Ubiquitous Power Grid

- Integrating Renewable Energy Sources and Electric Vehicles into Power Grid -

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Low carbon energy system
- Large-scale Renewable Energy Sources (especially rooftop PV)
- (Plugin Hybrid) Electric Vehicle

Issues:
- Uncertainty of generation
- Reverse power flow/voltage rise
- Excess energy when low demand
- Additional dispatching resources
- Design of charging infra for EVs

Resilience and reliability of mesh and radial network configurations was evaluated considering power system configurations.

Critical clearing time was obtained by equal area criterion of P-δ curve, assuming one machine to infinite bus model including PV. A novel method of aggregating distribution systems with PVs was also proposed for stability analysis.

Battery SOC was balanced around 50% in V2G mode, and charging request was satisfied by grid-friendly charging. Trickle charge-discharge for power grid were obtained.