UNIVERSITY OF FLORIDA

Secure Energy Systems - Vision and Architecture for Analysis and Design

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Description: Individuals, families, private enterprises, and public sector organizations all depend on availability of energy at predictable prices in desired quantities. At the same time, assured energy supply is threatened by natural and/or man-made disruptions, but can be augmented by the intelligent inclusion of a web of renewable energy sources such as solar (PV or solar thermal), wind, or biomass. For example, a hurricane can seriously disrupt availability of electricity for days. A terrorist attack can disrupt oil supplies. Thus, it is clear that a thorough understanding of security of an energy system at a given level of granularity is desirable, indeed necessary. Such understanding can be useful to corporate leaders, public officials, military commanders, private investors, and citizens. The goal of this project is to investigate the concept of secure energy systems and formulate a concrete vision of a broad-based, comprehensive research program. An additional project goal is to develop architecture for modeling, analysis, and design of secure energy systems.

In our formulation, we are considering all aspects: energy generation, energy consumption, transmission and distribution, and the control systems which connect these systems together. The approach is based on analyzing the threats or attacks on the systems. We consider the physical threats to the power systems and also the growing cyber threat to the control systems and the SCADA systems.

We will describe the outline of a graphical user interface which will form the external interface for the analysis system. This will serve as a framework for a tool for analysis of the security properties of the energy system. The graphical user interface will consist of the various threats faced by the energy systems and the analysis questions in case of an attack.

We are also initiating an initial study of the security of energy needs in transportation systems which will finally be a part of the graphical user interface. The security of the transportation system involves the security of fuel and the transportation of fuel to the systems.

Progress Summary

This project began in May 2010. In the work conducted so far, we have found that there is not much literature on energy system security analysis which takes a complete look at the energy system as a whole. We are hoping to develop a comprehensive view and research agenda for analysis and design of secure energy systems.