ENG3004 Assignment 2 Ho Cheuk Yin 19060108D

Topic: Electric Vehicles

When looking at the development of electric vehicles, it can be looked at as a double-edged sword. Although the idea behind the need of electric vehicles is to decrease the usage of diesel cars and fossil fuel with the use of renewable energy to make vehicles more environmentally friendly, people tend to ignore the source of the green energy and will not think whether it is really 100% green because they are the consumer of the products. As a

future engineer, it is important for us to understand an issue from different perspectives and dimensions.

The given background of an EV battery’s material and its disposal highlights some of the challenges associated with the production, use, and disposal of lithium-ion batteries, which are a crucial component of electric vehicles. The use of cobalt, a critical material in the production of lithium-ion batteries, has been linked to child labor and human rights abuses in the Democratic Republic of the Congo, which is responsible for producing the majority of the world's cobalt. In addition, if spent batteries end up in landfills, they can release toxic substances that can harm the environment and public health. While proper battery recycling is necessary to reduce the negative environmental impact of lithium-ion batteries, battery recycling can also be a hazardous process due to the presence of toxic materials and the risk of fires and explosions.

Despite these challenges, the growth of the electric vehicle market is expected to continue as countries around the world push for greater adoption of zero-emission vehicles to reduce greenhouse gas emissions and combat climate change. In response to concerns about the social and environmental impacts of lithium-ion batteries, efforts are underway to develop alternative battery chemistries that are more environmentally friendly and ethically sourced. Additionally, recycling technologies are advancing rapidly, which can help to reduce the reliance on newly mined materials and minimize the environmental impact of battery production and disposal. The future of electric vehicles from different dimensions will be discussed in the following paragraphs.

For the Professional Perspective, the growth of the electric vehicle industry is creating new opportunities for professionals in fields such as renewable energy, automotive engineering, and urban planning. However, the ethical and environmental concerns associated with the production of lithium-ion batteries highlight the need for professionals to develop more sustainable and responsible battery technologies and recycling processes. It is because engineers need to use their skills to contribute to society in a moral way such that technological advancement can be balanced with the impact to the environment. In this way, there will be a need for individuals with expertise in materials science, environmental engineering, and sustainability to drive the development and progress in this field.

From the Economic Perspective, the adoption of electric vehicles has the potential to create jobs in the manufacturing, research, and development sectors, as well as in the emerging industries related to battery recycling and charging infrastructure. However, there may be costs associated with ensuring that the materials and labor used in the production of lithium-ion batteries are ethically sourced and that the batteries are disposed of in an environmentally responsible way. In other words, it is important to allocate resources to prevent the amount of child labour in producing batteries to ensure the whole project is ethical and having a positive impact to society. Therefore, there is a need for a cost-benefit analysis that considers both the economic benefits and the social and environmental costs of electric vehicle production.

From the Environmental Perspective, the environmental benefits of electric vehicles are well-established, including reduced greenhouse gas emissions and improved air quality. However, the concerns related to the production and disposal of lithium-ion batteries highlight the need to ensure that electric vehicles are truly environmentally sustainable. Efforts to minimize the environmental impact of battery production and disposal must be prioritized, including the development of alternative battery chemistries that use fewer scarce or problematic materials.

From the Health and Safety Perspective, electric vehicles can have positive health effects by reducing air pollution and improving air quality, which can decrease the incidence of respiratory diseases and other health problems. However, the production, use, and disposal of lithium-ion batteries can also have negative health and safety impacts such that it has the risk of releasing toxic substances, threatening the health of the consumers or workers. Therefore, safety standards like the UL and CE must be followed thoroughly and implemented to mitigate the risks associated with battery production and disposal, as well as the risk of fires and explosions in the event of a battery malfunction.

From the Legal Perspective, the adoption of electric vehicles is being supported by policies and regulations in many countries, such as tax incentives, subsidies, and regulations that require car manufacturers to reduce their greenhouse gas emissions. However, concerns about the social and environmental impact of lithium-ion batteries have led to calls for stronger regulations and standards to ensure that electric vehicles are truly sustainable. This may include regulations related to the sourcing of battery materials, the disposal of spent batteries, and the development of alternative battery chemistries.

In conclusion, while the concerns raised about lithium-ion batteries highlight the need for continued innovation and progress in the development of sustainable and responsible electric vehicle technologies, it is clear that electric vehicles remain a key solution in the transition to a low-carbon future. The development of alternative battery chemistries and recycling processes, combined with strong policies and regulations, can help to ensure that electric vehicles are truly sustainable and contribute to a greener future from all five perspectives discussed here.