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Eco-Friendly Trolley Bus System

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ABSTRACT

An Eco-friendly trolley bus system that can manage all their transportation requirements is essential for smart cities. To enhance public transportation services, a smart city's transportation system should be hassle-free, and environmentally friendly the most appropriate choice for public transportation that also addresses future energy concerns is the Eco-friendly trolley Bus System, which manages fleets and energy. Several European cities have pledged to entirely purchase zero-emission buses by 2025, with battery electric buses being the most viable option to meet this goal. Even though this technology promises to address several environmental issues, charging these buses could provide difficulties in planning and operation. The paper proposes to run the bus continuously, battery-free, around the clock. A trolleybus is a vehicle having rubber tires that run on electricity obtained from two overhead lines supported by trolley poles. sizing of PV systems at the traction at the trolley pole or traction substation.

Keywords: Energy-efficient power systems, environmental sustainability, Transport System for Smart Cities, Trolleybus Line, and Metropolitan Transportation

INTRODUCTION

The overall structure of the trolley bus system is shown in Figure 1. Four important regions need more development to create an environmentally friendly public transportation system that is emission-free. Transportation is the most crucial. By facilitating the introduction of solar energy, they replace by permitting bidirectional substation to follow energy. To improve the system's overall sustainability and efficiency, this modification is required. Issues with battery storage systems and battery weight are present in electric buses. To get around this problem, we introduced the trolley bus system, which is powered by solar panels and runs on an overhead transmission line. The buses' energy requirements. utilizing solar energy and building a sustainable system for the installation of a photovoltaic system at the station or location solar panels install at the station, so that we get an adequate amount of solar energy, and on street poles. We are unable to entirely depend on solar energy because the sun is only visible for 12 hours a day, and the best time to obtain more solar energy is between 9 a.m. and 4 p.m. Therefore, we must rely on solar energy before drawing power from the grid. However, with this plan, we can reduce our reliance on the conventional grid by 70% by reducing our use of fossil fuels. Although we now want to rely on renewable energy sources, in practice, this requires more storage systems, and it is not feasible to store the

Fig1. Basic model diagram Trolley bus system

The complete system for emission-free public transportation with overhead transmission line is depicted in Figure 1. This transformation requires the development of four critical areas. Modern active-front-end inverters, which can regulate contact wire voltage and enable bidirectional substation operation for solar energy integration, are to be used in place of passive rectifiers as the first step. Enhancing system sustainability and efficiency requires this upgrade. Repurposing trolleybus batteries as stationary batteries to increase their longevity is another crucial factor. This action aligns with sustainability goals while optimizing performance. Considering economic viability, the operating company has simultaneously set a minimum power requirement of about 50kW. There are useful advantages to designing the inverter to meet this low power requirement. It enables the distribution of power among several inverters to reduce losses during malfunctions, improving.

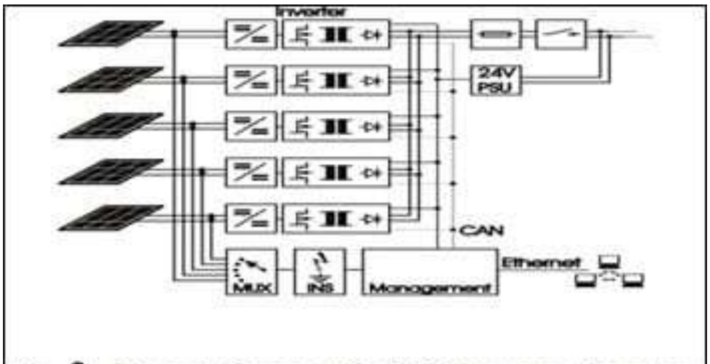

Fig. 2 Overall System DC-DC Converter Topology

Copied from google.com.

Figure 1 depicts the proposed broad system. Four crucial areas need to be further developed to realize an emission-free public transportation system with an intelligent charging infrastructure. The first step is to swap outdated passive rectifiers for contemporary active-front-end inverters. These sophisticated inverters can regulate the contact wire voltage and keep it at a set level. Moreover, they enable the integration of solar energy through bidirectional substation operation. Improving the system's overall sustainability and efficiency depends on this transformation. A major component of this shift is the increasing use of trolleybus batteries as stationary batteries. Considering that the energy density of these batteries eventually decreases with time, this calculated action attempts to increase their average lifespan.

Fig.3. Gadkari recently announced trolley bus system in Nagpur. Copied from google.com.

Union Minister Nitin Gadkari's efforts are expected to bring a new trolley bus system to Nagpur, improving the city's public transport options. People who live in places not served by the current metro network should find it easier to travel thanks to this exciting initiative. At a recent railway station development program in Godhani, Gadkari revealed the plan. This project will soon begin with funding of Rs. 150 crores from the state government. Starting at Katol Naka, the trolley bus system will make convenient stops at key locations such as MIDC, Hingna T-point, Chhatrapati Chowk, Kalmana, Kamthi Road, and Chhindwara route. The affordability of this trolley bus system adds to its allure. Fares will be significantly less than those of the standard diesel-powered. This is the best incentive offered by the government, and this paper suggests that in order to make the trolley bus system sustainable, it should be powered by renewable solar energy.

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