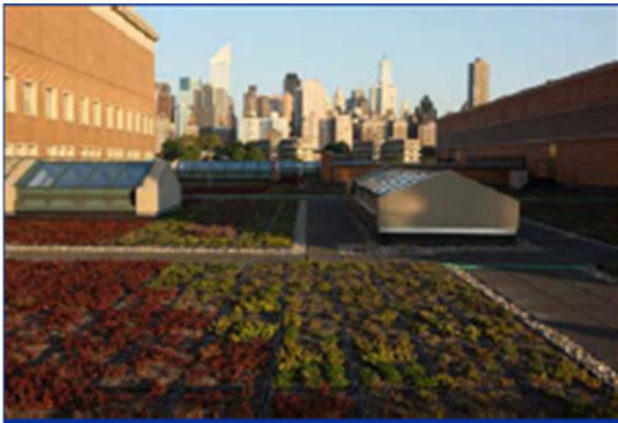


Transmission Efficiency Initiative: Host Demonstration Project Improving Energy Efficiency of Substation Auxiliary Systems and Operations



"Green roof" concept to improve air quality and conserve energy

Project Scope

As part of EPRI's Transmission Efficiency initiative, ConEdison is evaluating a possible demonstration project to assess the benefits of implementing measures to reduce energy consumption of substation auxiliary systems.

Efficiency improvements in substation systems and the associated equipment is one area that can be reviewed for potential "low-hanging fruit" to reduce a utility's own electric consumption.

Many approaches exist to substantively reduce consumption in substation control rooms, including optimal HVAC units, higher-efficiency fans and pumps, and better transformer efficiencies in the substation yard. The successful implementation of a number of efficiency technologies in the commercial and Industrial sectors will also help utilities to develop a more efficient substation system. These technologies include the following:

- Better building insulation and weatherization would improve the efficiency of the substation control buildings.

- Evaluate measures to reduce consumption of the Con Edison substation system and its associated equipment.
- Benefits include reduced energy losses and reduced carbon footprint.

- High-efficiency lighting would lower the electrical usage and improve lighting in work areas inside the control buildings and outside in the substations.
- Higher-efficiency HVAC systems would increase the efficiencies of the necessary units, keeping the battery system and protective relaying at normal temperatures.

Con Edison has proactively completed initial energy measurements and calculations for the electric consumption at their substations. Using these measurements as a baseline, Con Edison is thoughtfully assessing the benefits of integrating efficiency technologies into its substation system in an effort to lead the way in energy efficiency and, consequently, reduce their greenhouse gas contribution and carbon footprint. The measures that Con Edison is implementing in this regard range from changes in substation operations (such as turning off some of the outdoor lights) to new concepts in substation building design (such as the "green roof" concept).

This project will enable EPRI, partnering with Con Edison, to identify, document, and implement energy efficiency measures applicable within the substation system. Although managing usage through efficiency implementations is not a new concept, many utilities have not viewed system electrical usage in the electrical substation system as a high priority.

This project is a field demonstration on a handful of substations, including a review of the system savings for the efficiency implementations. If the savings are significant, the efficiency implementations could be implemented on a larger number of substations. New learning in this project will help to set the stage for larger efficient substation deployments. The new learning in this demonstration effort will be incorporated into EPRI's R&D efforts and might be expanded to a larger effort in the future.

Expected Benefits

There might be significant potential to reduce losses and energy usage in electrical substation systems while taking advantage of efficiency technologies to manage the electrical substation systems more efficiently, which will benefit society and utilities at large. These measures can directly reduce greenhouse gas emissions and the associated carbon footprint.

Approach for Measurement and Validation

A key objective of EPRI's Transmission Efficiency Initiative is to verify and validate the "actual" benefits realized by the application of the identified technology using a consistent measurement and verification (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:

- Energy savings will be determined based on energy measurements and calculations for the electric consumption at the substations being improved, before and after the implementation of the energy efficiency measures.
- A methodology will be developed to assess CO₂ emission savings and life cycle carbon footprint.

Project Schedule

The project tasks are as follows:

1. Evaluation of Con Edison substation characteristics and their energy usage patterns.
2. Review and comprehensive analysis of the measures that Con Edison has been implementing to improve substation efficiency.
3. Development of construction recommendations and guidelines for refurbishing existing substations to improve energy efficiency.
4. Development of recommendations and guidelines for the construction of new substations with energy efficiency considerations.
5. Development of a calculation methodology for accounting and documenting energy savings and CO₂ emissions reduction.
6. Identification of one or more substations as candidates for energy-efficient improvement (refurbishing) according to the developed guidelines.
7. Measure energy consumption of candidate substations for predefined period.
8. Implement the energy efficiency measures in the candidate substations (refurbish).
9. Measure energy consumption of refurbished substations for a predefined period.
10. Apply EPRI protocols to quantify and assess energy and CO₂ emission savings.
11. Document results.
12. Share experience with other demonstration project participants.

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