Green Emerging Technologies in Energy to Support the Grid (Energy Management)

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Impacts of PV on AC Grid System

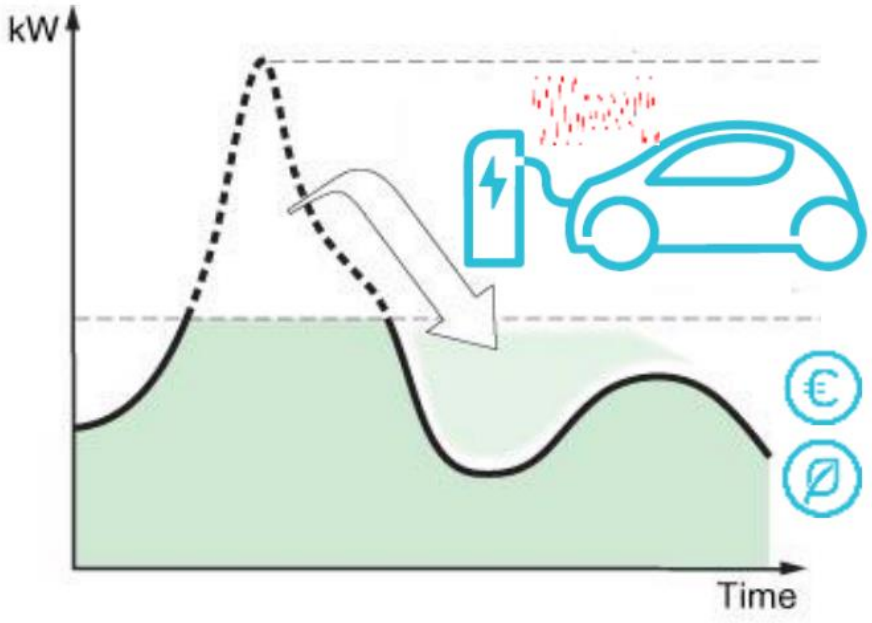
- Most of the power industries are opting for PV-DG combination set/ PV with storage system.
- As it makes PV to operate at MPP in both the grid connected and autonomous mode.
- Due to proliferation of PV—which has intermittent resource characteristics that vary the power output throughout the day and requires inverters for DC-AC conversion imposes various challenges utilities
- Due to the variability caused by passing clouds, PV can significantly affect volt/VAR control, power quality, and system operation.
- Some of these impacts can only be investigated through dynamic/transient studies that include the time-varying behavior of fast-acting generation (inverters), load, and automatic voltage-control devices on the feeders.
- The severity of these impacts varies with the penetration level, the location of the PV, and the electrical characteristics of the distribution systems.

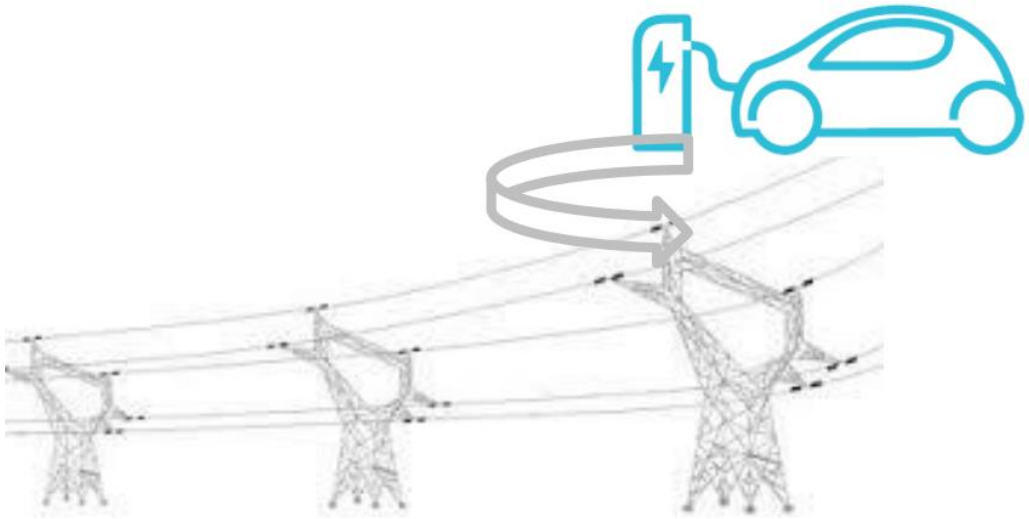
Impacts of PV on AC Grid System

- ✓ power quality, PV intermittency may lead to voltage fluctuation issues
- ✓ overcurrent and overvoltage protection, including mal-operation of overcurrent protection equipment and temporary overvoltage (TOV)
- ✓ change in electric losses, where relatively large reverse power flow may increase losses
- ✓ variations in power factor of a feeder or system, which may have economic impacts on local distribution companies purchasing power from larger utilities

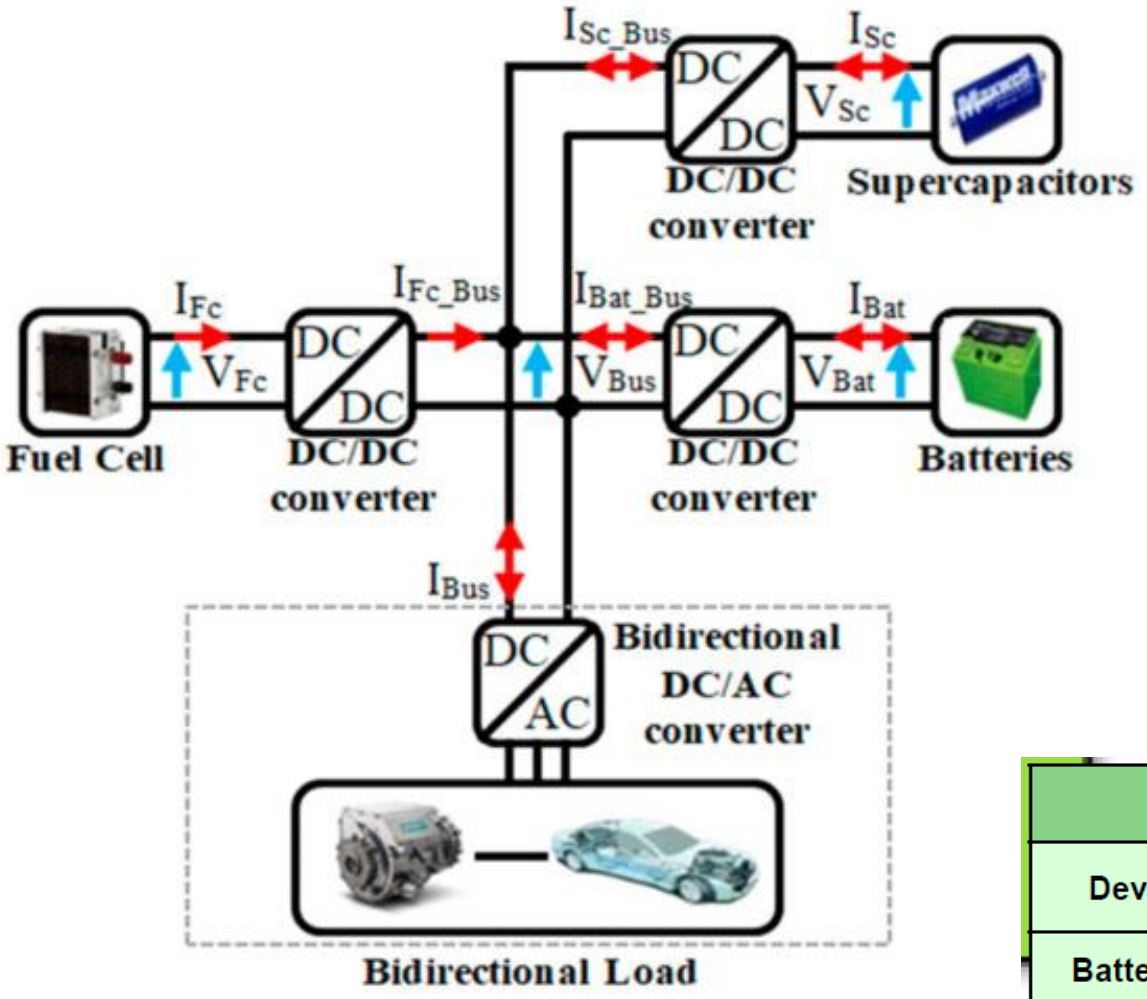
Bidirectional Charging

- SMART CHARGING: Optimization of a controlled charging while satisfying the mobility need through bidirectional communication link.
- VEHICLE TO GRID: Bidirectional smart charging.





Energy Storage Systems



Capacitor / Battery Comparison				
Device	Energy density Wh/L	Power density W/L	Cycle life Cycles	Discharge time Seconds
Batteries	50-250	150	$1 - 10^3$	> 1000
Capacitors	0.05 - 5	$10^5 - 10^8$	$10^5 - 10^6$	<1

Thank you