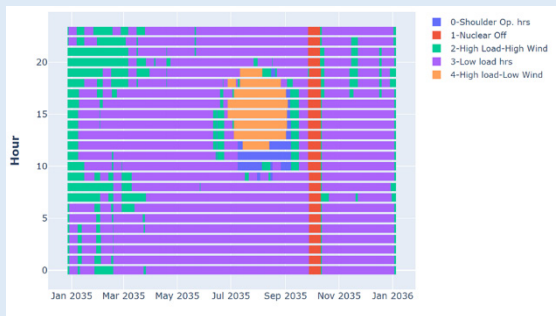


APPLICATION OF HIGH-LEVEL SCREENING (HILS) TOOL FOR POWER SYSTEM PLANNING DATA ANALYTICS



HILS clustering example

PROJECT HIGHLIGHTS

- Apply HiLS to screen critical operating conditions from large, complex operational datasets
- Provide guidance on data visualization techniques for analysis of critical operating conditions
- Support system operators and planners to make reliable, cost-effective decisions

Background, Objectives, and New Learnings

The increased variability of renewable generation and modern consumer loads has resulted in power system planners and operators encountering stressed operating conditions that have not been historically commonplace. Screening for these stressed operating conditions requires analysis and visualization of large operational datasets, which can be a significant challenge due to their size. However, screening for these operating conditions has become a necessity for planning future power systems with large amounts of renewable generation and for ensuring system reliability.

This project supports the emerging power system operational and planning needs of utilities through targeted application of the High Level Screening (HiLS) tool. Through this research, EPRI intends to use HiLS to analyze operational data sets provided by project participants and help transmission planners and operators screen for critical operating conditions that should be focused on for future reliability planning. Visualization of critical operating conditions analyses is an important component for future planning purposes and will be demonstrated throughout the project.

Benefits

This project is expected to advance operations planning by making it easier for utility engineers to navigate the variability and uncertainty of the modern power system with its complex load and generation profiles.

It is also expected to provide a state-of-the-art tool and process to give participants the ability to screen and plan for stressed operating periods, including visualization of the analysis results. This helps utility companies improve reliability, thus benefitting the general public by reducing unwanted customer interruptions and outages, and ultimately supports decisions that balance cost and reliability.

Project Approach and Summary

The following high-level tasks define the project approach:

1. **Gather relevant data from the Funder:** EPRI plans to obtain the data from participants and develop a translation process to convert the data to a format applicable to HiLS. EPRI plans to refine this process in consultation with the participant's staff. The data is expected to capture the historic/projected operational performance of the system in the short/long-term, influenced by different varying load levels as well as actual/projected variations in wind and solar power generation.
2. **Apply the HiLS tool:** EPRI plans to apply the HiLS tool to analyze and cluster the data by similar operating hours. EPRI plans to work in consultation with participant's staff to refine/develop visualization of this data to help utilities analyze the operational impacts driven by the variability and uncertainty of future load and generation.
3. **Technology transfer:** EPRI plans to conduct technology transfer sessions with the participant to help in understanding the data requirements for the tool and enable them to use the tool as a part of their routine transmission and operational planning processes.

EPRI plans to perform these tasks for up to three (3) data sets for the funder. Analysis of further data sets is possible but will incur additional costs.

Deliverables

Each participant will receive the following deliverables:

- Periodic project meetings (via Webex) to present the progress of work and discuss participant feedback.
- A final report documenting the project work, including outcome of the HiLS application and recommendations on data visualization from the results.
- Access to the HiLS software will be provided as part of the project. Note - The HiLS tool is supported through EPRI's Transmission Planning R&D program, Project Set 40C: Methods and Frameworks for Advancing Transmission Planning.

Price of Project

The base project cost is \$80,000. This includes work for three (3) data sets as noted in the Project Approach section. Additional data sets may be analyzed at a cost of \$28,000 per data set.

Work will be done on an individual funder basis. There is no minimum number of funders required to begin work.

The project is eligible for Self-Directed Funding (SDF).

Project Status and Schedule

From the kickoff, the project is estimated to take seven months to complete.

Who Should Join

Utilities experiencing significant system changes or expecting future challenges will strongly benefit from the HiLS analysis and reporting. These variables could include:

- Unprecedented load growth (such as EV charging stations, new data centers, and crypto mining loads)
- Rapid transition from traditional synchronous generation to inverter-based resources (IBR)
- Increasing extreme weather scenarios, especially when accompanied by impactful outage events

Contact Information

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