## Plan Overview

*A Data Management Plan created using DMP Tool*

**DMP ID:** https://doi.org/10.48321/D18P6M

**Title:** Multi-level optimization applied to distribution systems planning including non-utility-owned distributed energy resources

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**Funder:** São Paulo Research Foundation (fapesp.br)

**Template:** Digital Curation Centre

**Project abstract:**

Distribution systems are being restructured, modified, and adapted to operate in the smart grid environment, allowing the integration of distributed energy resources such as distributed renewable generation, energy storage systems, electric vehicle charging stations, and so on. These technologies provide several operational and environmental benefits to distribution networks, but they also present several challenges that must be addressed carefully in order to avoid system operational issues, which can vary depending on the location, size, and type of distributed energy resource installed. Furthermore, the installation of these resources in the network allows the emergence of new agents in the energy market, which may have different objectives and/or conflict with the concessionaire's objectives, making proper planning of the size and location of these resources difficult. As a result, utilities require specialized tools to assist them in making decisions in the face of these new challenges. The current research project proposes to use bi-level optimization to address the problem of distribution system planning that includes distributed energy resources that are not owned by the utility. The bi-level optimization allows to hierarchically model problems involving multiple agents and finds a balanced solution that optimizes each agent's objectives. Thus, the objectives of the utility will be considered at the upper level, while the objectives of the owners of distributed energy resources will be considered at the lower level. To represent the planning problem, mathematical optimization models will be

developed to be solved using commercial solvers, as well as variable neighborhood search metaheuristics. Furthermore, the formulation of the problem will be expanded to account for the uncertainties associated with the planning problem. The proposed methods will be used to solve systems with varying degrees of complexity from the literature, and the results will be compared to existing methods.

**Start date:** 01-01-2023

**End date:** 12-31-2024

**Last modified:** 07-08-2024

**Copyright information:**

# Multi-level optimization applied to distribution systems planning including non-utility-owned distributed energy resources

## Data Collection

### What data will you collect or create?

1. Data of test systems (distribution networks, renewable distributed energy resources, cost and parameters of expansion alternatives).
2. Result of analyzed case studies (cost values, electrical variables, operation settings for batteries and distributed energy resources).

### How will the data be collected or created?

The data for the test systems will be based on IEEE test networks and microgrids from specialized literature.

Algorithms for the generation of stochastic parameters such as fault duration and occurrence, demand, solar irradiation, will be developed to produce operation scenarios.

The generated information will be stored as text and CSV files .

## Documentation and Metadata

### What documentation and metadata will accompany the data?

The files with the data will be available along with a README file explaining the several fields.

## Ethics and Legal Compliance

### How will you manage any ethical issues?

There are no ethical issues related to the research.

### How will you manage copyright and Intellectual Property Rights (IP/IPR) issues?

Although there is no restriction on the data, the source must be referenced when used for research purposes.

## Storage and Backup

### How will the data be stored and backed up during the research?

Repositories such ResearchGate and GitHub will be used to share the data once it is produced and before the submission of papers to journals. Submitted versions of manuscripts will be deposited in ResearchGate, while data of case studies and programming codes will be uploaded to GitHub.

### How will you manage access and security?

There are no risk securities since the data is public.

## Selection and Preservation

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### Which data are of long-term value and should be retained, shared, and/or preserved?

All the data will have long-term (test systems and results of simulations) and will be shared before the submission of papers to journals.

### What is the long-term preservation plan for the dataset?

The data will be shared, using ResearchGate, in a permanent way before the submission of papers to journals or at the end of the research.

## Data Sharing

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### How will you share the data?

The data will be shared via a repository (manuscript with ResearchGate and codes and data with GitHub).

### Are any restrictions on data sharing required?

There are no restrictions on the sharing since the information of the test systems will be adapted from standard IEEE test systems.

## Responsibilities and Resources

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### Who will be responsible for data management?

John Fredy Franco will be responsible for the data management.

### What resources will you require to deliver your plan?

There is no need for additional specialized software or hardware. The institution (UNESP) provides the computational/information infrastructure for data management.

The repositories are free, so there will not be any kind of fees.