

Center for Energy Systems Research

CESR Mission

To advance and apply scientific and engineering knowledge associated with energy systems and in particular in electric power while supporting the instructional program of Tennessee Technological University (TTU) in academic areas associated with energy systems.

Strategic Research Areas

- Smart Grid
- Resilient Infrastructure

Research and Testing Facilities

Smart Grid Laboratory

- Optimum and Stable Operation
- Efficient Integration of Sources and Loads



- Resilient and Secure Communication
- Ageing and Lifetime issues
- Accurate Instrumentation
- Protection against disturbances and threats
- Information Technology Applications
- Can test real industrial hardware
- Can test new control strategies

Microgrid Testbed





Battery Research Laboratory (Creation and Testing)

www.tntech.edu/engineering/research/cesr 931-372-3615 cesr@tntech.edu



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Research and Testing Facilities

Resilient Infrastructure – Focus Area

- Advanced Materials
- Advanced Computational Methods
- Monitoring and Control
- Environmental / Climate Sustainability
- Modeling and Simulation

Smarter Traffic

- Survey Existing traffic
- Simulate and model new traffic patterns
- Design and implement new traffic control strategies





Smart Bridges

- On-site bridge reconnaissance for planning the long-term structural health monitoring (SHM) system
- Supplement the dynamic instrumentation with a static-based monitoring system
- Track the position of the structure and member force distribution before and after a seismic event to ensure adequate structural performance













More Resilient Concrete

- Perform research to determine if a rapid, more efficient, and reliable means to determine concrete mixtures to achieve and increase bridge deck service life.
- Select mixtures designs for Evaluation.
- Fabricate and test 5 validation batches of each mixture design.
- Evaluate rapid chloride permeability and surface resistivity.
 - Analyze data and literature / compare with previous results and generate correlations
- Formulate recommendations.

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