

## **IART-054**

### **Exploration of a New System Strategy for Reliable Electric Transmission Lines**

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#### **Abstract**

Engineers design electric transmissions systems so they will not fail under expected natural hazards such as wind and ice. Unexpected conditions, or expected events which happen more frequently than predicted, cause transmission lines to fail, as happened recently in Florida and the Gulf Coast. It is impractical to design each structure never to fail, and much controversy surrounds the frequency and severity of the hazards to which a structure is designed. More research on low-frequency events often increases rather than decreases the uncertainty under which designers must do their job.

This project evaluates new systems engineering approaches that can make the entire system more survivable and easier to repair when overloads happen. We wish to explore cost-effective ways to reduce the down-time of the transmission grid when design limits for individual structures are exceeded. The project will consider: enhanced structural specifications for transmission line structures, including identification of cost-effective structural changes; a structural backbone system in which the network skeleton has a higher level of reliability than the remainder of the system; use of anti-cascade structures; use of mechanical fuses to limit the spatial extent of structural damage; and use of emergency replacement structures.