**ENG3004 Assignment 2**

**Name: Lai Chi Yiu Student ID: 19068963D**

**Q2**

**Is electric vehicles (EV) paving the way to a greener future? Each EV Li-ion battery needs 15kg of cobalt and over two third of the world’s cobalt are mined in the Democratic Republic of the Congo. According to this report, 40,000 Congolese children work in the cobalt mining every day. If spent battery ends up in a landfill, its cells can release problematic toxins, including heavy metals. And recycling the battery can be a hazardous business.**

Invention of electric vehicles (EVs) aimed to lead people towards a greener future as an alternative to the current transportation mode. EVs emit significantly less greenhouse gases when compared to traditional vehicles that are powered by gasoline and diesel, which reduce carbon emissions and help combat climate change. However, the production and disposal of batteries used to power EVs raised many ethical and environmental concerns. For instance, Li-ion batteries rely on cobalt, which is mainly mined in the Democratic Republic of the Congo. Lots of child workers are hired to work in the cobalt mining of Congo, which could be considered unethical for different reasons, like interfering their physical and emotional development. On the other hand, recycling the battery can be a hazardous business. When Li-ion batteries are not properly recycled or disposed of, the heavy metals can leach into the soil and groundwater, contaminating the environment and potentially harming human health. Other factors such as the source of electricity and the overall efficiency of transportation systems also need to be taken into consideration. Whether EVs are paving the way to a greener future, the issue will be further discussed in the following sections from five different perspectives: Professional, Economic, Environmental, Health and Safety, and Legal.

From a professional perspective, professional experts in relevant fields are supporting the application of electric vehicles to reduce greenhouse gas emissions and mitigate climate change. According to the International Energy Agency (IEA), transportation highly relys on fossil fuels and accounted for 37% of CO2 emissions from end‐use sectors in 2021 [1]. EVs have the potential to significantly reduce carbon emissions, as they can be powered by clean energy sources and produce zero emissions from the tailpipe. In addition, renewable energy sources such as wind and solar are becoming more established. Using renewable energy sources from a professional perspective can reduce costs and greenhouse gases production. There will be increased adoption of renewable energy sources, paving the way to a greener future.

However, building charging infrastructure can be one of the biggest challenges induced from widespread adoption of EVs. Building charging infrastructure for EVs is a complex process that requires expertise in a variety of areas, including engineering and construction. Various stakeholders and professionals have to collaborate and reach a consensus to address these challenges.

From an economic perspective, it can be divided into two points of view: the consumers and the producers. EVs can be more cost-effective for users in the long run, since electricity is generally cheaper than gasoline or diesel fuel. EVs also require less maintenance because there are fewer moving parts than traditional vehicles. This allows users of EVs to afford lower fuel costs and maintenance costs. Moreover, many governments are also offering incentives to encourage people to purchase EVs. In Hong Kong, the government has been promoting the use of EVs by offering first registration tax (FRT) concessions for EVs. Private car owners are also allowed to replace their old private car with a new electric private car to enjoy a higher FRT concession under the “One-for-One Replacement” Scheme. [2]

However, for the producers, the cost of producing EV batteries is likely to increase as more measures have to be implemented for sourcing and disposal to meet ethical and legal constraints. This could affect the demand for electric vehicles and lead to an increase in the price of EVs. Nevertheless, the long-term benefits of reducing carbon emissions and impacts of climate change can be expected by changing the mode of transport.

From an environmental perspective, charging EVs with renewable energy can significantly reduce greenhouse gas emissions. According to the US Department of Energy, gas-powered vehicles produce nearly three times higher emissions than EVs on average every year. [3] However, there are also concerns about the environmental impact of battery production and disposal. Mining rare metals, such as lithium and cobalt, can have significant environmental impacts. Mining activities can cause significant land degradation, water and air pollution, This can have negative impacts on biodiversity and ecosystem services. Therefore, a sustainable supply chain for metals used in EV batteries is essential for implementing safe and effective recycling processes.

From a health and safety perspective, it is important to consider the risks associated with the extraction and disposal of cobalt used in EV batteries. A large portion of the world's cobalt is mined in the Democratic Republic of the Congo raises concerns about the welfare of mine workers, including the use of child workers. Additionally, the handling of EV batteries present potential risks to workers and the environment due to the presence of toxic materials, such as heavy metals. EV batteries contain flammable and combustible materials, and if not handled properly, they can pose a risk of fire or explosion. EV batteries contain chemicals such as lithium, cobalt, and nickel, which can be toxic if ingested or inhaled. It is important to ensure proper safety measures are put in place throughout the battery lifecycle to minimize these risks.

From a legal perspective, the production, use, and disposal of EV batteries are subject to various regulations and laws. In Hong Kong, the disposal of electric vehicle (EV) batteries is regulated by the Environmental Protection Department (EPD) under the Waste Disposal Ordinance. The EPD requires that all EV batteries be disposed of at licensed waste disposal facilities in accordance with the law. [4] Governments around the world have implemented regulations related to mining and disposal of batteries to ensure public health and safety. For example, companies involved in cobalt mining and battery production need to comply with human rights laws. Additionally, regulations related to battery disposal and recycling require companies to take specific measures to ensure environmental protection and worker health and safety. It is important to comply with these laws and regulations to promote responsible waste management practices and to protect public health and the environment.

Reference:

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