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# The Implementation of Solar Panel with CCTV Camera in the National Road of Zambales, Philippines: A Proposal Study

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## ABSTRACT

The Province of Zambales is a peaceful place where you want to consider as a retirement place because of the beautiful nature site seeing. But there is particular problems that majority of the municipality in the province of Zambales, Philippines particularly in the towns of Subic and Castillejos cannot solve and there is a big problem that we are facing at night which is there are no street lights and CCTV Camera that can monitor the activity of the road during at night and in the morning because accidents are prone in the busy road during at night. There are so many violators in the National Road specially in rush hours, they do not follow the stipulated law related to National Road. Even enforcers don't implement the said policy and guidelines because they don't care about the possible impact and danger on the road. It's been 2 years from now, since we experienced this kind of situation, even there is a law constituting the implementation of road courtesy under the Department of International and Local Government (DILG) Memorandum Circular No 2020-036 concerning the STRICT BAN OF TRICYCLES AND PEDICADS ALONG ALL NATIONAL HIGHWAYS to prevent from accidents. Now since most of the enforcer cannot monitor the national road event there is signage, the researcher is proposing to develop and come-up with a system that can be powered by a solar panel and can generate electricity to run the CCTV Camera and Street lights. In this way it can help our enforcer to monitor the traffic within the National Road of Zambales and this can also save electricity and to prevent from any accidents that may occur and can send real-time report to the concerned offices. In conclusion, the implementation of this kind of system is a big help to our government and to our constituent and drivers.

## Keywords:

CCTV, Solar Panel, Camera

## Introduction:

The Province of Zambales is a peaceful place where you want to consider as a retirement place because of the beautiful nature site seeing. But there is particular problems that majority of the municipality in the province of Zambales, Philippines particularly in the towns of Subic and Castillejos cannot solve and there is a big problem that we are facing at night which is there are no street lights and CCTV Camera that can monitor the activity of the road during at

night and in the morning because accidents are prone in the busy road during at night. furthermore, we can also explored the potential of energy generation using the land above national road highways by constructing a roof structure that can contribute to the energy generation without extra cost for the land and can generate energy as a source of supply the solar panel lights within the National Road, (Sharma & Harinarayana, 2013) . There are so many violators in the National Road specially in rush hours, they do not follow

the stipulated law related to National Road. Even enforcers don't implement the said policy and guidelines because they don't care about the possible impact and danger on the road. Its been 2 years from now, since we experienced this kind of situation, even there is a law constituting the implementation of road courtesy under the Department of International and Local Government (DILG) Memorandum Circular No 2020-036 concerning the STRICT BAN OF TRICYCLES AND PEDICADS ALONG ALL NATIONAL HIGHWAYS to prevent from accidents. Now since most of the enforcer cannot monitor the national road event there is signage, the researcher is proposing to develop and come-up with a system that can be powered by a solar panel and can generate electricity to run the CCTV Camera and Street lights.

The development and construction of an adaptive street lighting system that improves safety at any intersections, which is the result of applying the Internet of Things (IoT) techniques to intelligent transportation system will be the solution about this persisting problems, (García-Castellano et al., 2019). In this way it can help our enforcer to monitor the traffic within the National Road of Zambales and this can also save electricity and to prevent from any accidents that may occur and can send real-time report to the concerned offices. In conclusion, the implementation of this kind of system is a big help to our government and to our constituent and drivers.

### Objectives:

This study aimed to study the Implementation of Solar Panel with CCTV Camera in the National Road of Zambales, Philippines through the following objectives:

1. Determining the suitable types of solar lighting technologies with CCTV for National Road
2. Determining the applicability and advantages of solar technology for highway service;
3. Determining the economic effects and environmental effects of solar technologies on highway service area.

### Methodology:

The Descriptive research is a scientific method, which involves observing and describing the behavior of a subject without influencing it in any way, (Shuttleworth, n.d.). As such, the research design maximizes objectivity by Measures of central tendency include the mean, median, and mode.

- This study aims to determine the Implementation of Solar Panel with CCTV Camera in the National Road of Zambales, Philippines using qualitative research design and Descriptive research.

- The locale of the study is within the Area of Zambales specifically the town of San Marcelino, Castillejos, and Subic, Zambales where there are no lights in the evening. Which is not really safe for the drivers to pass through during the evening.

This study has acquired a sample size of 30 respondents.

Figure 1. Map of the Province of Zambales



**Results and Discussions:****Determining the suitable types of solar lighting technologies with CCTV for National Road**

Solar lighting technologies that can be installed in the national road within the area of San Marcelino, Castillejos, and Subic, Zambales is Design and installation of streetlights with CCTV in order to get optimal results, both off-grid and grid-tied types should consider in several engineering parameters like local weather conditions, panel size, light source watts, battery bank size, days of autonomy. The purpose of a solar panel and CCTV is to monitor the busy activities in the main road of the said town specially at night and during dawn because as of today those areas mentioned above are really dark.

The power output of the optimal sites selected from the possible national highway was computed at a total of 8227 MWh and was transformed into solar-panel families in three-dimensional environments. Thus, this study may help to identify optimal sites for PV plants in the areas near the National highway, (Heo et al., 2021). It is also ideal for traffic monitoring and incident management applications. Also, the Solar Panel with cameras can also provide live video from key routes to enable the immediate identification of congestion, allowing traffic control centers to take action, (Traffic and Highways Surveillance and Security Cameras - WCCTV, n.d.).

**Determining the applicability and advantages of solar technology for highway service;**

Solar panels can carry a 20-year warranty, so it can be assured of their reliability that batteries may perform much better in cold weather than lithium-ion batteries further contribution to the reliability of solar power warning lights in the National highway, (Spears, 2017). The main advantage of Solar Roadways is to generate clean renewable energy on the national highways and any other surface that can be walked or drove in the evening that will include the road paths and the main roads covering the Fast and Slow lane, (Solar, n.d.). By using solar technology, it will save energy and of course the National Government can also save enough

money with regards to this kind of technology platform.

**Determining the economic effects and environmental effects of solar technologies on the highway service area**

When determining the economic effects and the environment effects of the solar technologies on the National highway area will be more beneficial and positive on the part of the Department of Public Works and Highways (DPWH) because it can really save a lot of budget for the government. As Compared to other energy sources, solar energy has the least negative impact on the environment. It can generate electricity with solar panels with no greenhouse gasses, unlike fossil fuels which can generate harmful carbon dioxide and methane emissions, (Phelan Energy Group, 2019).

**Conclusions:**

The implementation of Solar Panel and CCTV in the National Road of Zambales will be beneficial for the drivers and to the community of Zambales, because it will be safer now to travel to Zambales even at Night. Also it will be a big potential for the Provincial Government of Zambales in terms of economic factors because they won't mind in paying electricity bills and it will be a big opportunity also for Zambales to become a highly Industrialized Province in Luzon.

**Recommendations:**

It is strongly recommended for the implementation of Solar Panel and CCTV in the National Road of Zambales for the purpose of safety travel at night and to lessen accidents.

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