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Statistical Analysis of Feeder and Locational PV Hosting Capacity for 216 Feeders

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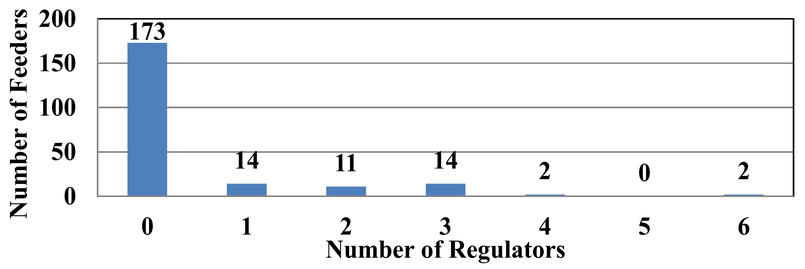
Abstract

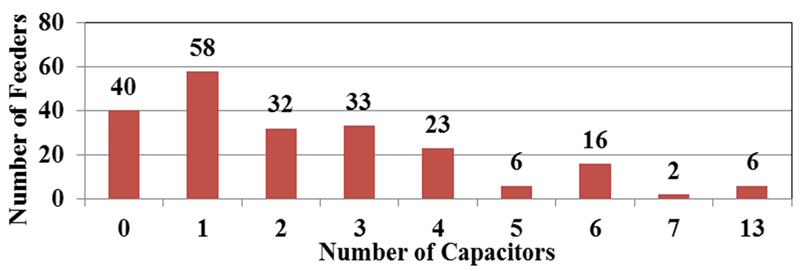
As PV penetration on the distribution system increases, there is growing concern about how much PV each feeder can handle. A total of 216 medium-voltage distributions feeders have been analyzed in detail for their individual PV hosting capacity and the locational PV hosting capacity at all the buses on the feeder. A statistical analysis is performed on the hosting capacity results in order to compare correlation with feeder load, percent of issues caused, and the variation for different feeder voltages. Due to the large number of distribution systems simulated, the analysis provides novel insights into each of these areas. Investigating the locational PV hosting capacity also expands the conventional analytical methods that study only the worst-case PV scenario.

Distribution Systems Analyzed

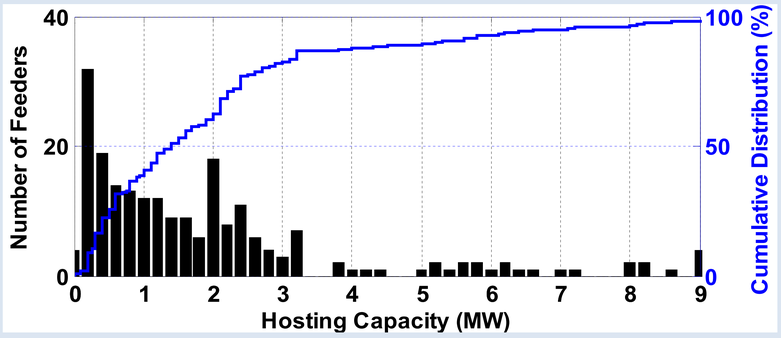
- The feeders range in length from 1.8 km to 52.5 km
- The buses per feeder varies from 142 to 6001
- The peak load ranges from 0.6 MW to 28.5 MW
- Several types of voltage regulators, including wye-connected phase regulators, gang-operated delta-connected regulators, and open-delta regulators

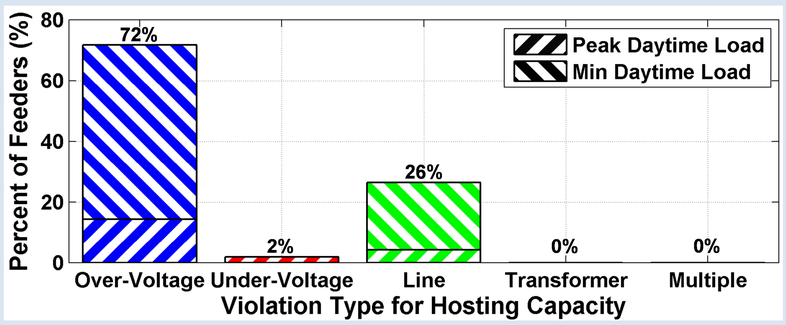
Voltage Level	4 kV	12 kV	12.47 kV	13.2 kV	13.8 kV	16 kV	19.8 kV	20.78 kV	22.9 kV	24.9 kV	33 kV	34.5 kV
Feeders	18	43	96	3	8	2	16	6	3	9	1	11

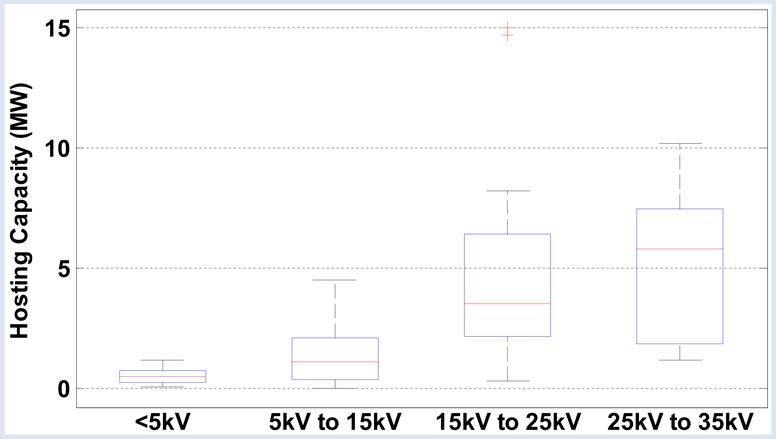




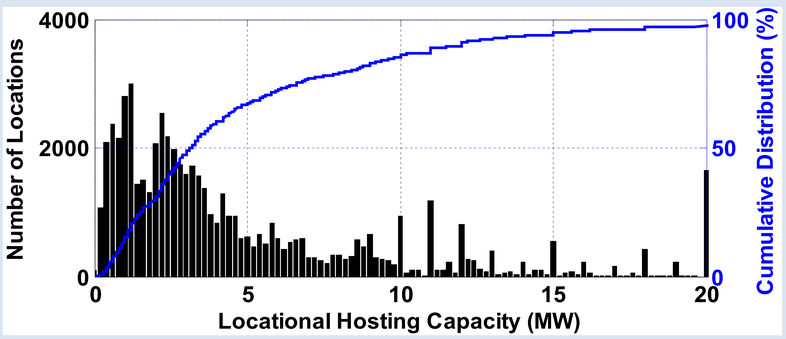
Hosting Capacity (216 Feeders)

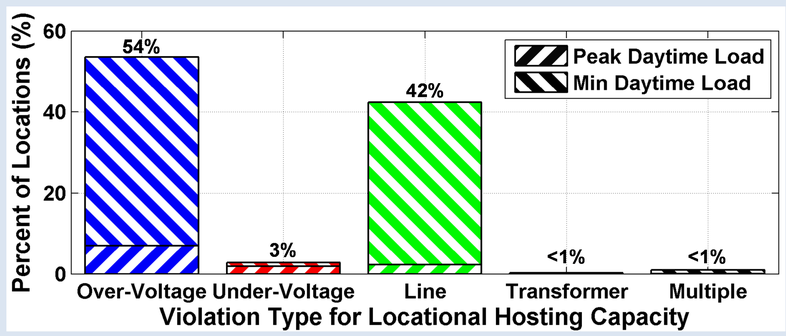


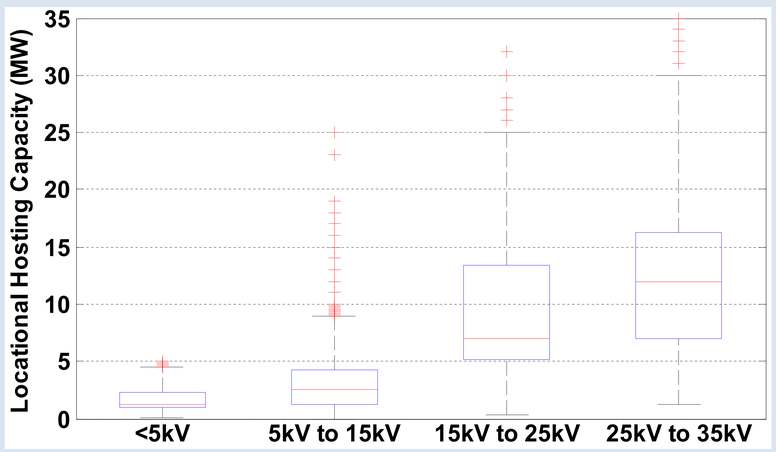




Locational Hosting Capacity (60,000 interconnection locations)







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