STUDENT'S WILLINGNESS TO CHANGE A PATHWAY TO CARBON NEUTRALITY

(A Case Study [redacted])

ABSTRACT

To lower human-induced carbon dioxide emissions in the atmosphere, the world must aim toward a carbon-neutral future to successfully combat climate change. The research aimed to investigate students‟ willingness to change their attitude as a pathway to achieving carbon neutrality. An online survey was created using the JISC tool to examine students at the University of Salford's desire to change their behaviour to meet a carbon neutrality objective. Overall, 122 responses were received from the respondents and a non-parametric statistical approach was used to analyse the data. The Spearman‟s rho correlation coefficient of respondent‟s familiarity level with climate change and their willingness to change was found to be moderate negative and statistically significant at 0.001 level. Out of 122 respondents who completed the study survey, 30 (24.6%) of them said that they first learned about climate change in school, Internet and television sources came second on sources utilised for information. In addition, 93 (76.2%) of the respondents were ready to give up certain individual benefits to reduce CO_2 emissions. Carbon neutrality seems like an ambitious goal for policymakers to attain; though people are willing to alter their lifestyles to reduce CO_2 emissions in the areas of energy consumption, food waste, and transportation. However, they are not willing to go beyond if doing so will cost them more; people need to be made more aware of the issue and adopt a pattern to reduce wasteful lifestyles to reduce their carbon footprint, and it will require true political and widespread social commitment.

Keywords: Carbon Neutrality, lifestyles, pathways, Salford

INTRODUCTION

The continued existence of life on earth is at risk due to global warming, which is brought on by the excessive emission of greenhouse gases, caused by human activities (Kılkış et al., 2020). It has not only threatened life, but also threatened the availability of natural resources, energy, food accessibility, and other areas of the environment, which poses a serious risk to human well-being (Kushawaha et al., 2021). The objective of addressing significant concerns with the current economic improvement model that would create a low-carbon and ecologically friendly environment has caused the interest of the global population to focus more on climate change in recent decades (Li et al., 2020).

The word carbon neutrality means to have a balance between the amount of carbon that is emitted and the amount that is absorbed in carbon sinks. In order to achieve a low-carbon environment, humans‟ day-to-day lifestyle must target a carbon neutrality future, by reducing carbon dioxide (CO_2) emissions in the atmosphere caused by anthropogenic activities, like using fossil fuels for power generation, transportation, heating, and food handling. Carbon neutrality which can also be referred to as Net-zero carbon dioxide (CO_2) emissions, is the balance of CO_2 inputs into the atmosphere with the CO_2 removal from the atmosphere, to prevent CO_2 from increasing in the environment, which results in global warming (Wu et al., 2022). The primary heat-trapping and heat-radiating gas on Earth is carbon dioxide. Unlike oxygen or nitrogen, which make up the majority of our atmosphere, greenhouse gases are able to absorb heat emitted from the Earth's surface and then release it in all directions, including back towards the surface. The natural greenhouse effect of the planet would not be strong enough to sustain the average world surface temperature above freezing without carbon dioxide. People are enhancing the natural greenhouse effect by increasing the amount of carbon dioxide in the atmosphere, which raises the earth's temperature (NRDC, 2022).

According to Smith et al. (2018) in their research, if greenhouse gas (GHG) emissions continue to increase at the rate they currently are rising, or even faster, the temperature will rise by 1.5 degrees Celsius or more, it will cause climatic extremes to occur more frequently and more intensely, and this will result in greater hazards in the future. The most vulnerable systems are those that affect the environment and food production. Coastal flooding, the decline of marine life, and a decrease in seasonal rainfall are just a few of the negative repercussions that will harm the globe

(Intergovernmental Panel on Climate Change, 2018). Our planet's biggest existential threat is climate change. The repercussions of rising global temperatures, if we don't reduce greenhouse gas emissions from burning fossil fuels, include huge agricultural and fisheries collapses, the extinction of hundreds of thousands of species, and the uninhabitability of whole populations. Even if these consequences may still be preventable, climate change is already resulting in pain and fatalities. Its compounding consequences are still being felt today, just outside our windows, in the form of roaring wildfires and amplified storms (Rebecca, 2023).

In many nations, which includes the UK, China, New Zealand, Sweden, and France, net-zero objectives of the Paris Agreement have been made public. However, it is still up for debate in other developing and underdeveloped nations; although, many countries throughout the world are starting to accept the adverse effects and risks of GHG emissions on the environment (Huang & Zhai, 2021).

Climate change and global warming are the two ecological and environmental problems that humanity now faces. Unless nations across the world take appropriate measures, laws, and other efforts, the diminishing natural environment will continue to harm the next generation (Li et al. 2021). As a result of the ongoing use of fossil fuels, global carbon dioxide emissions reached 34.81 billion metric tonnes in 2020 (International Energy Agency, 2021), making a significant contribution to global warming. Even though the ultimate goal is for all countries to be carbon neutral for the continued existence of life in the environment, different individuals, communities, towns, and organisations have various ideas for reducing emissions like building carbon storage facilities, tree planting, Direct Air Capturing technology, reducing the use of plastic, putting environmental sustainability to new designs.

Among 198 nations of the world, only three countries Bhutan, Suriname, and Panama representing almost 4.5% have achieved carbon neutrality objectives (Laurie, 2021), 10.6% have acknowledged and perhaps even determined to achieve carbon neutrality targets, 8.6% have enshrined it in law to achieving carbon neutrality objectives, 29.3% have developed appropriate strategies to achieve carbon neutrality targets, and the remaining 47% are still debating appropriate policies to achieve carbon neutrality goals (Chen et al., 2022).

Rapid urbanisation is nearly the current occurrence in nations of the world in the 21st century, and this has led to an international urban problem in light of the climate emergency and energy crisis that is ravaging the world. Urban migration increased dramatically in the 20th century, and today there is global urbanisation at one end and growing CO_2 emissions at another end (Liang & Yang, 2019). According to the United Nations, cities are where the battle for a society that is carbon neutral will either be won or lost; this is because as of 2017, 54% of the world's population lived in cities, which was also where about 70% of the world's energy was used and approximately 75% of greenhouse gas emissions connected to energy were released into the atmosphere (University of Reading, 2021).

Although achieving the Paris Agreement's climate change mitigation objectives depend on each individual's carbon footprint actions that will be taken (United Nations Framework Convention on Climate Change, 2015), this is because the UNFCCC acknowledges individual efforts and provides a list of actions that people may take to reduce GHG emissions (Reichl, et al., 2020). However, there are many options available to citizens, such as purchasing environmentally friendly goods, reducing food waste, and making energy-saving choices, lifestyle changes have not yet been fully used as a major pathway to meet CO_2 neutrality objectives (Dubois et al., 2019).

The necessity for at least some public awareness of the origins and effects of carbon emissions, as well as the capacity and desire for individuals to cut emissions, is highlighted by policy approaches that rely on individuals' voluntary carbon reduction. However, the contextual implications of carbon and energy in daily living and decision-making, have not been given much attention in order to achieve a worldwide carbon-neutral environment for everybody (Whitmarsh et al., 2011). This research was conducted to bridge the knowledge gap by investigating the University of Salford students' willingness to change, as a pathway to achieving the climatic set targets of the United Kingdom to reach a net-zero future.

Research Objectives

The research aim was to investigate students‟ willingness to change their attitude to achieve a net zero environment and the objectives of the research are to:

1. Examine if there is a relationship between what students studied in school and their knowledge of climate change.

2. Critically determine the main sources of information for students on the topic of climate change.
3. Evaluate student‟s willingness to change their behaviour to contribute to carbon emission reduction.
4. Determine if there is a relationship between students‟ knowledge of climate change and their willingness to change their attitude to achieve carbon neutrality.
5. Estimate students‟ acceptability of climatic policy to achieve carbon neutrality.

Study Area

Salford is located in the Northwest of England and is one of the cities in Greater Manchester, within the boundary of Salford are Bolton and Wigan at the west, Bury, Rochdale, and Manchester at the East, and Warrington and Trafford in the south, see **Figure 1** (University of Salford. “n.d.”).

***Figure 1**: The Green part shows the Salford area*
***Source:** Salford Home Search. (n.d.).*

This study was conducted at the University of Salford because of its diversity of the different populations of students both international and from within Europe. Manchester has one of the largest student populations in Europe, with over 70,000 students choosing to reside there. Salford is known for having a dynamic city centre with a unique European atmosphere, as well as a thriving international lifestyle (University of Salford Profile and Courses "n.d.").

RESEARCH METHODOLOGY

A quantitative research approach was adopted, to primarily examine students at the University of Salford's desire to alter their behaviour in order to meet a carbon neutrality objective, an online survey was developed using the JISC online survey, which includes closed-ended and open-ended questions. Comparable options were available in the survey. This is because according to Krosnick et al (2002) in their research, found out that people are more likely to acquire an opinion or attitude without this choice, hence they strongly advocate against allowing respondents to choose this "no option". However, Grendall and Davies (2003), recommended that it is important to include a "no view" option, and this is in contradiction with the decision to have all inquiries need a response. Only a balance between the two theories on the survey allowed this strategy to function. However, the survey had more of a closed-ended question to help guide respondents not to form an opinion.

Sampling Technique

The Probability sampling method was used for this study because it incorporates an aspect of random selection, that ensures that every member of the sampling population is given an equal opportunity to be selected for the study (Berndt, 2020), there were no financial incentives for responding to the

survey, with the reality that individuals that took part, did so with their genuine interest in the subject and a more accurate result was obtained from the analysis of the data from the online survey.

Method of Data Collection

Data from this research were collected using a JISC online survey tool of the University of Salford between 4th July 2022 to 24th September 2022, A shareable link was created and disseminated through more than five student social media channels, including University of Salford student WhatsApp groups, Facebook groups, LinkedIn, and indirect and direct emails. This was done to keep the survey limited to the student population. The number of students who got the survey link could not be determined since it was shared by other colleagues and students. The funding organisation Tertiary Educational Trust Fund (Tetfund), and Federal Polytechnic Ekowe Bayelsa State is not involved in the collection and analysis of data for this research.

RESULT AND DISCUSSIONS

The sample represents 63 (51.63%) Undergraduate and 58 (47.54%) Postgraduate students between the age range of under-eighteen to over fifty. About 53.3% of the survey participants were female; 36.9% were male and about 9.8% preferred not to say. In that group, 28 (23%) were from the business school, 27 (22.1%) were from the school of health and society, 25 (20.5%) were from the school of arts, media, and creative technology, 42 (34.4%) were from the school of science, engineering, and environment (see **Table 1)**.

Table 1: Demographics of Respondents

Description	**SAMCT N (%)**	**SHS N (%)**	**SSEE N (%)**	**SBS N (%)**	**Total N (%)**
Total	25 (20.5)	27 (22.1)	42 (34.4)	28 (23)	122
Gender					
Male	6 (4.9)	11 (9.0)	20 (16.4)	8 (6.6)	45 (36.9)
Female	19 (15.6)	11 (9.0)	17 (13.9)	18 (14.8)	65 (53.3)
Prefer not to say	0 (0)	5 (4.1)	5 (4.1)	2 (1.6)	12 (9.8)
Age					
Under eighteen	14 (11.5)	8 (6.6)	9 (7.4)	16 (13.0)	47 (38.5)
< – 24	8 (6.5)	18 (14.8)	20(16.4)	9 (7.4)	55 (45.1)
25 – 34	3 (2.5)	1 (0.8)	11 (9.0)	3 (2.5)	18 (14.8)
35 – 44	0 (0)	0 (0)	2 (1.6)	0 (0)	2 (1.6)
45 – 54	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
55 – >	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
The highest level of Education attained					
Secondary School	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
College	1 (0.8)	0 (0)	0 (0)	0 (0)	1 (0.8)
Undergraduate	18 (14.8)	12 (9.8)	15 (12.3)	18 (14.8)	63 (51.7)
Postgraduate	6 (4.9)	15 (12.3)	27 (22.1)	10 (8.2)	58 (47.5)
Professional Certification	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

*__SAMCT__: School of Arts, Media, and Creative Technology; **SHS**: School of Health and Society; **SSEE**: School of Science, Engineering, and Environment; **SBS**: Salford Business School

About the respondent‟s familiarity level with the issue of climate change, was categorised into four groups; novice which represented 26 (21.3%) of the respondents, apprentice which the majority of the respondents fall under, representing 56 (45.9%) of the total responses, practitioner which is the second largest represented 34 (27.9 %) of the respondents and expert with the smallest population which represented 6 (4.9%) of the respondents (**see figure 2**). This shows that the majority of the

respondents are still at the apprentice stage when it comes to the issues of climate change and emission reduction.

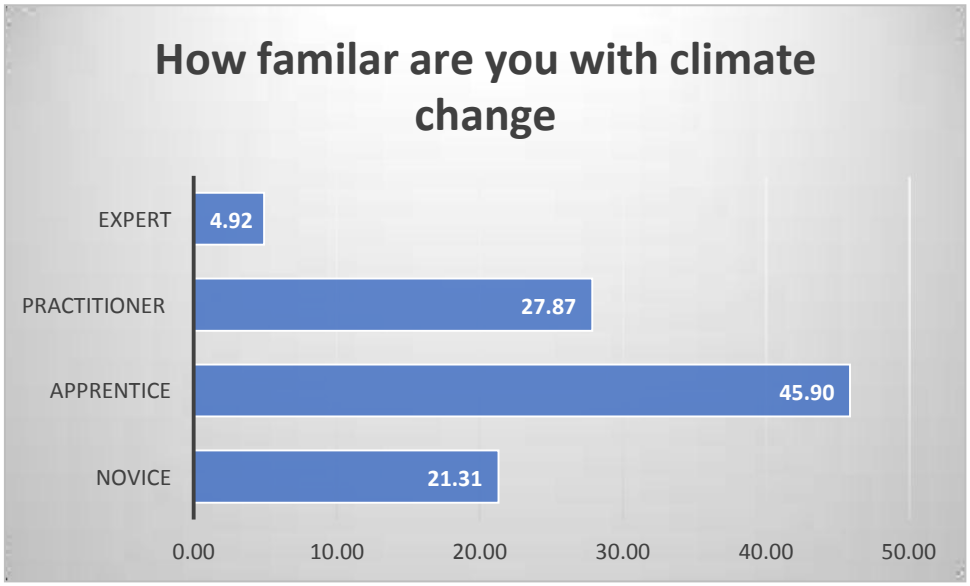

Figure 2: *Bar Chart showing respondent's level of understanding of climate change.*

Global warming has now been elevated to the top of the international agenda thanks to environmental activists. However, it's possible that their efforts are too little, too late given the scientific, economic, and political realities according to Saunders & Turekian, (2007).

Table 2: Spearman's rho Correlation Matrix

	What School are you at the university?	How familiar are you with the subject of climate change?	Are you willing to sacrifice some individual benefits to reduce carbon emissions?
What School are you at the university?	1.000		
How familiar are you with the subject of climate change?	.003	1.000	
Are you willing to sacrifice some individual benefits to reduce carbon emissions?	.019	-.479**	1.000

**. Correlation is significant at the 0.01 level (2-tailed).

The result of Spearman's rho correlation coefficient of respondent‟s familiarity level with climate change and the school the participant is enrolled at the University of Salford showed no correlation i.e., was not significant so the H1 was retained. However, when compared with respondent‟s willingness to change their lifestyle, it was moderately negatively correlated with their level of familiarity with climate change and statistically significant at both 0.005 and 0.001 levels i.e $r = -0.479$, $p < .001$ therefore, the H2 was rejected (See **Table 2**).

Respondent’s sources of climatic information

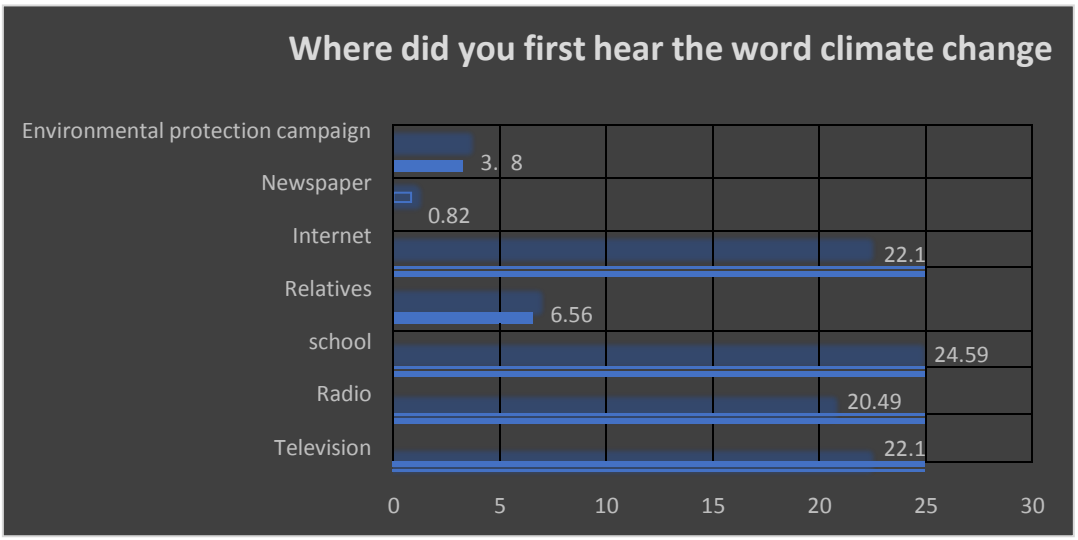

Figure 2: *A bar chart showing respondent's sources of information in percentages.*

Out of 122 respondents that responded to the research survey, 30 (24.6%) which represent the majority of the respondents, picked school as the first place they first came across the word climate change, Internet and Television sources were second in the channels used, which was very close to school channel as the first place respondents got their information on the issue of climate change, they both represented 27 (22.1%) respondents respectively in the responses gathered, Radio represented 25 (20.5%) of the respondent, followed by friends and relatives 8 (6.6%), environmental protection campaign represented 4 (3.3%) of the respondents and Newspapers was the lowest with just 1 (0.8%) of the respondents. These demonstrations show that newspapers are not effective in passing climatic information to people in the study area see **Figure 2**.

Respondent's Willingness to Change

Moreso, respondents were asked, if they were concerned about the issue of climate change, 95 (77.9%) of the respondents were concerned, while 27 (22.1%) were not concerned. Furthermore, 93 (76.2%) of the respondents were willing to sacrifice some individual benefits to reduce CO_2 emissions, while 27 (22.1%) of the respondents were not willing to sacrifice individual benefits. This shows that people are highly aware that climate change is a problem to our environment and are willing to make a little adjustment to reduce their CO_2 footprint, Whitmarsh et al. (2011) also confirm the high awareness of people on the issue of climate change.

Respondent's acceptance of climatic policies

Table 3: Respondent's attitude to climatic mitigation strategies

Statement	SD	D	N	A	SA	Total
People should only use electric vehicles, public hybrid buses, and cycling for their trips within Greater Manchester to better the environment	8	29	46	33	6	122
Everyone should give up their private non-environmentally friendly automobiles to reduce emissions	17	30	47	26	2	122
People should start paying for carbon emissions that they generate	17	19	39	43	4	122
Frequent environmental audits should be carried out in every home	1	3	13	61	44	122

* **SD**: Strongly Disagree; **D**: Disagree; **N**: Neutral; **A**: Agree; **SA**: Strongly Agree

Lastly, was to gauge students' acceptance of climate policy in order to attain carbon neutrality goals. 8 (6.6%) of the respondents strongly disagreed, 29 (23.8%) disagreed, 46 (37.7%) of the respondents were indifferent, and 33 (27.0%) agreed that individuals should only travel inside Greater Manchester

in ecologically friendly cars (See Table 4). Furthermore, 26 (21.3%) agree and 2 (1,6%) of the respondents strongly agree that everyone should give up their private non-environmentally friendly automobiles like cars, motorbikes, etc., while 17 (13.9%) of the respondents strongly disagree, 30 (24.6%) disagree, the majority of respondents representing 47 (38.5%) were neutral. Moreso, 17 (13.9%) of the respondents strongly disagree, 19 (15.6%) disagree, 39 (32.0%) were neutral, while the majority of the respondents representing 43 (35.2%) agree and 4 (3.3%) of the respondents strongly agree, that people should start paying for CO_2 emissions to reduce carbon footprint. The majority of the respondents were indifferent in their response, it may be possible that these results (Table 3) are due to the fact that people‟s acceptances of climate policies have been found to be influenced by a number of social, psychological, and demographic factors (Kitt et al., 2021; Lorenzoni et al., 2007; Whitmarsh et al., 2011). Moreover, the social level to implement some of these CO_2 reduction policies may not be available to individuals who have the willingness to reduce their CO_2 footprint (Lorenzoni et al., 2007).

4. CONCLUSION AND RECOMMENDATION

Achieving carbon neutrality seems an ambitious objective to achieve by policymakers. However, if individual behavioural changes are viewed as a pathway to carbon reduction, it will go a long way toward assisting countries throughout the world in achieving their CO_2 neutrality goals.

According to present studies, people are prepared to change their lifestyles to minimise CO_2 emissions in the areas of energy use, food management, and transportation. However, they are not willing to go beyond if doing so will increase their costs. Additionally, it was discovered that carbon is not a visible factor in daily decision-making, that misconceptions persist, and that the gap between knowledge and behaviour is consistent with earlier findings on public participation in climate change and carbon reductions. Since personal transportation and household energy use account for more than one-third of carbon emissions in many industrialised nations, the willingness to attitudinal change in people will undoubtedly be vital in any future transition to a carbon-neutral environment.

Even more so, a person's acquaintance with climate change did not necessarily indicate that they would be willing to modify their behaviour to minimise CO_2 emissions. These might indicate that there are certain obstacles that prevent even informed and motivated people from acting. When analysing several respondents‟ water end uses, it shows that the majority are willing to reduce their shower duration for a better environment. Showering typically represents the most indoor demand, accounting for between 30 and 45 percent of all residential consumption.

The public needs to be made more aware of the issue and adopt a pattern of reduced consumption which requires true political and widespread social commitment. Even at the individual level, a drastic shift in beliefs, behaviour, and institutions is required to successfully combat climate change and meet the UK Government's goal of an 80% reduction in carbon dioxide emissions.

- There should be more investigation on how individuals consider minimising their carbon footprint when making decisions and carrying out daily activities.
- Every little thing counts, so when electronics are not in use, people should disconnect them and turn off the lighting.
- To monitor their progress in lowering their carbon footprint, people should regularly undertake an environmental audit at their homes to evaluate their day-to-day lifestyle.
- Governments must begin implementing the payment of taxes for individual emissions at all levels to meet the specified carbon neutrality goals.
- People should only cook what they can consume and buy what they can use.
- Several of your frequent short-trip locations may be reached by walking or bicycling. A mile may usually be covered in less than 20 minutes of walking, this helps improve your health and reduce carbon emissions.

ACKNOWLEDGMENT

I want to express my gratitude to my supervisor, Kevwe Olomu, for her unwavering support and direction during the length of my MS.c research endeavour. A special thanks go out to my wife Juliet

Tonbra, who has been a support throughout my academic career, no matter the challenges, Professor Enetimi Idah Seiyaboh and everyone who took part in the research, contributed their time, and made it possible for this study to be conducted. Additionally, gratitude goes to Tertiary Educational Trust Fund (Tetfund), and Federal Polytechnic Ekowe Bayelsa State for making sure I have the needed funds.

COMPETING INTERESTS

No competing interests exist.

CONSENT

Student"s Willingness to Change a Road to Carbon Neutrality

Page 1: Introduction

Participation Information Sheet
Date: 25 July 22

Title of Study: Student willing to change a Road to Carbon Neutrality

Name of Researcher: Tonbra Seiyabo Inemo, a postgraduate student of Environmental Assessment and Management at the University of Salford.

Invitation Paragraph:

You are invited to take part in a research project: Student willing to change a Road to Carbon Neutrality. It is important to understand why the research is being done and what it will involve. Please take time to read the following information carefully before you decide whether you wish to take part. You are welcome to discuss this project with others before you make your decision. Please contact: T.I.Seiyabo@edu.salford.ac.uk, if there is anything that is not clear or if you would like more information.

Purpose of the study?

The purpose of the study is to investigate students" willingness to change or adjust their attitudes to achieve a carbon neutrality environment.

Why have I been chosen?

You are invited to participate in this study as a student at the University of Salford to aid this research project.

Do I have to participate?

No- this is completely voluntary.

What will happen should I participate?

The process of answering questions will take around 15 minutes and you are free to ask any questions or withdraw at any time.

Benefits

The information we get from the study will help to increase the understanding of student"s day to day lifestyle like traveling choices, food-wasting, energy usage, etc. We are a university, so it is part of our

reason for being that we advance knowledge through research and teaching. Your participation in this research helps us to do that.

What if there is a problem?

If you have any questions or concerns about any aspect of this study, you should ask to speak to the researcher by email: T.I.Seiyabo@edu.salford.ac.uk, who will do their best to answer your questions. Alternatively, if you have any issues or complaints, you may contact the research supervisor: Kevwe Olomu by email: K.G.Olomu1@salford.ac.uk.

What will happen to the results of the research study?

The data will be stored on the school-secured database, from where it will be accessed by the researcher, collated and statistically analysed. The responses will be generated into numerical data and will be completely anonymous.

Do you consent? *Required*

I consent to how my data will be used and managed

ETHICAL APPROVAL

From: ethics
Sent: 10 August 2022 19:00
To: Tonbra Seiyabo
Cc: Kevwe Olomu

Subject: Ethics Application: Panel Decision
Importance: Low
The Ethics Panel has reviewed your application: Student willingness to change a Road to Carbon Neutrality.
Application ID: 7714
The decision is: Application Approved.
If the Chair has provided comments, these are as follows:
10/08/ Ethical dimension is considered and appropriately managed. CC
You will no longer be able to edit your application in the system.
Link to the Ethics Application Tool: https://apps.powerapps.com/play/de0240e7-3d59-4974-849eba87d2541856?tenantId=65b52940-f4b6-41bd-833d-3033ecbcf6e1

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