

Carbon Neutrality and Society

1. Motivation behind Research Paper

When I did research on the melting ice in the arctic ocean, I discovered that due to the increase of greenhouse gas emissions caused by humans, the ice in the sea is melting rapidly. As a result, the lives of animals and indigenous people living in the arctic are being threatened. Therefore, my group and I felt that we need to make greater efforts to reduce carbon dioxide emissions. It is necessary to change the mentality of those who believe that no action should be taken because the problem does not affect them. We also questioned that Japan raised a goal that we will decrease greenhouse gases emissions by 46% by 2030. Furthermore, the goal of electric vehicles in new car sales by 2035. We started researching to solve the two questions: (1) "Is moving to electric cars and other advanced technologies really the best way to reduce carbon dioxide emissions?" (2) "Is there anything high school students can do to reduce carbon dioxide?".

2. Introduction

According to a survey conducted by the Institute for Sustainable Energy Policies (IEP) based on electricity survey statistics from the Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry, 78.1% of Japan's electricity mix in FY2020 will come from non-renewable energy sources that emit carbon dioxide. (Reference: Institute for Sustainable Energy Policies HP, 2021) In

addition, it is known that electric vehicles emit about twice as much carbon dioxide as gasoline-powered vehicles during production. (Refer to Carbon footprint report Volvo C40 Recharge, 2021)

We believe that promoting the use of electronic vehicles in the current situation is not a solution for the future because electric vehicles emit more greenhouse gases than gasoline powered vehicles during their production and electricity that electric vehicles need to run is made from about 80% of electricity in Japan is generated in an unsustainable manner that emits greenhouse gases. Therefore, I decided to focus on the “Basic Hydrogen Strategy “ that the Japanese government formulated in 2017 to reduce greenhouse gases emissions and use hydrogen energy as a familiar energy source to achieve a decarbonized society. According to New Energy Foundation HP, 2022, there are three types of hydrogen related to carbon neutrality. They are blue hydrogen, grey hydrogen, and green hydrogen. Blue hydrogen can collect and store the emitted carbon dioxide. Grey Hydrogen is made from fossil fuels, so it emits carbon dioxide during production. Green hydrogen can be produced without emitting CO₂, but it costs too much. Those energies are produced on a large scale for carbon neutrality as an energy source that does not emit carbon dioxide when used. However, we thought that how factories and electricity are provided is an issue that we cannot change easily.

3. Results and Analysis

We did a presentation related to the benefits of park and ride, which is a system where you park your car at a bus or train station along the way to your destination and take public transport the rest of the way and contacted the Nara

Prefectural Road Management Department about the improvement of park and ride. We also sent posters to Nara prefecture that can be displayed at train and bus stations.

First, we explained about the presentation at a Parent Teacher Association's (PTA) meeting. We did a presentation about the benefits of park and ride and explained why we are doing this exploration. We also asked parents on Google Forms about their awareness of park and ride, and whether they would want to use such a service.

There are three parking areas for park and ride in Nara city. The largest parking lot is at Heijo Kyuuseki. It has been open since October 1st 2021, but even so, it did not reduce any traffic jams. The results of the survey, anonymously done by area 47 parents, that we presented at the PTA meeting revealed the following. The first question was "did you know about park and ride before?" 59.6% of parents answered "yes", and 40.4% of parents answered "no". We found out that about 60% of parents knew about park and ride services. The second question was for parents who said yes to the first question. The question was "have you ever used park and ride?" 19 out of 31 people answered yes. The percentage of those who have used the service before was below 40%. The third question was "did you think that you wanted to use the park and ride after listening to our presentation?" 31 out of 40 people answered that they were interested in using park and ride services. I asked people who said that they do not want to use them to explain why they don't want to use them on Google form. Some of the opinions included, "I felt it would be easier and more convenient to take my own car to get close to my destination, considering the luggage and transportation costs, because I would feel like I had to take a car and then take public transportation twice." Some of the comments included opinions

about the park-and-ride system itself, such as "I felt it would be easier and more convenient to use a private car to get to my destination considering the cost of luggage and transportation," some parents also say that information dissemination by Nara prefecture is not enough to spread the idea to tourists coming from other prefectures. In addition, 38 people volunteered to answer the question, "If you were to use a park-and-ride system, what kind of service or system would you prefer to use?" Some of the opinions included, "I want to use this system if it provides information on available parking spaces, a system to reserve parking spaces, and specific information on what to take from the parking lot to the next destination, such as times and prices." I would like to see the current system improved to enhance the experience of using the park-and-ride system, such as "free parking," A system that provides information on free transportation, sightseeing, dining, and facilities. The government first needs to better disseminate information through the media, as in Osaka, Kyoto, and Kobe. If there are restrooms and souvenir shops attached to the bus, people would not have to worry about waiting for the bus. Some visitors expressed that they would like the park-and-ride system and other tourist attractions in Nara City to be improved.

From these results, we realised that a certain number of people do not know about the park and ride is not a useful system due to insufficient information dissemination by the Nara prefectural government and the media, and that the service provided when using the system is not yet sufficient, so it is not considered a very practical means of transportation. The services offered when using the park-and-ride system are not yet comprehensive, so it is not considered a practical means of transportation.

Secondly, we asked Nara prefecture "Is there anything high school students

can do to improve Park and Ride?” They said that we can spread information and promote the use of public transport on social media to show people the benefits of using buses that pass through the city, stopping at all the sightseeing spots. We thought of asking for the cooperation of Instagram accounts that focus on Nara tourism to spread information about park and ride system. When we asked Kinki Nippon Railway to display the posters we had created to promote the use of public transportation, they replied that they could not display posters to promote the use of public transportation free of charge, as posters are only displayed in station buildings for a fee.

4. Conclusion and Future Problems

In this paper, we have actively approached the two questions “Is shifting to developed technologies such as electric cars the best way to reduce carbon dioxide emissions?” “What can high school students do?” The answer to the first question, as explained in the introduction, is that carbon dioxide emission from the production of electric vehicles is about twice that of gasoline vehicles, and not renewable energy sources account for a large portion of Japan's electricity mix. We also found that grey, green, and blue hydrogen have the disadvantages of being expensive to produce and emitting carbon dioxide. The answer to the second question, from the results of sending emails to the Nara Prefecture Land Management Department and Kinki Nippon Railway and doing presentation at PTA meeting, we learned that we high school students can do what we can do to continue to care about the environment in small ways and to take action to make more people aware of the current situation we have investigated and to change the awareness of as many

people as possible. We learned that we, high school students, can do what we can do.

5. Reflection

Through this exploration, my group and I learned the importance of thinking critically about solutions that are believed to be good solutions for environmental issues. Also, not only problems about carbon neutrality, we have become more aware of the issues that are happening in the world. From now on, I want to live more environmentally friendly and actively take actions to solve many environmental and social problems around the world.

6. Work Cited

The Institute for Sustainable Energy Policies (ISEP), Percentage of electricity from renewable sources in 2020, 12 Apr. 2021, Web, 13 Jun 2021

Volvo cars, Carbon footprint report-Volvo C40 Recharge, 1 Jun 2021, Web, 29 July 2022

Agency for Natural Resources and Energy, How do we make the next-generation energy "hydrogen"? 12 Oct 2021, Web, 13 Nov 2021

Agency for Natural Resources and Energy, What is carbon neutral? (Part 2) - Why is Japan aiming to make it happen? 16 Mar 2021, Web, 4 May 2021