will be transitioned into the private sector for use after development.

KEY TAKEAWAYS

- Provides quantum-based secure communications for control of distributed energy storage systems
- Recognizes the utility of distributed energy storage systems for future use in the energy grid and their vulnerabilities
- Allows point-to-point and point-to-multipoint secure communication

OUTCOME

The project develops quantum physics-based technologies to improve the cybersecurity for supervisory control of DES resources. Protocols for quantum-secured communications with DES resources will be developed and demonstrated.

PARTICIPANTS	ROLE
Oak Ridge National Laboratory	Leads overall project including continuous variable thrust.
Qubitekk	Leads the discrete variable thrust including polarization-based, quantum key authentication and quantum digital signatures.
epb	Provides fiber and engineering support for fiber network access and testing.
Los Alamos National Laboratory EST. 1943	Provides red team services.

CONTACT INFORMATION

Initial Leads:

Carol Hawk
Program Manager

Nicholas A. Peters
Principal Investigator
Oak Ridge National Laboratory
865-576-3386
petersna@ornl.gov

Current Contact as of February 2020:

Akhlesh Kaushiva
Senior Technical Systems and Cybersecurity Advisor
Department of Energy (DOE)
Office of Cybersecurity, Energy Security, and Emergency Response (CESER)
202-287-6062
Akhlesh.Kaushiva@hq.doe.gov

Period of Performance: September 2019 – October 2022

Total Award Value: $3,000,000
DOE Share: $3,000,000
Cost Share: $0

CYBERSECURITY FOR ENERGY DELIVERY SYSTEMS (CEDS)

CEDS projects are funded through DOE CESER, which aims to enhance the reliability and resilience of the nation's energy infrastructure by reducing the risk of energy disruptions due to cyberattacks.

Website: https://www.energy.gov/ceser

Date Written: June 2021