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Small Grid Integrated Renewable Energy System for EVCS with Voltage Quality Improvement and Hormonic Reduction

Akil M[1], Gokul L[2], Madesh S[3], K. K Poongodi[4]

UG Student, Department of Electrical and Electronics Engineering,, Paavai Engineering College, Namakkal, Tamil Nadu, India[1,2,3]

Assistant Professor, Department of Electrical and Electronics Engineering,, Paavai Engineering College, Namakkal, Tamil Nadu, India [4]

ABSTRACT: In modern day the raise of power electronic converter and inverter control techniques are evolved. Likewise automobile industries are involved in development pollution free EV's (Electric Vehicle) so the utilization of batteries will increased day by day. This will be intended to propose a new idea implementation of Vehicle to Grid and Grid to vehicle technology. In DC micro Grid, batteries are helped to supply the power when demand time has been raised. In order improve the fast charging capability of batteries and vehicle to grid power transferring, this paper presents a new control technique. A bi directional power flow control technique is the best option for V to G and G to V. The simulation is developed for wind energy based DC micro grid inverter. The outcome of the test gives the high performance for EV charging station. Dc bus voltage has a good stability under dynamic power flow regulation. The proposed control system design is guaranteed in reduced harmonic current distortion.

I.INTRODUCTION

Energy production and especially electricity production is a major source of pollution that intensifies the CO2 content in the atmosphere, it is the so-called "greenhouse effect" that results, consequently the average temperature the globe continues to climb in recent years. There are negative effects on the planet such as: temperature increase, melting of polarize, considerable rise in sea levels, increased tornado precipitation etc. Everyone agrees on the seriousness of the situation and that future generations will inherit a quite problematic situation. Hence the need to find other alternatives sources of energy, including the development of renewable energies (hydraulic, biomass, solar, wind..etc.) Which are currently little exploited on a global scale. These natural resources are available everywhere on the planet, they are also abundant and inexhaustible and to exploit them it is only a question of setting up large-scale operating structures.The number of blades is often one to three, with three being the most frequent because there is a consensus between efficiency and price. These wind turbines are less expensive than those with vertical axes; they are much more ergonomic in terms of space occupied on the ground as the place of the receivers in height is less prone to turbulence. Thus all the studies will only deal with the case of horizontal axis wind turbines. For the generation of electrical energy, it is possible to use different types of electrical machines called generators according to the desired application. The development of magnetic materials has enabled the construction of synchronous machines with permanent magnets at increasingly competitive costs.

II.LITERATURE REVIEW

VEHICLE TO GRID BIDIRECTIONAL ENERGY TRANSFER: GRID SYNCHRONIZATION USING HYSTERESIS CURRENT CONTROL- In vehicle to grid technology, main emphasis is on the V2G mode where the grid gets the power from the energy which is stored in a battery. The bidirectional property of the AC to DC power converter has been established. The bidirectional property which the DC-DC converter had to achieve has also been established. The bidirectional property of the integrated system has been established and is verified through simulations. Using an LC filter the harmonics has been reduced and the bidirectional power transfer between the vehicle and the grid is completed.

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Relevance to current Research

OPTIMAL LOAD MANAGEMENT OF PLUG-IN ELECTRIC VEHICLES WITH DEMAND SIDE MANAGEMENT IN VEHICLE TO GRID APPLICATION- The paper demonstrates an autonomous distributed optimal load scheduler integrated with smart metering infrastructure in order to minimize peak to average demand ratio, energy consumption cost and time for charging/ discharging for cluster of PHEVs. Unlike other optimization algorithms which only caters the request of individual PHEV or satisfies only single objective, the proposed algorithm serves many objectives and large number of PHEVs at a time. Simulation results confirm that proposed optimization algorithm is able to reduce PAR, PHEV charging cost as well as charging time.

Relevance to current Research

TIME-DELAYED MODEL PREDICTIVE DIRECT POWER CONTROL FOR VEHICLE TO GRID AND GRID TO VEHICLE APPLICATIONS- A time-delayed FMPC is presented in this study for vehicle to grid and grid to vehicle applications where a delay is considered in the input of the system model. This approach has shown a better transient and steady state performance while reducing the power ripples significantly for power converters in distributed generation. The proposed method compensates the delay time resulting from DSPs' computation and implementation of the control signal.

III.METHODOLOGY OF PROPOSED SURVEY

Energy storage systems are important components of a micro-grid as they enable the integration of intermittent renewable energy sources. Electric vehicle (EV) batteries can be utilized as effective storage devices in micro-grids when they are plugged-in for charging. Most personal transportation vehicles sit parked for about 22 hours each day, during which time they represent an idle asset. EVs could potentially help in micro-grid energy management by storing energy when there is surplus (Grid-To-Vehicle, G2V) and feeding this energy back to the grid when there is demand for it (Vehicle-To-Grid).

V2G applied to the general power grid faces some challenges such as; it is complicated to control, needs large amount of EVs and is hard to realize in short term. In this scenario, it is easy to implement V2G system in a micro-grid .The Society of Automotive Engineers defines three levels of charging for EVs. Level 1 charging uses a plug to connect to the vehicle's on-board charger and a standard household (120V) outlet. This is the slowest form of charging and works for those who travel less than 60 kilo meters a day and have all night to charge. Level 2 charging uses a dedicated Electric Vehicle Supply Equipment (EVSE) at home or at a public station to provide power at 220 V or 240 V and up to 30 A. The level 3charging is also referred to as dc fast charging. DC fast charging stations provide charging power up to 90 kW at 200/450 V, reducing the charging time to 20-30 minutes.

DC fast charging is most popular for implementing V2G design in micro grid because of the short power transfer that's needed once EVs are used for energy storage.

Additionally the dc bus is used for integration renewable generation sources into the system. In majority of the previous studies, V2G thought has been applied within the general facility for services like peak shaving, depression filling, and regulation .The V2G development during a micro-grid facility to support power generation from intermittent renewable sources of energy remains at its infancy. Also, level one and level two ac charging is used for V2G technology in most of the works reportable.

These ac charging systems are restricted by the facility rating of the on-board charger. a further issue is that the distribution grid has not been designed for bi-directional energy flow. During this state of affairs, there's a probe would like for developing technically viable charging station architectures to facilitate V2G technology in micro-grids. This work proposes a dc fast charging station infrastructure with V2G capability during a micro-grid facility. The dc bus wont to interface EVs is additionally used for integration a solar photo-voltaic (PV) array into the micro-grid.

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The proposed architecture allows high power bi-directional charging for EVs through off-board chargers. Effectiveness of the proposed model is evaluated based on MATLAB/Simulink simulations for both V to G and G to V modes of operation. A constant current control strategy using PI controllers is implemented for charge/discharge control of the battery charger circuit .

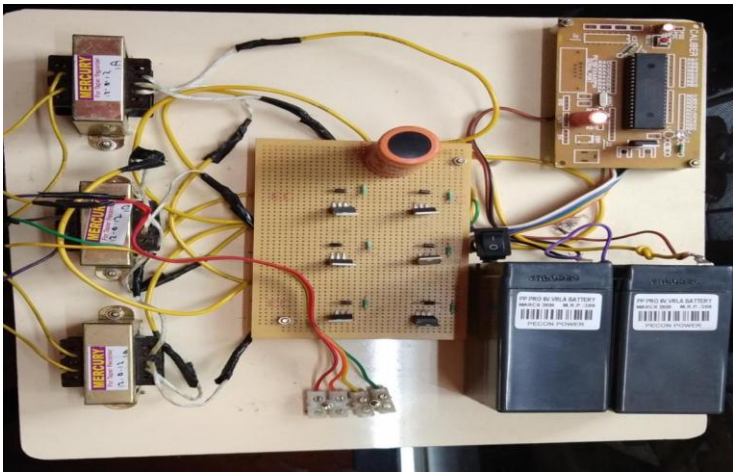

Figure.1 Hardware Kit

IV.CONCLUSION AND FUTURE WORK

Modelling and design of a V2G system for the duration of a micro-grid the usage of dc rapid charging diagram is given throughout this paper. A dc rapid charging station with off-board chargers and a grid linked electrical converter is meant to interface EVs to the micro grid. The device designed for this power digital interface permits bi-directional electricity switch between EVs and the grid. The simulation outcomes exhibit a glossy strength transfer between the EVs and consequently the grid, and consequently the excellent of grid injected modern from the EVs adheres to the applicable standards. The designed controller provides good dynamic overall performance in terms of dc bus voltage stability and in following the modified lively energy reference. Active power rules aspects of the micro grid are thought of at some stage in this work, and consequently the deliberate V2G gadget can be utilized for many choice services like reactive electricity control and frequency regulation.

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