E1.02 - L³ Energy

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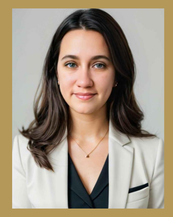
TEXAS STATE INGRAM SCHOOL OF ENGINEERING

System Impact Study of Photovoltaic Generator into 24kV Distribution System

Meet the Team

Luke Scarpato



Lisette Lugo

Lilly Martinez

Project Overview

Goal

- Conduct a System Impact Study for integrating a 5 MW solar PV generator into a 24 kV distribution network.

Objective

- To study the impacts of interconnecting a 5 MW solar generator to a 24kV distribution system, focusing on stability, safety, and compliance.

Tools Used

- Simulations are performed using Milsoft WindMil to evaluate load flow, short circuit, and flicker levels both before and after PV integration.

Project Requirements

PV Generator

- Evaluate impact from PV generation fluctuations to meet flicker standards.

Interconnection

- Conduct short circuit analysis.

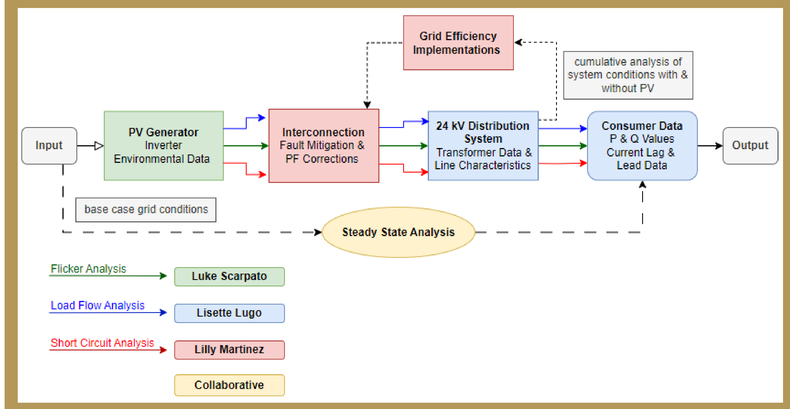
24kV Distribution System

- Perform load flow and post-integration load flow to detect voltage violations.

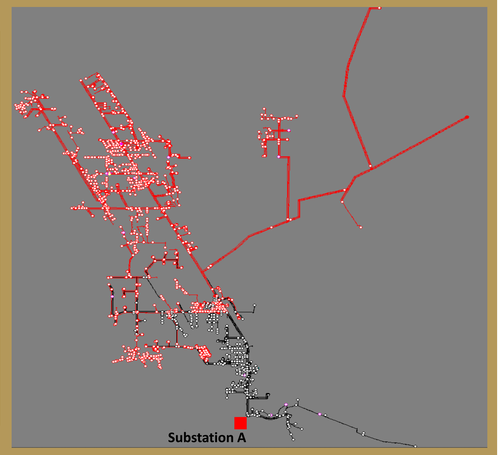
Project Objectives

- Analyze the PV generator's effect on the distribution network.
- Maintain voltage stability and avoid overloads or unacceptable flicker levels in the system.
- Ensure the PV generator's integration enhances grid resilience and supports reliable power delivery during varying demand conditions.
- Identify necessary upgrades or mitigations to meet safety and regulatory standards.

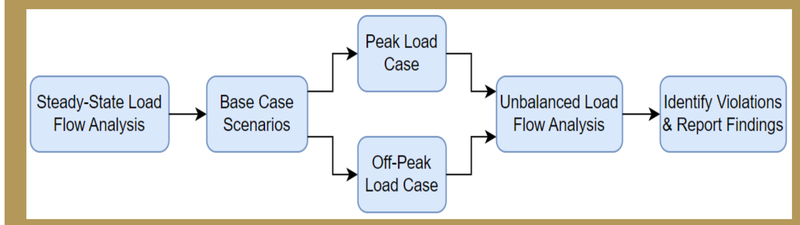
Overall Block Diagram

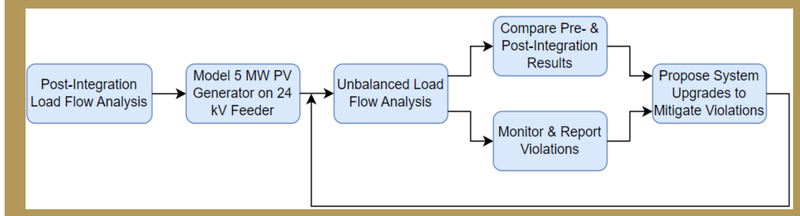


On-Peak Pre-Project

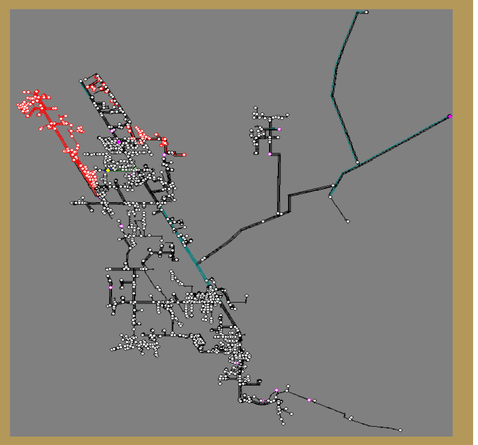


Load Flow Analysis Flowchart

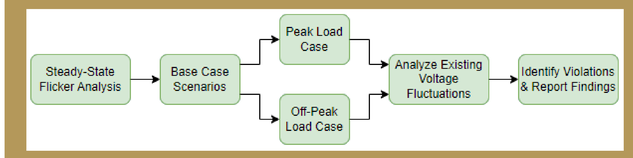


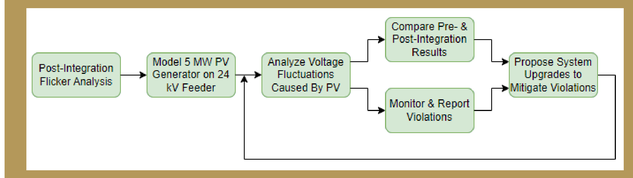


On-Peak Post Project

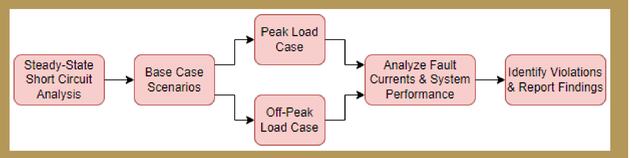


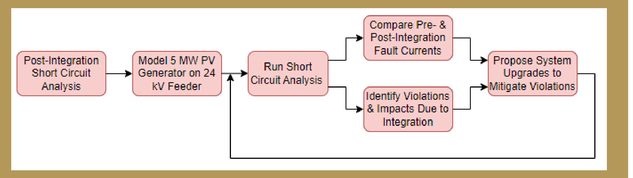
Flicker Analysis Flowchart



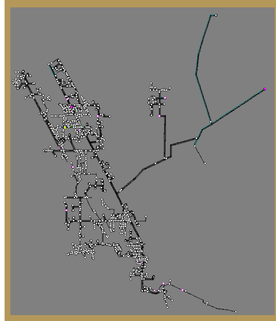


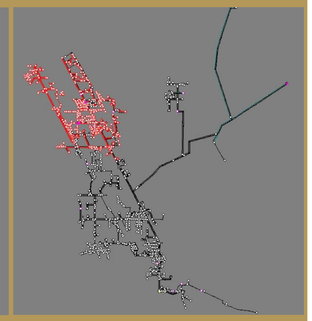
Short Circuit Analysis Flowchart





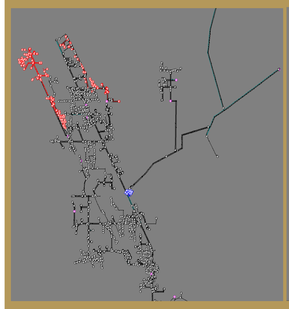
Test Cases

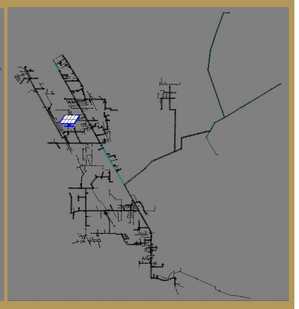




Base Case Scenario

	Off Peak	Peak
System Load	3 MVA	8 MVA
Substation Voltage	120 VLL	126 VLL
Regulator Voltage	120 V	126 V





PV Integration Peak Scenario

Location	South	Central
System Load	8 MVA	8 MVA
Substation Voltage	126 VLL	126 VLL
Regulator Voltage	126 V	126 V
PV Generator Power	8 MVA	8 MVA

Acknowledgements

Thank You:

- Faculty Advisor: Dr. Billy Diong
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