

Transmission Efficiency Initiative: Host Demonstration Project

Integrated Resource Planning to Improve System Efficiency—Generation Siting with Efficiency Consideration



Generator Station

Project Scope

As part of EPRI's Transmission Efficiency Initiative, Southern Company will support EPRI in a demonstration project using the measurement and validation (M&V) methodology to quantify efficiency gains from locating generation near load.

Technology Description

Power plant siting is a complex and intricate process in which many aspects and elements must be taken into consideration. Location of new generation impacts adequacy and reliability requirements for the entire power system. It is strongly influenced by other aspects such as availability and cost of fuel supply, the cost of land, water, and environmental permitting, and so on.

Available locations for new power plants are usually limited. Strict policies normally exist to designate location for large electric power facilities in an orderly manner that is compatible with environmental preservation and the efficient use of resources. The objective of such policies is to minimize adverse human and environmental impact while ensuring electric power system reliability and integrity and ensuring that electric energy needs are met and fulfilled in an affordable and timely fashion.

- Demonstrate the benefits of locating substations near the load center with respect to transmission system efficiency.
- Monitor before and after energy losses and carbon emissions and document the results
- Benefits include reduced losses and reduced carbon footprint.

Southern Company uses a holistic, integrated resource planning approach to siting new generation in which all costs are considered, including firm transmission delivery. The cost, reliability, and efficiency considerations associated with delivery often result in economies in siting new generation near load.

An 840-MW gas-fueled combined-cycle power plant—the McDonough power plant—is being built in the Atlanta urban area, quite close to the load it serves. Siting the power plant close to the load eliminates the need for substantial transmission expansion, reduces congestion, lowers transmission losses, and avoids issues associated with siting long transmission lines and acquiring rights of way. Another substantial benefit is that McDonough power plant provides great reactive power support for the Atlanta area, avoiding US\$160 million in dynamic reactive devices for voltage reliability.

Expected Benefits

Many of the following benefits might be realized through the application of the concept of generation siting with efficiency consideration:

- Reduced congestion
- Reduced need for substantial transmission expansion
- Reduced transmission system losses
- Less right of way and, consequently, reduced land usage and impact of new transmission
- Better voltage control
- Higher reserve and margins
- More dispatch flexibility
- Improved reliability through reduced exposure of transmission to storms and vegetation.

Approach for Measurement and Verification

A key objective of EPRI's Transmission Efficiency Initiative is to verify and validate the benefits realized by the application of the technology using a consistent M&V methodology that will be developed as part of EPRI's transmission efficiency research portfolio.

The detailed methodology of M&V will be developed during the course of the project using the following general approach:

- Demand, energy, CO₂ savings, and loss reduction will be determined based on load flow analysis and system operation simulations.
- System utilization improvement will be assessed by considering generation dispatch, congestion costs, and other metrics that will be defined.

Project Schedule

The schedule of the project tasks is as follows:

1. Southern Company will provide the system technical and operational information needed to conduct the analysis.
2. EPRI will perform the analysis in close coordination with Southern Company staff.
3. Final project report, December 2011.

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