

Grid to Vehicle and Vehicle to Grid Technology

Rajashekar K¹, Muskan Banu², Asma Naaz³, Vinod Raj Y H⁴, Mohammed Danish Khan⁵

Assistant Professor, Electrical and Electronics Engineering¹

Students, Electrical and Electronics Engineering, Ballari, India²⁻⁵

Rao Bahadur Y. Mahabaleswarappa Engineering College, Ballari, India

Abstract: *Vehicle-to-Grid (V2G) and Grid-to-Vehicle (G2V) technologies represent a modern bidirectional energy management system that integrates electric vehicles (EVs) with the power grid. In the G2V mode, electric vehicles draw energy from the grid for charging in an efficient, controlled, and cost-effective manner. In contrast, the V2G mode enables EVs to return stored energy back to the grid during peak demand, helping to balance load, enhance grid stability, and support renewable energy integration. This two-way interaction transforms EVs into mobile energy storage units, reducing stress on the grid and improving overall energy reliability. By enabling flexible power flow and intelligent communication systems, V2G and G2V technologies contribute significantly to sustainable energy management, reduced carbon emissions, and the development of smart grid infrastructure. Their combined capabilities make them essential components in the future of clean transportation and advanced power systems.*

Keywords: Vehicle-to-Grid (V2G), Grid-to-Vehicle (G2V), Bidirectional power flow, Electric vehicles (EVs), Smart grid:

