# Strategic PMU Placement for Secure and Resilient Power Grids

Student: Elda A. Ramirez

Advisor: Dr. Ioannis Zografopoulos

### Introduction

- Power Grids delivers power from generators to loads
- Phasor Measurement Units (PMU) measure voltage and current

# **Objectives**

- Minimize total cost
- Maximize Observability
- Accounting for CN and ZIBs

### Methods

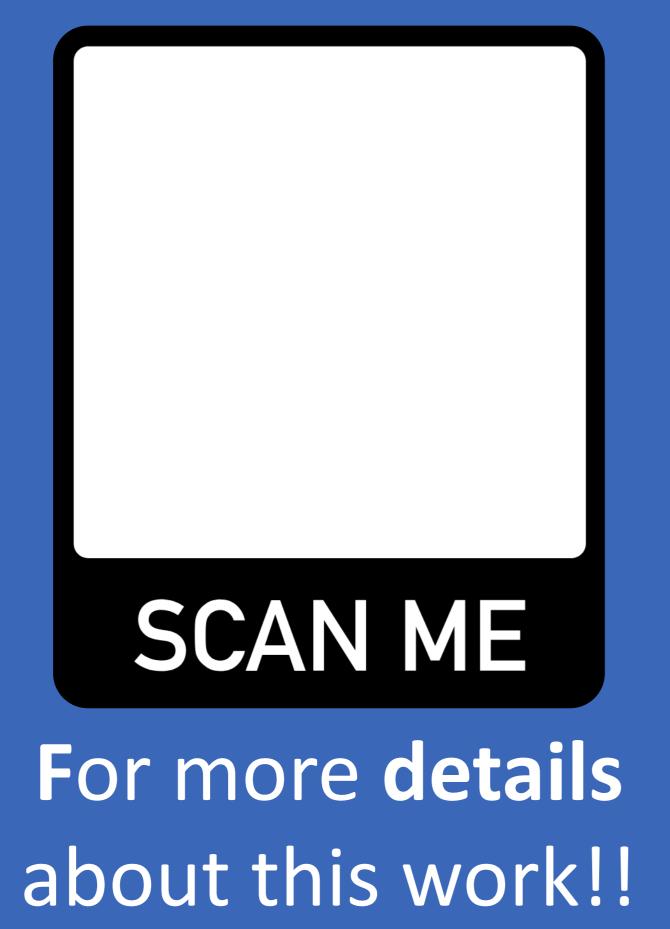
- 1. Integer Linear Programming (ILP)- GAMS
- 2. IEEE- bus systems MATPOWER

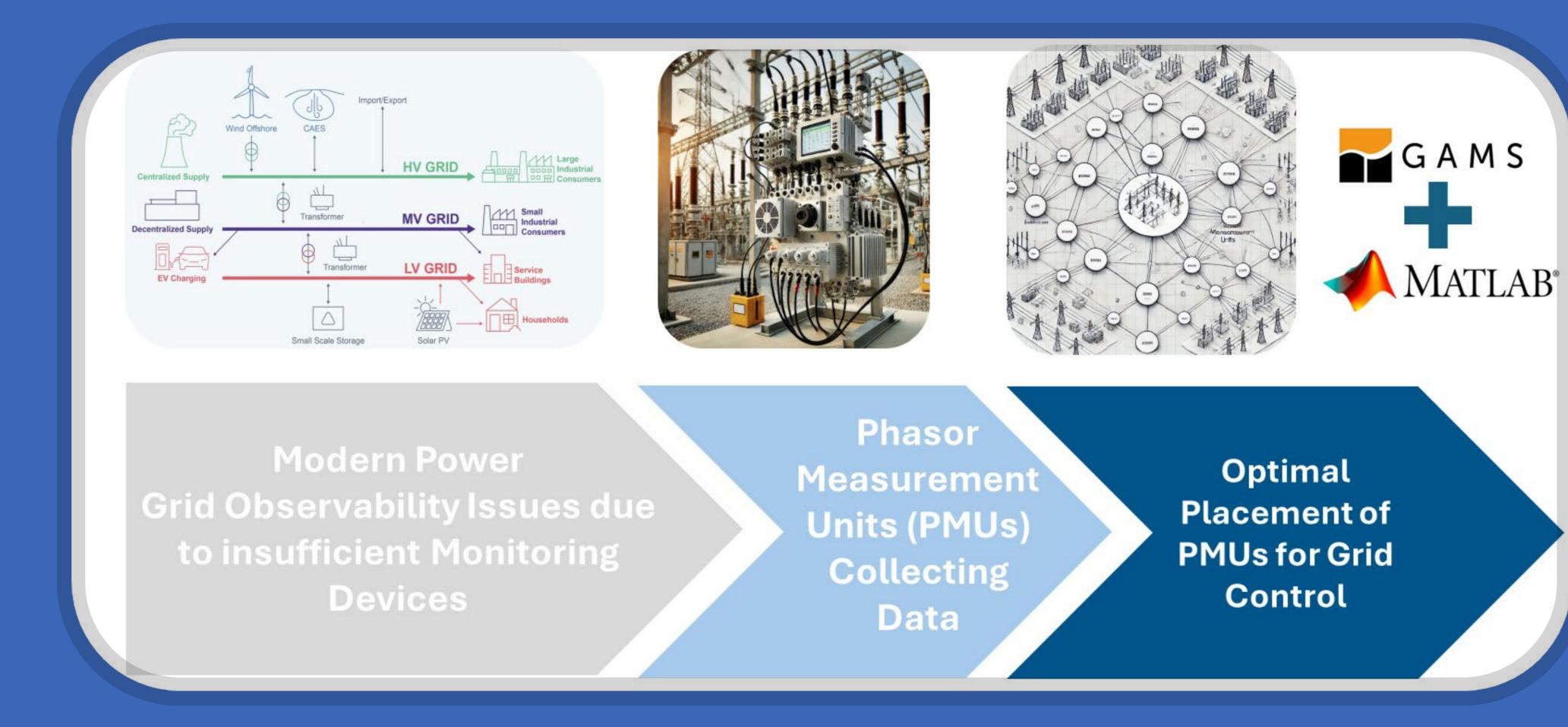
# Results

- IEEE 30:  $N_{PMU} = 8$
- IEEE 57:  $N_{PMU} = 13$
- IEEE 118:  $N_{PMU} = 31$

# The Electric Grid's Secret Eyes: How Strategic PMU\* Placement Transforms Grid Awareness

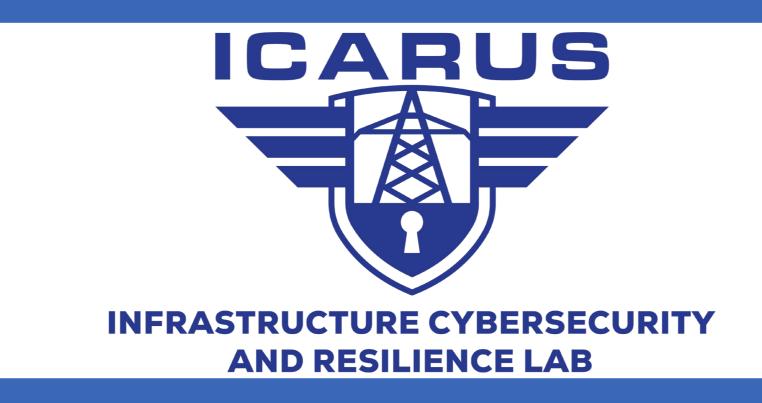
\*PMU: Phasor Measurement Unit







ALFRED P. SLOAN FOUNDATION





## Results

