

ANALISIS *HOSTING CAPACITY* PLTS ATAP PADA JARINGAN DISTRIBUSI 20KV BERBASIS IEEE 34 *Node Test Feeder* MENGGUNAKAN OPENDSS

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ABSTRAK

Peningkatan pemanfaatan Pembangkit Listrik Tenaga Surya (PLTS) atap pada jaringan distribusi menimbulkan tantangan dalam menjaga keandalan sistem, salah satunya terkait batas kemampuan jaringan dalam menerima penetrasi pembangkit terdistribusi (*hosting capacity*). Penelitian ini bertujuan untuk menganalisis pengaruh lokasi penempatan PLTS atap terhadap nilai *hosting capacity* pada jaringan distribusi menggunakan IEEE 34 *Node Test Feeder* dengan perangkat lunak OpenDSS. Lokasi pemasangan PLTS dipilih pada *Node* 802, *Node* 816, *Node* 838, serta beberapa kombinasi ketiga *Node* untuk merepresentasikan berbagai posisi pada penyulang. Hasil simulasi menunjukkan bahwa lokasi penempatan PLTS memberikan pengaruh terhadap nilai *hosting capacity* dan karakteristik operasi jaringan distribusi. Peningkatan kapasitas PLTS menyebabkan profil tegangan pada *Node* pemasangan cenderung meningkat, sedangkan rugi-rugi daya jaringan mengalami penurunan akibat berkurangnya aliran daya dari sumber utama. Pada seluruh skenario, batas *hosting capacity* ditentukan oleh terjadinya *overvoltage*, sementara *reverse power flow* belum terjadi hingga batas kapasitas yang diperoleh karena daya yang dihasilkan PLTS masih dapat diserap oleh beban sistem. Hasil penelitian menunjukkan bahwa lokasi penempatan PLTS merupakan salah satu faktor penting dalam menentukan kemampuan jaringan distribusi menerima penetrasi PLTS tanpa melanggar batas operasi yang diizinkan.

Kata kunci: *hosting capacity*, IEEE 34 *Node Test Feeder*, OpenDSS, PLTS atap, profil tegangan, rugi-rugi daya, *reverse power flow*.

***HOSTING CAPACITY ANALYSIS OF ROOFTOP PV SYSTEMS ON A 20KV
DISTRIBUTION NETWORK BASED ON THE IEEE 34-NODE TEST FEEDER USING
OPENDSS***

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ABSTRACT

The increasing adoption of rooftop photovoltaic (PV) systems in distribution networks presents technical challenges in maintaining system reliability, particularly regarding the network's capability to accommodate distributed generation, known as hosting capacity. This study aims to analyze the effect of rooftop PV installation locations on the hosting capacity of a distribution network using the IEEE 34 Node Test Feeder modeled in OpenDSS. PV systems were installed at Nodes 802, 816, and 838, as well as several combinations of these nodes, to represent different locations along the feeder. The simulation results indicate that the installation location of rooftop PV significantly affects the hosting capacity and operating characteristics of the distribution network. Increasing the PV capacity causes the voltage profile at the installation nodes to rise, while the system power losses decrease due to the reduction in power supplied by the main source. For all simulation scenarios, the hosting capacity was limited by the occurrence of overvoltage, whereas reverse power flow did not occur because the generated PV power was still fully absorbed by the network loads. These findings demonstrate that the installation location is one of the key factors influencing the hosting capacity of a distribution network while maintaining compliance with the allowable operating limits.

Keywords: *hosting capacity, IEEE 34 Node Test Feeder, OpenDSS, power losses, reverse power flow, rooftop photovoltaic, voltage profile.*