



WASHINGTON STATE
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MPOPF Simulation and OpenDSS Validation

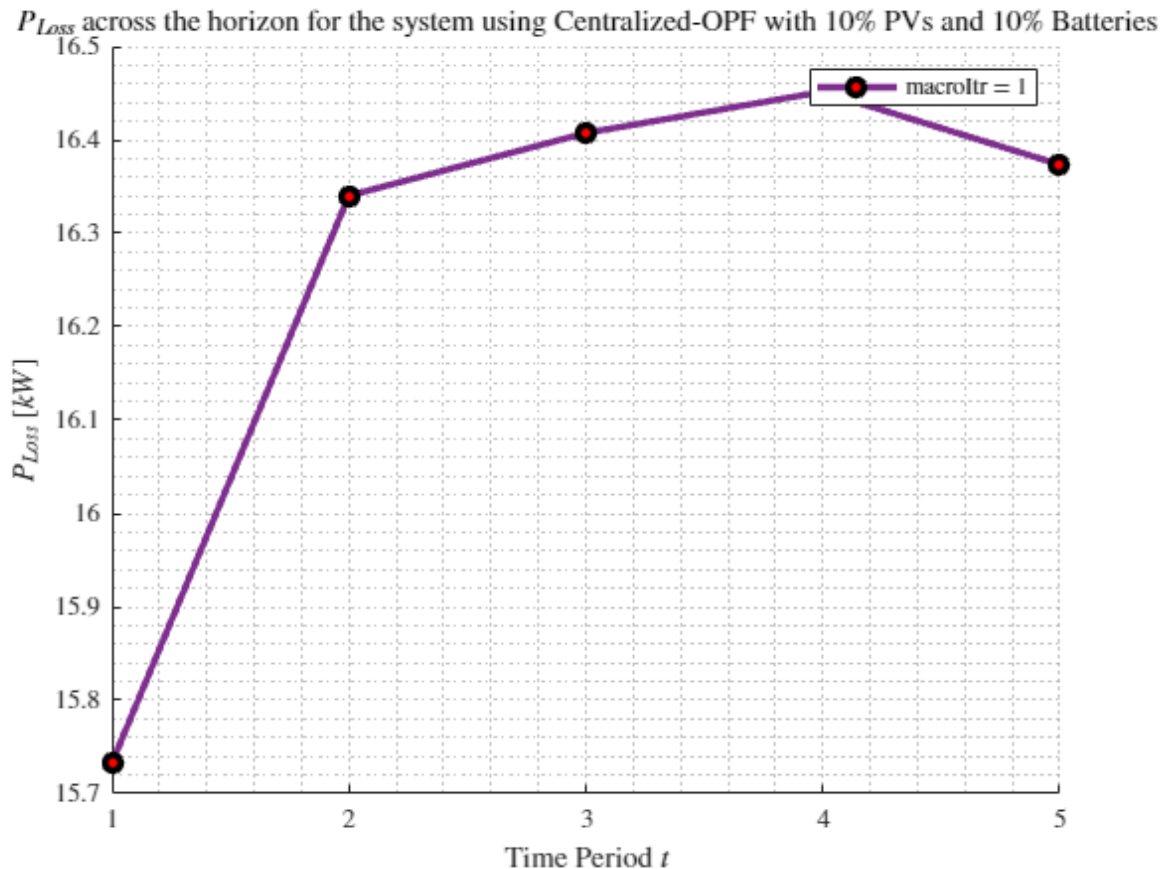
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MPCOPF Simulation has been verified for X% PVs and Y% Batteries

Only for small horizons ($T = 5$) because of long simulation time.

MPCOPF Simulation Results



These slides will show results for a 5-hour (hourly) 10% PV + 10% Battery Simulation Validation for IEEE 123 system, but I've validated for many other percentage penetrations too, for smaller time-steps.

For example, even this simulation took 500 seconds on my 32GB Office PC.

Even for the same T , increasing the GED penetration % increases the OPF solution time.

And even for small GED penetration percentage (10% each like the one done in these slides), increasing T increases the simulation time by a lot.

MPCOPF Simulation has been verified for X% PVs and Y% Batteries

Only for small horizons ($T \leq 5$) because of long simulation time.

MPCOPF Simulation Results

Hour: 1

Line Loss: 15.733 kW

Substation Power: 870.6341 kW

Total Load: 872.3977 kW + 480.009 kVAr

Total Generation: 17.4967 kW + 370.9863 kVAr

Total PV Generation: 17.4967 kW + 10.4932 kVAr

Total Battery Generation: 1.2207e-17 kW + 10.4932 kVAr

Total Static Capacitor Reactive Power Generation: 350 kVAr

Substation Power Cost: 44.4023 \$

Hour: 5

Line Loss: 16.3736 kW

Substation Power: 887.3665 kW

Total Load: 909.6201 kW + 500.4894 kVAr

Total Generation: 38.6271 kW + 382.75 kVAr

Total PV Generation: 34.9933 kW + 16.375 kVAr

Total Battery Generation: 3.6338 kW + 16.375 kVAr

Total Static Capacitor Reactive Power Generation: 350 kVAr

Substation Power Cost: 24.8463 \$

OpenDSS Powerflow Results

Hour: 1

Line Loss: 15.7233 kW

Substation Power: 870.6134 kW + 139.5682 kVAr

Total Load: 872.3977 kW + 480.009 kVAr

Total Generation: 17.4963 kW + 370.9857 kVAr

Total PV Generation: 17.4963 kW + 10.4929 kVAr

Total Battery Generation: 3.7223e-05 kW + 10.4928 kVAr

Total Static Capacitor Reactive Power Generation: 350 kVAr

Hour: 5

Line Loss: 16.3655 kW

Substation Power: 887.4135 kW + 149.5691 kVAr

Total Load: 909.6201 kW + 500.4894 kVAr

Total Generation: 38.6262 kW + 382.7503 kVAr

Total PV Generation: 34.9933 kW + 16.3748 kVAr

Total Battery Generation: 3.6329 kW + 16.3755 kVAr

Total Static Capacitor Reactive Power Generation: 350 kVAr

10% PVs + 10% Batteries

MPCOPF Simulation has been verified for X% PVs and Y% Batteries

Only for small horizons ($T = 5$) because of long simulation time.

