ENERGY MANAGEMENT SYSTEMS FOR ELECTRIC VEHICLES AND MICROGRIDS

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Abstract

The purpose of study Smart Grid is the evolutions of our electric grid. Our electric components are developing day by day. The purpose of research on Microgrid systems are the integration of renewable energy sources (RES). Enhanced reliability, Reduce peak demand, Smarter consumers, Lower total energy consumption, which outlines power systems interconnection different Vitality era components (supplyside) with vitality utilization componen ts (request side) and capacity gadgets problem. The integration of RESs and ESSs in a microgrid is studied and analyzed by several authors for different purposes. Create and apply regular cost and advantages technique over all Smart Grid field ventures.

The method employs including underlying algorithms and assumptions. Ensure that this methodology can easily accommodate algorithms and assumptions. Develop business case for investors, regulators and customers.

This project has some limitations like it takes more time to configure all over the worlds, so expensive for the consumers. The objective is to keep end-user with more reliable and increased power availability and hence keeping higher priority load connected.

This study never been done before. This study also was provided current information about smart grid and electric vehicles.

Keywords - Energy Management; Microgrid; Electric vehicles; RES; ESS; PEV; EV; Smart home.

1. INTRODUCTION

This paper provides information about the future of electric grid. Reliable electric power is necessary for our society. To decrease environmental pollution, it is becoming necessary to increase the integrate renewable energy like solar power, wind mill, hydroelectric power. On the planet today petroleum products are the overwhelming vitality hotspots for both transportation division and power age industry. But the fuels are limited in the earth, and also the burning fuels are produces green-house gases (carbon di oxide, carbon monoxide, CFC), which changes the world climate. The findings demonstrate that a few countries such as China, India and Brazil have had proper planning and development in this technology (Andrew W. 1990). In some cases like China, the efforts are considered comparable with developed nations like U.S. Therefore, according to the development progress for smart grid in China, India and Brazil, a pattern of reference for other developing countries is suggested.

Projection by Energy Information Agency (EIA) reveals that the oil prices will substantially rise in the next two decades. But very sad news to all of us that the burning fuel and coals will be fully finished within 50 years. So we all have try to decrease the highly uses of fuel. And other hand tries to find the other energy recourses. The Australian Energy Market Commission (AEMC) projection shows up that by the year 2020 the growth in the EV's share of new vehicle sales will increasingly account for less than 10%, and it will further account for 15% to 40% increase of the new light vehicle sales after the year 2020.

On the other hand, the charge of transportation division shows up to be one of the doable arrangements to the challenges such as worldwide climate alter, vitality security and geopolitical concerns on the accessibility of fossil fills to this end, the EV technology can provide the grid support by delivering the ancillary services such as peak power shaving, spinning reserve, voltage and frequency regulations whenever needed. Besides, the integration of large renewable energy sources (RES) like wind and photovoltaic (PV) solar energies into the power system has grown up recently.

China for the year 2020 has set objective to introduce 150–180 GW of wind control and 20 GW of PV sun powered control. This tremendous entrance of the RES into control framework will require huge vitality capacity frameworks (ESS) to easily bolster electric frameworks so that the electrical control request and working guidelines are met at all the times.
This paper extensively reviews and assesses the EVs (Asmus P (2010)) interactions with the smart grid infrastructure as the future energy system model. It is discussed to unveil possible solutions and the EV-V2G future research trends are uncovered. The integration of the renewable energy sources especially wind and PV solar using the EVs is evaluated in the light of the latest research works. In addition, a few methods have been proposed executed to guarantee ideal vitality exchange in the V2G framework to maximize the advantage of V2G. Be that as it may, Inadequacies that the control stream of EVs was unidirectional, the charging rate was settled at the greatest restrain, and the ideal arrangement was the chosen charging interims amid the plug-in period. This paper bargain with the advancement of a wide control structure for an progressed savvy house associated to a microgrid, which incorporates renewable vitality sources, battery and an EV, so that the V2G control can be legitimately deployed.

II. Literature Review:

Some major programs already created by some researchers. These are Intelligrid, Grid2030, MGI, Grid wise, Pacific Northwest Smart Grid Demonstration Project. Pacific Northwest Smart Grid Demonstration project is a demonstration across five Pacific Northwest states-Idaho, Montana, Oregon, Washington, and Wyoming. It involves about 60,000 metered customers, and contains many key functions of the future smart grid (Irwin B., 2002). Some significant projects as of now made by some researchers. These are Intelligrid, Grid2030, MGI, Grid wise, Pacific Northwest Smart Grid Demonstration Project. Pacific Northwest Smart Grid Demonstration venture is a show crosswise over five Pacific Northwest states-Idaho, Montana, Oregon, Washington, and Wyoming. It includes around 60,000 metered clients, and contains many key elements without bounds brilliant grid. The creators express that the reconfiguration of dispersion system can lessen misfortunes, adjust stacks and enhance quality markers when in typical operation. Be that as it may, none contingency situation is considered in that work.

III. SYSTEM CONFIGURATION

The private smaller scale network or Keen House considered for this work looks at to one family and it is delineated in Fig. 1.

![Smart home scheme with V2G system](image)

The passed on imperativeness resources considered are a miniaturized scale turbine, a dynamic generator (photovoltaic module related with battery), and the battery of a PEV. The use of medium-limit battery can be expected to diminish the incurred significant damage and foundation space when contrasted with the use of tall limit battery. So likewise, the battery is related to the DC-DC converter, which can play out the DC interface voltage control around 400V. The EV is excessively related, making it impossible to the DC-transport by a DC-DC converter.
IV. EV HOME CHARGING PROCESS

SAE makes North American measures for EV rebuking and correspondences interface for autos and equipments. The particular SAE standard for vehicle charging is known by its alphanumeric title: J1772. This standard contains two sorts of charging frameworks that are reasonable for neighbourhood charging - Level 1 for 120V charges and Level 2 for 240V charging. Level 3 (DC "fast charging") is in the handle of being depicted. Level 1 license for up to 16 Amps of current at 120 Volts (typical family outlet), while Level 2 permits up to 80 Amps at 240 Volts ("dryer" outlet). Most pursuing frameworks have brought most unmistakable farthest point: predictable cut-off points meld 12 Amps at 120V (1.4kW) and 30 Amps at 240V (7.2kW). An identical course of action of benchmarks exists in the European Community addressed by IEC purposes of intrigue and depict an equivalent game plan of charging "modes," while China has however another game plan of principles.

V. ENERGY RESOURCES IN ELECTRIC VEHICLES

Energy storage unit

Our most commonly storage device is Battery. Other energy storage devices include hydroelectricity pumped storage, compressed air, and rechargeable battery, super capacitor[9] etc. These capacity gadgets could be utilized as an assistant vitality source (AES) or cross breed vitality source. Underneath is the state-of-the-art of vitality capacity unit utilized in a vehicle [Wang Shien, 1996].

Battery

An electric battery is a gadget comprising of two or more electrochemical cells that change over put away chemical vitality into electric energy. Each cell has a positive terminal, or cathode vitality and a negative terminal or anode. The terminal checked is at a higher potential vitality than the terminal checked negative [Hauck Bernhard, 1998]. The terminal stamped negative is a source of electrons that when associated to outside circuit will stream and convey vitality to an outside device. For illustration, a release rate of 1C demonstrates that the battery is exhausted in 1h while 2C demonstrates that the battery is exhausted in as it were half an hour.

Fuel Cell

A power device is an electrochemical cell that changes over the synthetic vitality from a fuel into power through an electrochemical response of hydrogen fuel with oxygen [U. Bossel, 2006] or another oxidizing agent. Fuel cells are not quite the same as batteries in requiring a consistent wellspring of fuel and oxygen (more often than not from air) to manage the compound response, while in a battery the concoction vitality originates [Andrew, Lance, 2001] (Dixon Juan W, 2001) from chemicals officially introduce in the battery. Power devices can create power ceaselessly for whatever length of time that fuel and oxygen are provided.

The main power devices were developed in 1838. The principal business utilization of energy components came over a century later in NASA space projects to produce control for satellites and space cases. From that point forward, power devices have been utilized as a part of numerous different applications. Energy components are utilized for essential and reinforcement control for business, mechanical and private structures and in remote or out of reach regions. They are additionally used to control energy component vehicles, including forklifts, cars, transports, pontoons, bikes and submarines.

VI. ENERGY MANAGEMENT REVIEW

Low level component control review

EV re-born is due to the headway of control electronic innovation. Control electronic plays a critical part in changing over, exchanging, cascading and controlling the vitality source and yield components. The taking after audit is made on the sorts of control electronic converter, vitality exchange sorts, sort of cascading and controlling strategy.

Power electronic converter topology

There are four sorts of converter, for example, DC– DC converter, AC– AC converter, inverter and rectifier. A bundle of DC– DC converters were made to meet the necessities of specific applications and can be arranged into various gatherings. This paper fixates so to speak on unidirectional (2-quadrant) and bidirectional (4-quadrant) DC– DC converter application.
Fig: 2. Available bidirectional DC–DC converters: (a) cascade buck-boost, (b) half-bridge, (c) Cuk, (d) SEPIC/Luo, (e) split-pi.

VILSMART HOME

When we are not in home, little questions can begin to knot our intellect. Did I turn the TV and electric machines off? Did I set the security caution? Are the kids doing their homework or observing television? With a keen domestic, we could overlook all of these stresses with a speedy look at our smartphone or tablet. You could interface the gadgets and apparatuses in your domestic so they can communicate with each other and with you. There are numerous keen domestic item categories, so you can control everything from lights and temperature to locks and security in your domestic.

Home Server:

The Home Server connects user interface to hardware interface. It has own application programming. Home server sends command to microcontroller through ZigBee handset. Microcontroller get flag command and run in like manner to do the operations. Home server controls all the electric equipment’s, so that the power utilization is low. The domestic server has a few useful pieces one of them is EMCU which is introduced in outlets and lights through a ZigBee getto point. The domestic server utilized the hub control piece for observing and controlling the EMCU piece. The square is vitality era director (EGM) it analyzes the renewable vitality era. Then next Square is vitality utilization supervisor totaled information is put away in data database.

VIII. CONCLUSION

By and large, the establishments were not simple. Numerous of the taking part utilities detailed among their lessons learned that the communications capabilities of different framework components were not interoperable. Smart Lattice is planned to supply power inmore productive way better apportioning power agreeing to consumer’s wants. It
is not a simple process. Its takes long time for successful. Hence, recommendation on government, companies and citizen levels to settle the predictable issue to offer assistance the fruitful usage of Savvy Lattice.

**Implications**

**Privacy** - Foundation parts and Buyer gadgets will move toward becoming Information obtaining Network gadgets. Monitoring and management of electric power frameworks requires consistent and natty gritty information.

**Security** - Joining of ICT and Power Networks presents the security issues of the web. Power Disruption can cause loss of Infrastructure, endanger Public Safety and jeopardize National Security. Personal security as an issue.

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