Assessment 1 Concept Proposal

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Abstract

The general public's understanding of their carbon footprint and its contribution to climate change is paramount for it to be prevented and reversed. However, there is a large amount of misinformation surrounding the topic that needs to be addressed. We researched the extent of and reasons behind the general public's lack of awareness about carbon emissions using questionnaires, a card sorting study and reliable secondary sources in order to design a web-based application that could help with this issue. Additionally, a thorough market analysis was conducted to obtain insights on the benefits and drawbacks of current solutions.

The research in this report shows that the general public was uninformed of the carbon emissions of daily activities and their personal carbon footprints. We also found users expressed the need to be informed of not only general information about carbon emissions but also information about how manufacturing and producing can contribute.

Based on these findings we designed a VR experience concept to make the user aware of the contribution that often overlooked actions would have to their carbon footprint. With this knowledge our hope is that the general public is able to make more informed and environmentally friendly choices. This concept would provide a completely unique product to a tragically empty market that the user would easily be able to relate to and engage with.

Introduction

According to the United Nations (UN), climate change is the defining issue of our time (United Nations, 2020). The gradual, but rapidly increasing changes to Earth’s weather and climate as a result of human actions is driving catastrophic long-term and short-term repercussions. Fires are ravaging bushland, melting glaciers are flooding towns, droughts are ruining agriculture and animal species are becoming extinct (Jackson, 2020). This can all be linked to greenhouse gas emissions such as carbon dioxide, methane, nitrous oxide, water vapor and chlorofluorocarbons causing fluctuations in the planet's temperature (The National Aeronautics and Space Administration, 2020). Throughout this report these gases we be collectively referred to as CO2e (carbon dioxide equivalent)

This issue is incredibly important but also incredibly complex, resulting in many different interpretations of facts and a general lack of understanding amongst the

general public. The overwhelming amount of differing explanations in combination with social media and the internet's ability to exponentially spread information can cause confusion about what climate change looks like and what must be done to combat the issue (Andrews, 2019).

Due to this confusion it is important for the misinformation surrounding this topic to be addressed. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), it is imperative for the general public to have a more accurate and advanced understanding of the causes and solutions to climate change in order to revert the damage done and prevent further harm (United Nations Educational, Scientific and Cultural Organization, 2019).

The purpose of this report is to gain an insight into people's interpretation and perception of information surrounding carbon emission and their influence on the planet. Additionally, the analysis of current solutions that address climate change and carbon emissions will be conducted to identify the successes and pitfalls of each product. These findings will be used to define the constraints of the project - to design and develop an interactive web application that will dispel misinformation and illuminate credible information to improve the general public's understanding of climate change and promote potential actable solutions.

A variety of primary methods and secondary sources will be utilised to accomplish this research. The primary methods include card sorting, surveys and interviews. Secondary sources consisted of news articles and both academic and government publications.

Project Brief

Interpretation of the Brief

The assigned brief tasked us with designing and developing an interactive web application to tackle misinformation perceived by the general public about the Anthropocene caused by the large amount of complex and sometimes misleading material. The specific issue chosen from this focus area is carbon emissions.

The Link Between the Brief and Problem Area

The Anthropocene is the period in which the actions and behaviours of humans became the primary influence on Earth's climate and environment (Zalasiewicz et al, 2008). Data from tracking carbon dioxide in the atmosphere objectively proves that this period started in the late 1800s/early 1900s, which directly correlates with the start of the Industrial Revolution (See Figure 1).

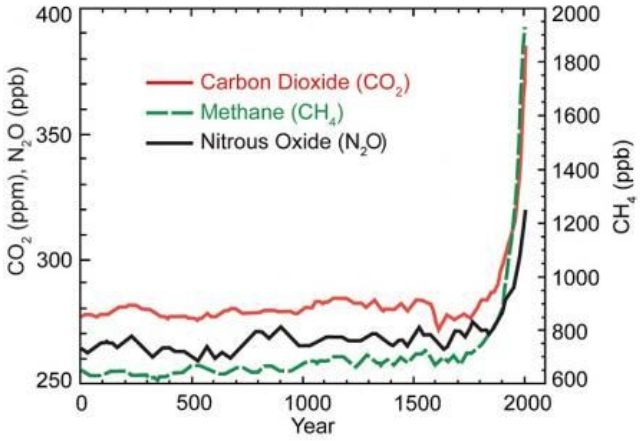

Figure 1: The increase in CO2e in the late 1800s proves a correlation between The Industrial Revolution and the Anthropocene (National Climate Assessment, 2014).

The Industrial Revolution was the start of humanity's move towards infrastructure and technology which was powered by the burning of fossil fuels that emit carbon (Jonsson, 2012). The byproducts of manufacturing and

exporting have led to a variety of effects, visualised in the form of a mind map (See Figure 2). Despite these environmental changes and increasing public acceptance that climate change is occurring, much uncertainty and confusion remains (Reynolds, T. W. Bostrom, A. Read, D. Morgan, M. G., 2018). As carbon emissions have been the crux of the negative consequences of climate change since industrialisation, we narrowed down our problem area to target the misinformation of carbon emissions.

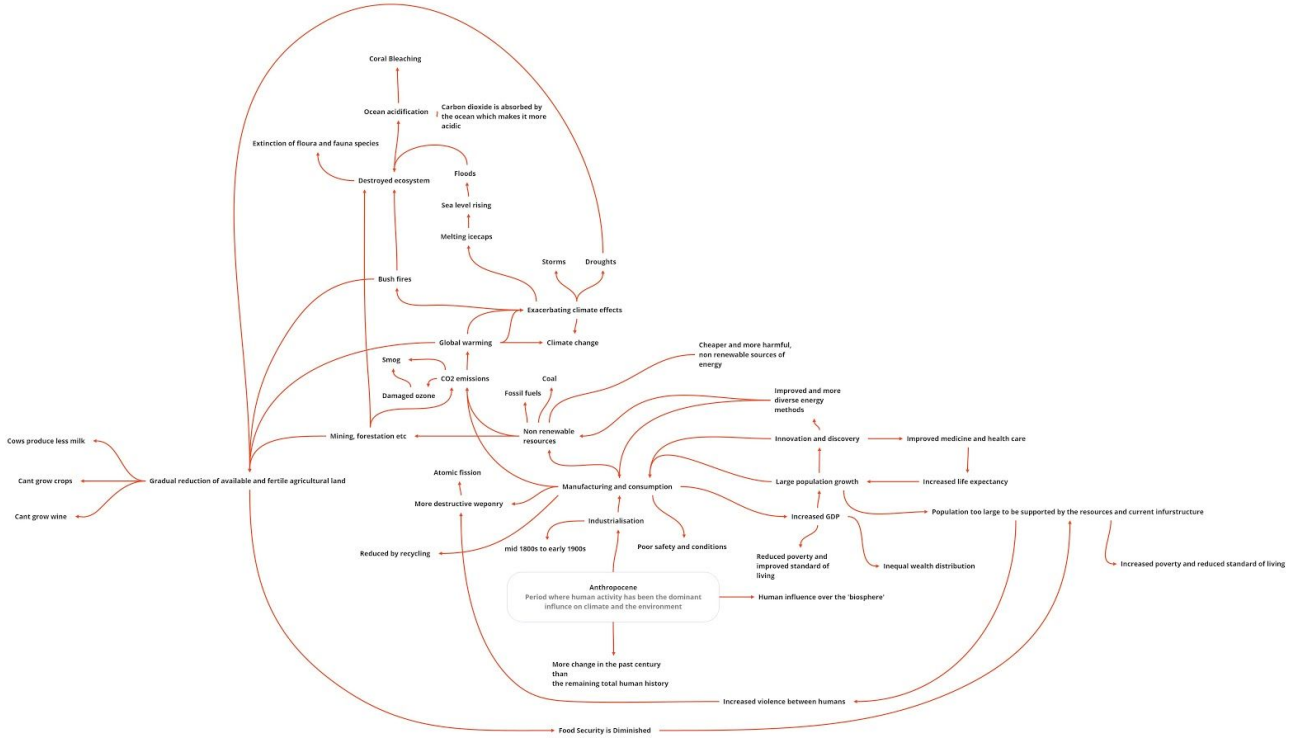

Figure 2: Mind Map created during the process of theorising and researching the causes and effects of the Anthropocene.

Goals

The main goal is to educate individuals on the impact carbon emissions have on the planet. To achieve this, the aim is to educate and inform people of the consequences of excessive CO2e, as well as their personal contribution towards their carbon footprint. By

making individuals aware of their carbon impact, we hope this will cause them to actively decrease it.

Background Research and Market Analysis

Problem Area Research

Further research was initiated into CO2e by referring to secondary sources such as news articles, government publications and academic studies (see Appendix 1).

CO2e emissions cause what scientists refer to as a "greenhouse effect". This involves these gases being trapped in Earth's atmosphere, preventing heat from escaping and gradually raising the average global temperature, this is commonly referred to as global warming (The National Aeronautics and Space Administration, 2020). The National Aeronautics and Space Administration's (NASA) publication on "The Effects of Climate Change" states the repercussions the planet and its occupants will face include: continuous rising temperatures, both shorter and longer agricultural seasons, fluctuating precipitation methods, more droughts and heat waves, exacerbated hurricanes, sea levels rising and the melting of the Arctic (The National Aeronautics and Space Administration, 2020).

The largest contributors to these greenhouse gas emissions are industry practises such as burning fossil fuels for power, manufacturing, mining, deforestation and urbanisation but the general public are still both a large contributor but also a large insentivisor of these industrial action (CDP, 2020). The use and consumption of products by the general public could be emitting CO2e depending on the product but it also promotes corporate actions to further burn fossil fuels or other dirty energy sources to continue production (Del Valle, 2020). This is a major factor to carbon emissions and the general public is not only contributing to climate change but they are also able to prevent it. Richard Heede, the co-founder and co-director of the Climate Accountability Institute, claims that out of all the CO2e emissions caused by industrialisation, "ninety percent are from their products" which the general public consume, use and demand (Del Valle, 2020).

User Research

The main aspect of CO2e emissions that we needed to research was what the general public did and did not know about them. This understanding was needed to provide insight into what elements of carbon emissions needed to be targeted in our final solution. This information was gathered in the form of a questionnaire and card sorting.

QUESTIONNAIRE

A questionnaire was conducted on 30 participants to discover how much, or how little, was known about carbon emissions (see Appendix 2). All participants selected were over the age of 18, to target adults who are able to understand and act upon the issue of carbon emissions.

The aim of the questionnaire was to gather quantitative data on Australians' knowledge of carbon emissions. Data from the "CO2 Data Explorer" (Our World In Data, 2019) was used to compare against answers from participants to gauge the accuracy of their answers.

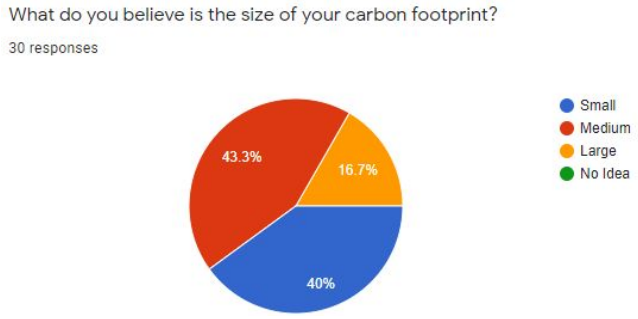

Figure 3: Screen capture of the question "What do you believe is the size of your carbon footprint?", from our questionnaire.

A key insight obtained from our questionnaire was that participants had misconceptions about the size of their carbon footprint. When asked, only 16.7% of participants stated they had a large carbon footprint (See Figure 3). However, in 2017, the average Australian contributed 16.96 tonnes per year, 8.48 times the recommended 2 tonnes that is needed to keep global warming in check (Our World In Data, 2019) (Gruber, 2018). Due to the fact that all participants were Australian residents, it can be assumed that all participants that answered "small" or "medium" were incorrect.

Another insight gathered from the questionnaire was one of accountability. When questioned about the CO2e per capita of Australia and other countries, most participants believed Australia was only a moderate contributor, with China and India being the worst. The results of the questionnaire can be found at Appendix 2B-2G.

However in reality, when compared to other nations in 2017, Australia is significantly worse as it has an average of about 17 tonnes whereas China's is 7 tonnes and India's is 2 tonnes. In fact Australia is more than 3 times higher than the global average and even significantly outweighs other first world countries (Our World in Data, 2019). The table below shows these averages. This illustrates a large lack of accountability in relation to the average Australians' personal carbon footprints as our participants consistently underestimated the country's CO2e per capita when compared to other countries.

Country	**Average CO2e in 2017 per capita (tonnes)**
Australia	16.69t
United States	16.21t
Canada	15.55t
China	6.92t
United Kingdom	5.81t
India	1.84t

Figure 4: Table displaying the average CO2e emissions in 2017 per capita in tonnes for the according countries.

Card Sorting

To obtain insights on how users perceive the carbon emissions of activities, a variation on the method of card sorting - which typically is used to help design the information architecture of a site - was conducted on 10 participants over the age of 18 (usability.gov, 2020). Traditionally, card sorting requires participants to sort cards into groups of similar cards and then give the grouping a name (usability.gov, 2020).

In our variation, test participants were given a set of 47 cards (see Appendix 3), each labeled with an activity or product (e.g. "making a coffee" or "a litre of milk"). Verbal instructions were given to place the cards in order from least to most CO2e attributed (see Appendix 4A-4G). Participants were also told to think aloud when placing their cards.

This method was chosen to give participants full freedom to display their opinions on activities and express their considerations out loud. We wanted to create a method that allowed users to think for themselves without any influences from the asking or phrasing of questions.

To determine what to put on the cards, Mike Berners-Lee's book *How Bad are Bananas?: The Carbon Footprint of Everything* was used (See Image 1). The book provides a highly researched estimation of how much CO2e would be emitted from different products and actions. An example includes, owning a dog contributes 770kg of CO2e per year. Berners-Lee is a credible source on this topic as he has a background in carbon footprint research (British Broadcasting Corporation, 2010).

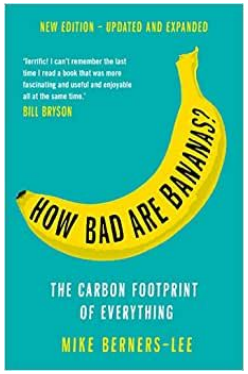

Image 1: How Bad Are Bananas?: The Carbon Footprint of Everything by Mike Berners-Lee. The book was updated in September of 2020 (Berners-Lee, 2020).

Using Berners-Lee's research ensured a less assumptive process of determining what would go on the cards and allowed us to gauge the accuracy of the users choices as they did the activity, which helped with analysing and questioning. Additionally, it also ensured we covered a wide range of areas to get a broad grasp on the users knowledge. However, the goal of the card sorting activity was less about the end display of cards and more so on the insights spoken by participants whilst doing so.

Throughout the card sorting activity, many users expressed confusion about the activities on the cards and it was clear the CO2e of some activities had never been considered before. Users seemed to believe that activities that were commonly associated with being environmentally friendly such as "riding a bike" or "walking to work" had little to no carbon emissions. However, when it came to more obscure activities like "reading a book", users discussed and questioned the manufacturing and production behind the items in the activity (e.g. "How was the book produced?"). Additionally, many participants voiced their opinions like fact, yet when questioned, often changed their mind.

Using an affinity diagram (see Appendix 6) these observations and quotes were synthesised into insights. These were summarised in the voice of the user and are as follows:

- "I need a product or service to help me confirm or deny the myths I hear about carbon emissions."
- "I need to be provided with simple and digestible general information about carbon emissions."
- "I need to be provided with information about how the manufacturing of an item attributes to carbon emissions."
- "I don't want to be blamed for my actions, I need to feel reassured."

Market Analysis

In addition to background research, it is imperative to analyse the market our product will exist in to determine what works, what doesn't and what gaps in the market need to be addressed. In order to systematically determine where our product fits into the climate change and carbon emissions awareness

market and what gaps there are, a competitor analysis was completed.

Competitor analysis

The template and method for performing a competitor analysis has been taken from *Design. Think. Make. Break. Repeat.* (Tomitsch, 2018). The initial step was to compile a list of the existing climate change and carbon emission products. We grouped these products based on their type of medium and provided their name, a description and where to find it (See Appendix 1).

The variables used to evaluate the competitors were: *reliability* (accurate and well sourced information is needed to solve misinformation), *informative* (the content must provide useful information), *understandable* (the content must be easy to grasp), *actionable* (the content needs to promote a call to action), *engaging* (products should be pleasant and enjoyable) and *relevant* (how closely the topic of the competitor aligns with our problem area). For each of these variables we gave the competitor a score out of 10 and explained how it succeeded and failed to address it (see Appendix 7A-7C).

The results of the competitor analysis are summarized below:

Reliability: Reliability was well accomplished by essentially all competitors as their sources were thorough and clear. Credible sources included recognised organisations and professionals being used to provide the research and information. We decided to give the highest reliability score to the products using the UN as it is an impartial international organisation with the widest range of research. Our product will need to make clear and consistent use of these sources.

Informative: The most informative products were the ones that thoroughly explained all components of the topic and gave the best explanations. However, these products often used professional jargon, making it hard for the general public to understand the information. This often took place through scientific language and extensive reports, which only made it less enjoyable for the user and more difficult to comprehend. This is seen in "NASA's Earth Now" mobile app and website where the information relies on specific science terms, acronyms, numbers and graphics that the ordinary person may not be able to completely understand (See Image 2). Our product will need to find a way to balance information without sacrificing clarity and enjoyability.

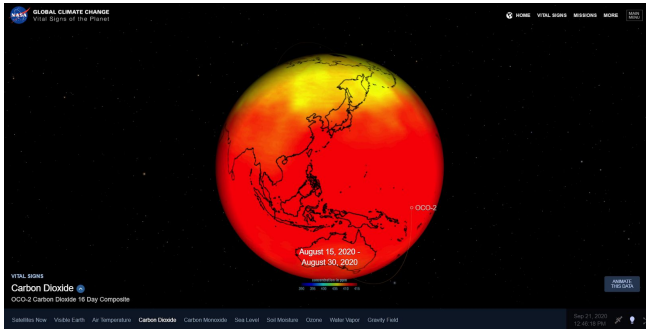

Image 2: Screen capture from "NASA's Earth Now" mobile application and website, which visualizes global climate data on the globe. These details include current natural disasters, CO2e emissions and sea levels (NASA: Climate Change and Global Warming, 2017).

Understandable: As discussed previously, the more complex the information the harder it becomes to understand the topic. The most understandable products used images, infographics and data visualisations to support their information. Additionally, the most understandable products used rhetoric that didn't require the user to be an expert on the topic. Our product will need to convey information through a

visual means to maximise its accessibility and make it as easy as possible to get the point across. One product that did this exceptionally well was the "Share the Science" mobile application, where through VR, the user is given interactive visuals that assist in the explanation (See Image 3).

Image 3: Screen capture of the "Share the Science" mobile VR application, which takes users on a virtual field trip underwater, in space and among the data. Throughout the application, the narrator explains climate change with visual and interactive examples (Otherworld Interactive, LLC, 2015).

Actionable: When the user is using our product the goal is to educate them on both carbon emissions in general and how they can decrease them. Some existing products had specific sections where they encouraged the user with a call to action, others had it implied throughout the product and some didn't address this at all. The best examples explicitly stated what to do but the changes and actions provided to them were not specifically catered to the user. Often advice was too broad and not applicable but some examples, such as the WWF Carbon Footprint Calculator (See Image 4), generated custom feedback based on the user's answers which was a lot more tailored and effective.

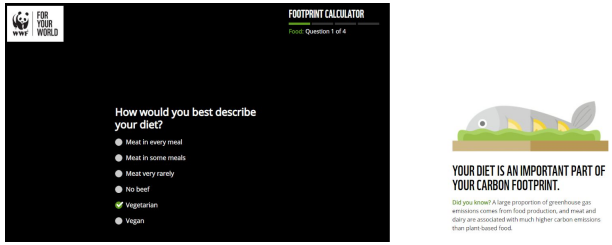

Image 4: Screen capture from the "WWF Footprint Calculator" website, which asks the user a series of questions about their life to determine their carbon footprint. The website breaks down the carbon footprint with visual effects and charts (WWF-UK, 2018).

Engaging: An insight acquired from the user research informed us that individuals believe they should improve their knowledge on carbon emissions but are not motivated to. This is likely due to the fact that many available products are text heavy and fail to grasp their attention. With an engaging product, these problems would be lessened and their ability to process and recall information would be improved. The most engaging products incorporated interactivity and interesting visuals. Products that doubled as games or used alternative mediums such as AR or VR were the most captivating such as the "WWF Free Rivers" (See Image 5).

Image 5: Screen capture from the "WWF Free Rivers" Augmented Reality (AR) mobile application. With this

application, users can depict an environment on any flat surface and learn about how different actions, such as dams, affect rivers (World Wildlife Fund, Inc, 2018).

Relevant: Our final variable was relevance, implying how relatable the product is to our problem area. There were lots of products that covered climate change and specific environmental effects but not very many covered CO2e specifically. Out of the few products that were directly relevant to carbon emissions most of them were hard to understand due to the language used, such as the "Carbon Footprint Calculator" (See Image 6) which was not very engaging and was not clear about their call to action. With our solution being a carbon emission specific product, it would be wise to improve upon these areas the most.

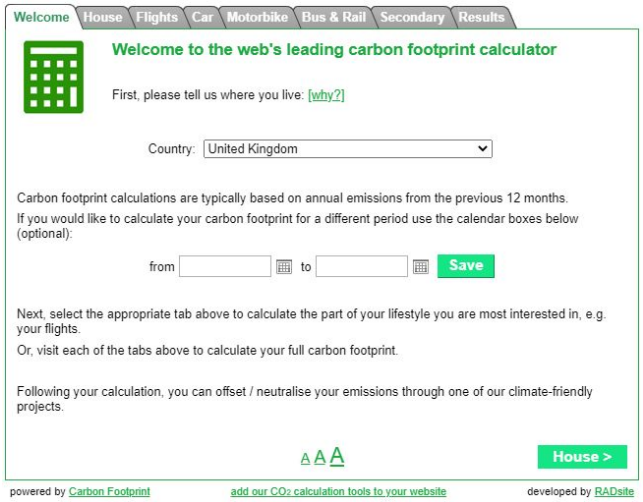

Image 6: Screen capture from the "Carbon Footprint Calculator" website, where users must input technical information about themselves to get accurate results about their carbon footprint (RADsite, N/A).

Summary of Remaining Issues and Gaps

To summarise, the most engaging solutions we found were ones that incorporated interactive data visualisations, short films and quizzes to help visualise one's individual impact. Online web-based games, like the Climate Adaptation Game (See Image 7), were often informative to a fault, with mass amounts of information making the game less enjoyable. We often discovered resources that only applied to a specific country, excluding the vast majority of the world and making the information inapplicable.

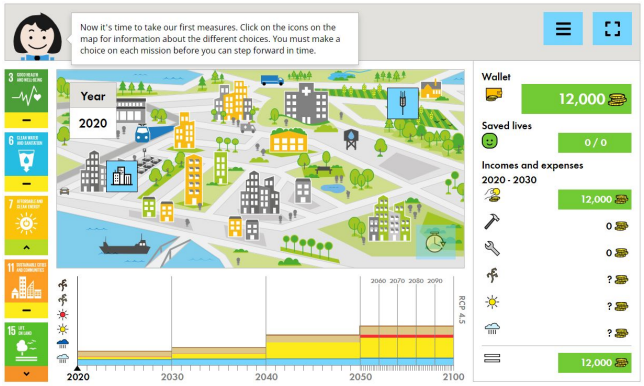

Image 7: Screen capture from the Swedish "Climate Adaptation Game", which places the user in a position of where they are forced to deal with climate change from a position of authority, weighing options against a budget for their town (Anderson et al, 2019).

Climate change focused VR and AR based mobile and web games were full of aesthetically pleasing graphics that captured attention, unfortunately none applied specifically to carbon emissions. This gap in the current marketplace is an opportunity for a new experience that is both educational and interactive.

Additionally, user research showed user's needed to be supplied with easy, digestible and most importantly,

relevant information about carbon emissions. We also discovered the need to inform users about not only general information, but also of the broader supply chain and how it can contribute to carbon emissions. These insights led us to explore concepts that focused on visual elements that helped provide information in a simple yet engaging manner.

Ultimately, there were not a lot of products on the market that related to carbon emissions and fewer that aimed to achieve what our product is aiming to achieve; making the general public aware of how they can reduce their carbon footprint. This gap may be the reason behind the general public's lack of awareness about carbon emissions. The large scale consequences of CO2e such as bushfires, storms, droughts, and floods have been focused on in designs. However the root of these effects, carbon emissions (AdaptNSW, 2020), hasn't been addressed in an interactive solution. Existing solutions commonly relied on complex and technical vocabulary which is very hard for the ordinary person to understand, causing them to lose interest in the solution. Moreover, these designs lack a personalised experience that targets the user, promotes self-reflection and provides a specific call to action.

Concept Ideation

What ideas did we explore?

Based on our background research and market analysis, we developed a number of initial concepts to explore. These initial concepts included:

- A quiz style game that would test the users' knowledge.
- An interactive virtual globe that could teleport the user to various regions and depict the impact of carbon emissions on the area.
- An interactive farmer experience that explains the issues they face due to carbon emissions.
- A virtual protest scenario with interactive posters that users can interact with.
- A virtual reality walkthrough through time and how carbon emissions have grown and affected the Earth.

Each of these initial concepts were compared against the variables used in our competitor analysis to measure each concept's potential.

Quiz Game

This concept would place users in a game show style environment, where they would be quizzed on topics surrounding carbon emissions. It would add a sense of competition as players compete against one another. The inspiration for this concept came from the "Buzz!" video game series (See Image 8).

Image 8: "Buzz!" game box art (Relentless Software, 2005).

Although this concept proved to be informative and engaging by gamifying the process of educating the user and placing them in an immersive VR

environment, it failed to create a highly interactive experience that allowed for self-reflection.

VR Globe

Our second concept incorporated an interactive planet Earth in a VR space in front of the user. The user could interact with the globe and select certain areas on the planet and be transported to the corresponding biome. When transported, the effects of carbon emissions (and in turn, climate change) would be visualised in that location.

Whilst this concept would be engaging for the user as it places them in various environments to witness the effect first hand, it fails to properly educate them on the causes of those emissions.

Farm Simulator

The next concept is the meeting and interacting with an Australian farmer, who travels around their farm and explains to the user how carbon emissions have negatively affected their livelihood. Users will tour the farm and look upon the effects of bushfires and droughts and the causes behind them, creating an educational and immersive experience.

Although informative, the concept may fail to create a personal connection with users that promotes self-reflection, as it lacks the link between cause and effect.

VR Protest

This concept immerses users in the middle of a protest against carbon emissions. The user would be able to interact with different signs being held by protesters in their vicinity which would transport them to a view of the world where those changes have taken place.

This experience would be quite informative and highly engaging for the user, however depending on the structure of the environment, being in the middle of a large crowd could prove over stimulating and claustrophobic for some users. Another issue with this concept is it does not visually reflect the impact of carbon emissions on the planet.

VR Walkthrough

Our final initial concept that we explored was a virtual reality walk through time. Users would experience how the Earth changes from the beginning of time to present day. This concept would highlight the impact of carbon emissions on Earth and then visualise a projection of what the future will look like if the issue is not addressed.

This concept would be highly engaging and immersive for the user, but does not involve any interactivity or call to action. Unfortunately this would not inspire a change in behavior for users.

After evaluating these five concepts, we identified and combined their benefits to develop a more holistic experience that would provide an engaging, interactive and informative solution that would lead to self reflection for the user.

Final Concept

What is it and how would it work?

Our final concept is called Carbon Consequences. It includes a first person life simulation where the user faces daily tasks and scenarios to determine the carbon emission friendliness of their decisions. These daily tasks will be a combination of simple actions not many people think about and tasks that are commonly thought of as bad for the environment. These tasks were chosen to highlight how carbon emissions are caused by all our actions - big or small. The presented tasks will be backed by reliable sources in order to create grounded scenarios for the user. As these tasks

are being completed users can look downwards and see the portrayal of their carbon footprint as an actual footprint under them, growing as they go about their day. After the last task, the user is given a summary of their actions and walks through a representation of how the planet would look in the future if everyone made choices similar to theirs. This comes in the form of a linear pathway where users can walk through environmental biomes. Each biome has three possible variations depending on how heavily it was impacted by the user's emissions. As the user walks through the different biomes, visual prompts will pop up around them with more detailed information on how their action's carbon emissions led to the natural effects they see around them. These visual prompts will be generated from the insights of government and academic publications only.

How would it solve the problem?
This solution helps combat the lack of understanding around the causes and effects of carbon emissions by allowing the user to experience the future effects without delay. Through placing the user in a first person life simulation they can relate to, we aim to make carbon emissions more understandable and help clear any misconceptions one may have.

Through the first person scenarios, Carbon Consequences will confirm or deny the myths users hear about carbon emissions. Additionally, through the use of VR, it will allow complicated concepts to be presented in a visual way, making them more understandable. Breaking down their actions, both big and small, will educate the user about the carbon emissions of daily actions, an insight we discovered users needed to know from the card sorting activity. It will be imperative that the concept displays the call to action in a way that makes the user feel reassured and not blamed, this will be accomplished through visual means in the end scene.

As the design explains and draws attention to the huge issue of climate change, this solution could be used to educate the general public and motivate change. Identified stakeholders include the universities, government corporations and non-for-profits.

How does it compare to other solutions already on the market?
Currently, the space for educational carbon emission games is quite bare. While the games that did focus on carbon emissions were too technical, lacked immersiveness and felt arduous. With Carbon Consequences, our concentration will be on immersiveness with a goal of making a user-friendly design that users can enjoy. By creating something pleasurable that users will want to use, thereby making the learning process much easier.

In terms of filling the gaps found from the competitor analysis, the final concept was iterated to fulfil them. To establish reliability, the concept will draw on respectable sources such as academic and government publications to create specific scenarios and end scene visual prompts that are factually correct. Through the medium of VR, an emphasis on showing over telling and strong elements of gamification, our concept becomes engaging and enjoyable. By accomplishing this it ensures the user's attention is captured and they are more inclined to learn about carbon emissions. The daily routine aspect of the concept allows the user to experience the information first hand which inturn will clearly depict how to reduce their carbon footprint.

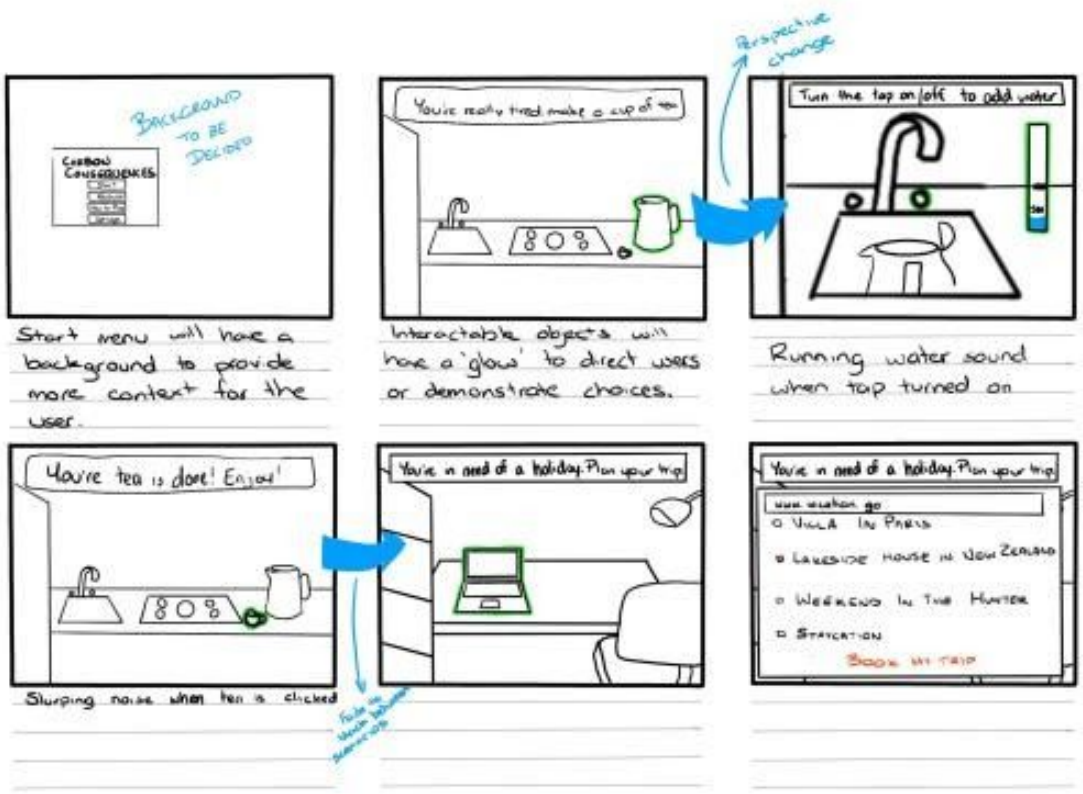

Image 9A: Storyboards for Carbon Consequences games.

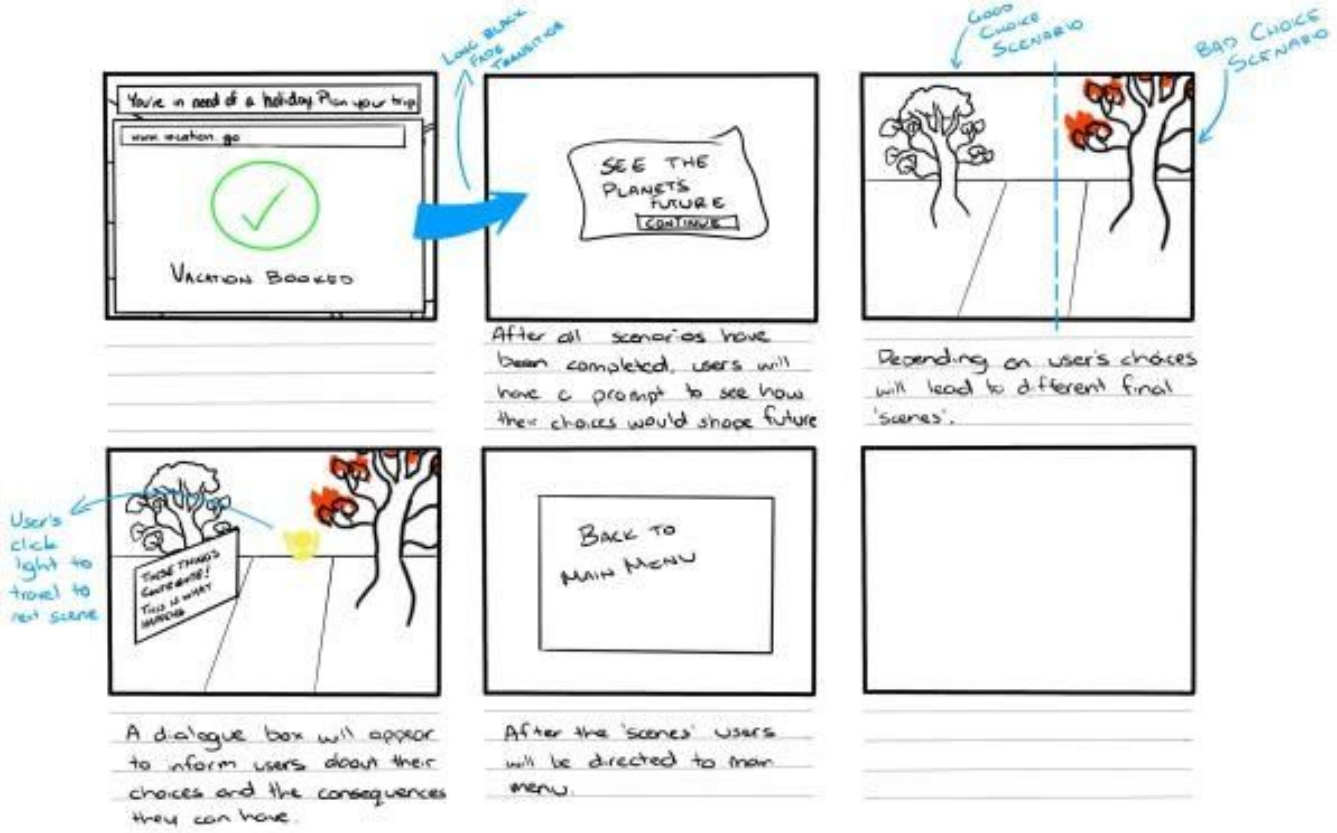

Image 9B: Storyboards for Carbon Consequences games.

Hardware/Software Requirements

What will it run on?

Carbon Consequences will run on Glitch through Unity with the WebGL API. This experience can run on any operating system (Windows, Mac or Linux).

Browser requirements?

Browsers compatible with WebGL include Google Chrome and Mozilla Firefox.

What softwares will be used?

The entire experience will be coded in the programming language of C# in Unity. The 3D models will be created in Blender.

Group Charter

Team Members

The team members for this design are as follows: Thomas Brettell, Christian Cerda and Alannah Frankel.

Roles of Thomas Brettell

- Interface designer
- User researcher
- 3D modeller
- Video editor
- Report writer

Roles of Christian Cerda

- Concept sketch artist
- C# programmer
- 3D modeller
- Animator

Roles of Alannah Frankel

- C# programmer
- Team leader
- 3D modeller
- User researcher

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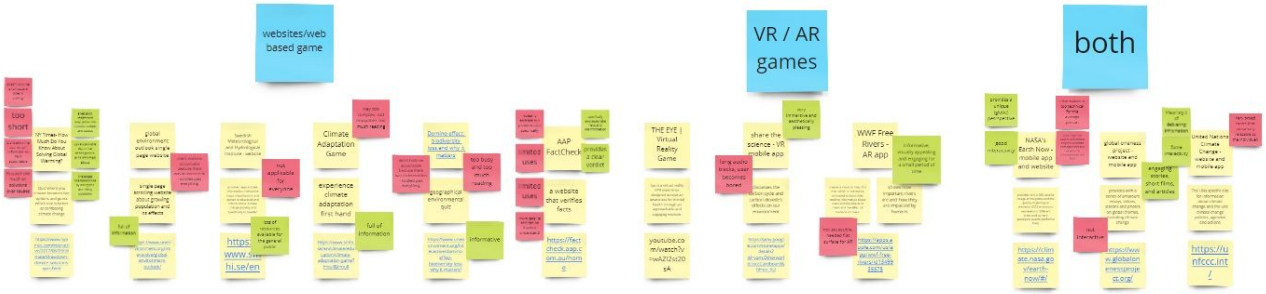
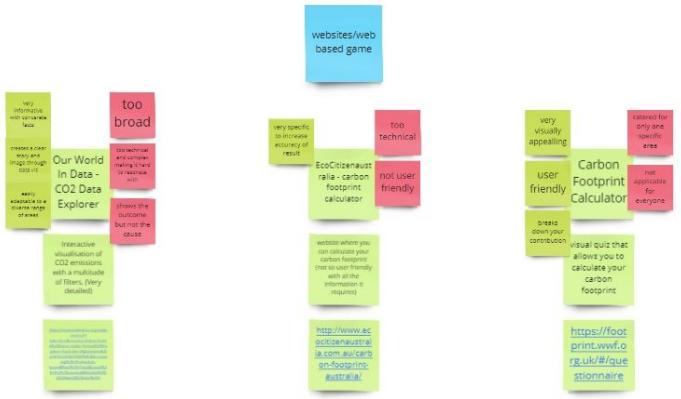
Appendix

Appendix 1 - Research of existing solutions/designs

Climate Change/Misinformation Designs:



Carbon Emission Specific Designs:

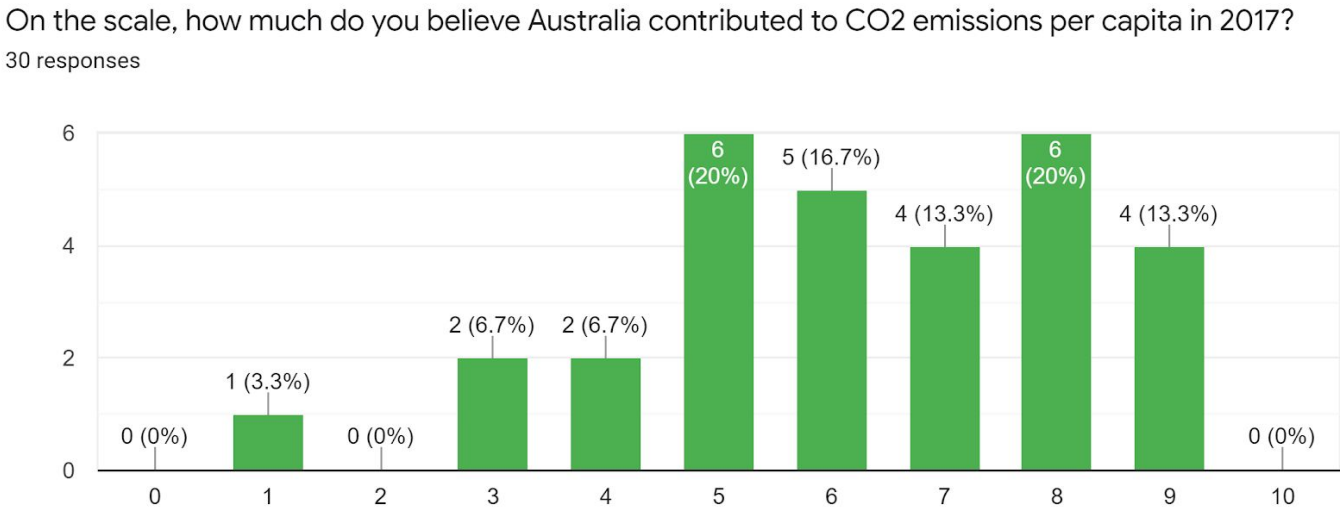


Appendix 2 - Questionnaire

Appendix 2A - Link to Questionnaire

https://forms.gle/ZYs8BsFuTnz2pcyQA

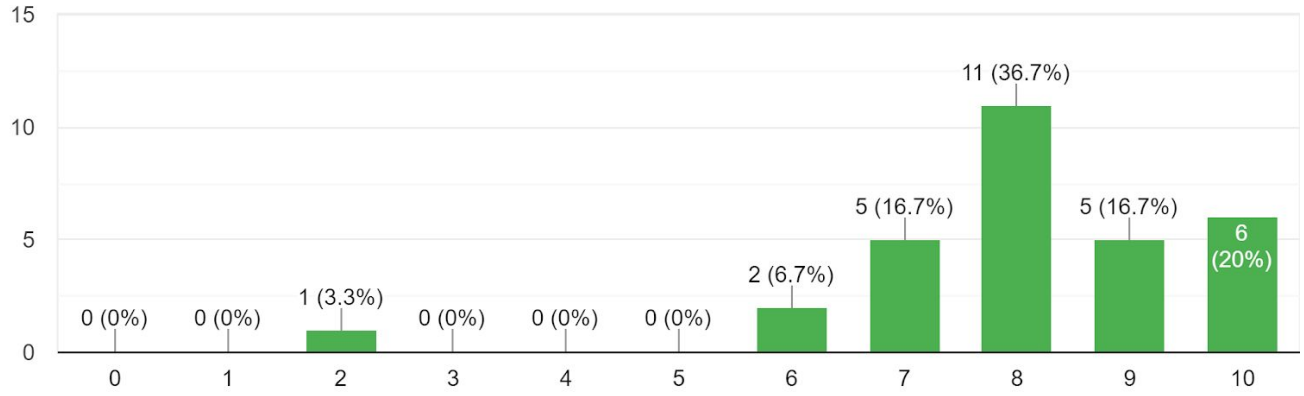
Appendix 2B - Australia CO2e Emissions per Capita Question



Appendix 2C - United States CO2e Emissions per Capita Question

On the scale, how much do you believe the United States contributed to CO2 emissions per capita in 2017?

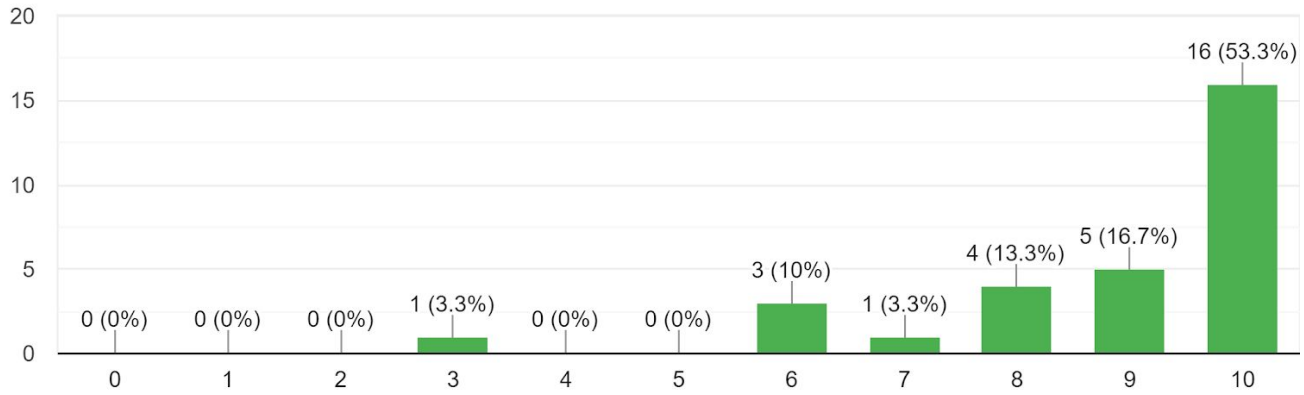
30 responses



Appendix 2D - China CO2e Emissions per Capita Question

On the scale, how much do you believe China contributed to CO2 emissions per capita in 2017?

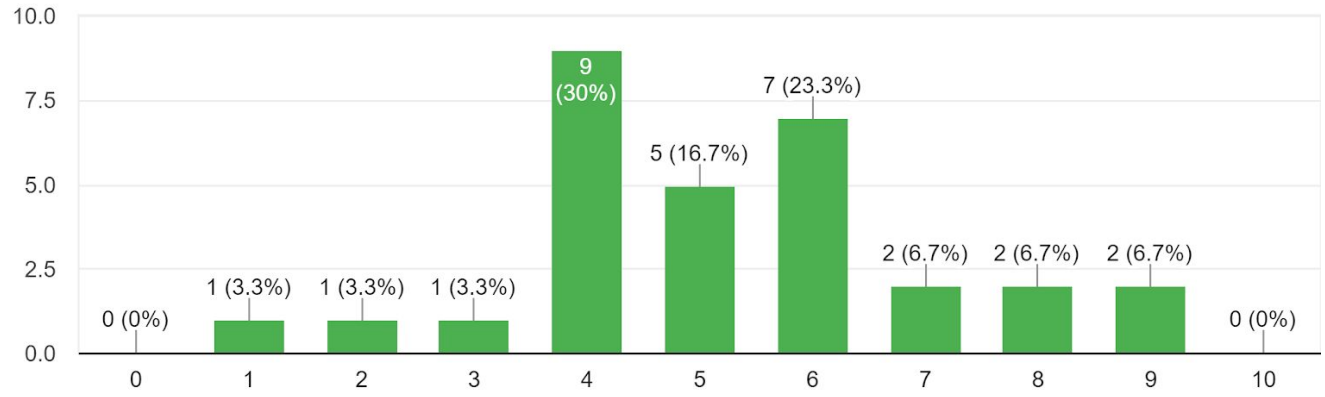
30 responses



Appendix 2E - Canada CO2e Emissions per Capita Question

On the scale, how much do you believe Canada contributed to CO2 emissions per capita in 2017?

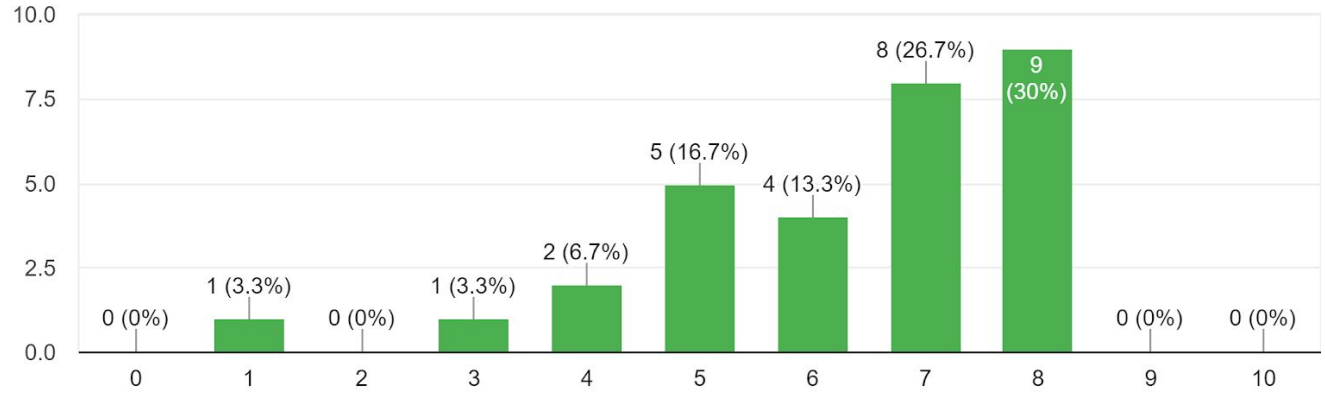
30 responses



Appendix 2F - United Kingdom CO2e Emissions per Capita Question

On the scale, how much do you believe the United Kingdom contributed to CO2 emissions per capita in 2017?

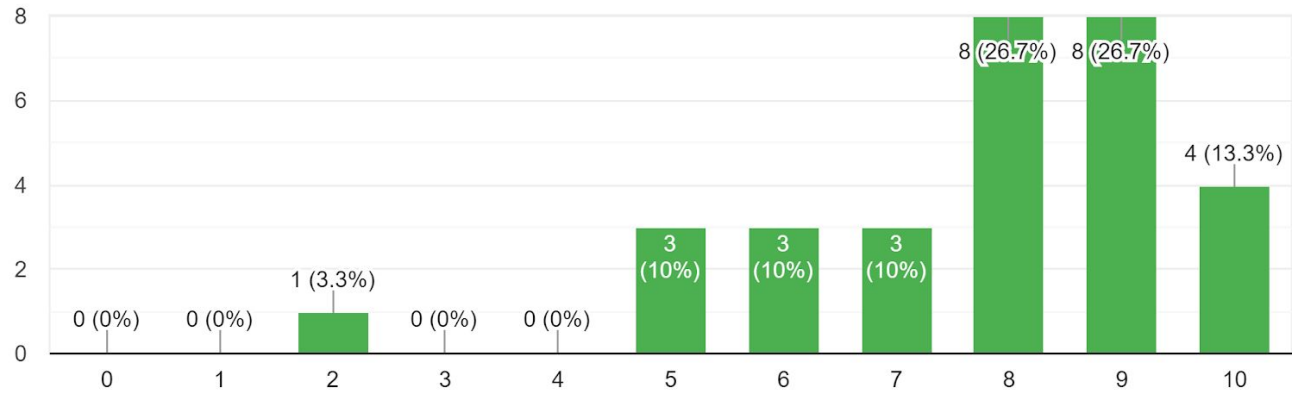
30 responses



Appendix 2G - India CO2e Emissions per Capita Question

On the scale, how much do you believe India contributed to CO2 emissions per capita in 2017?

30 responses

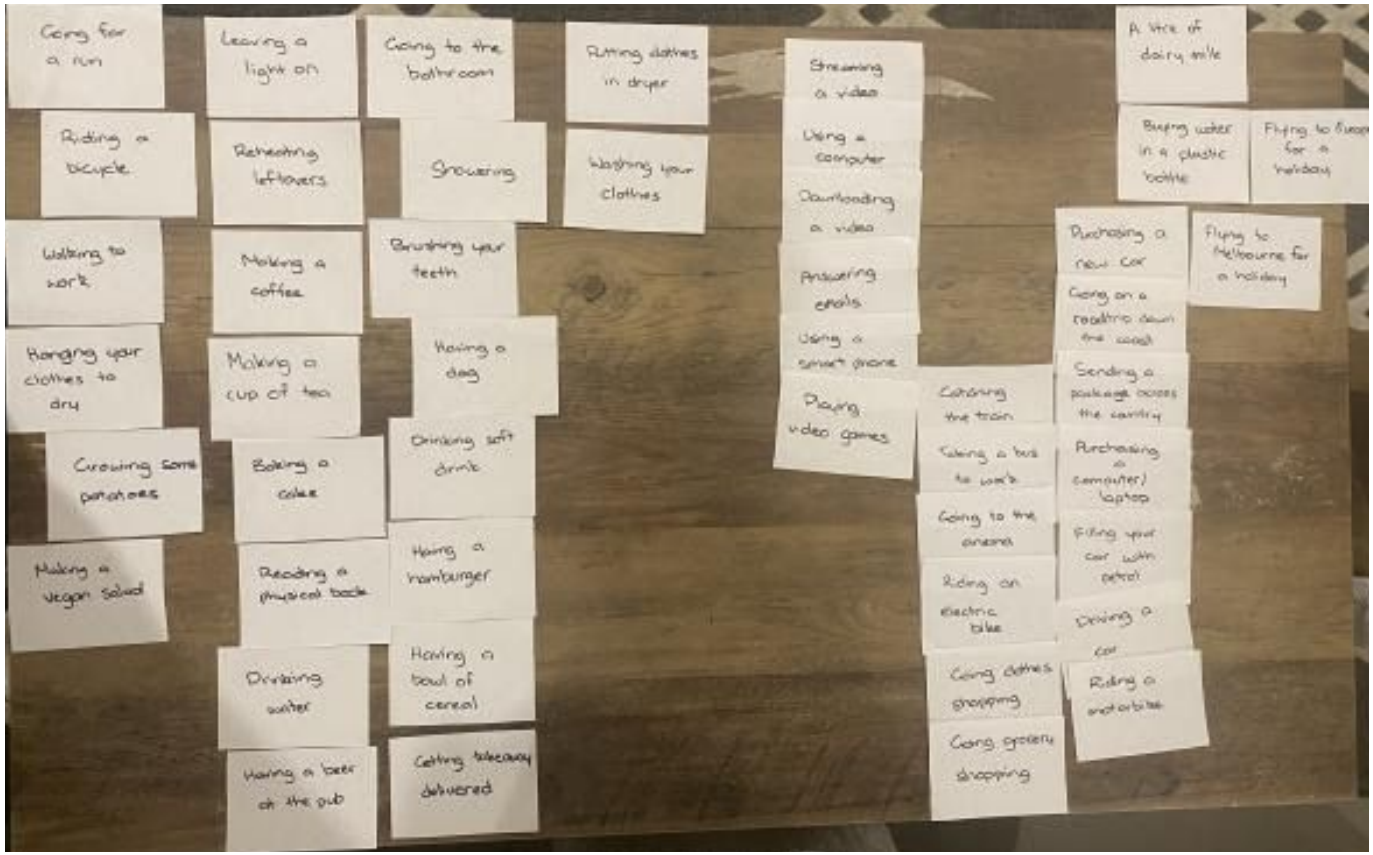


Appendix 3 - Cards used for card sorting activity

Appendix 4 - Card sorting exercise

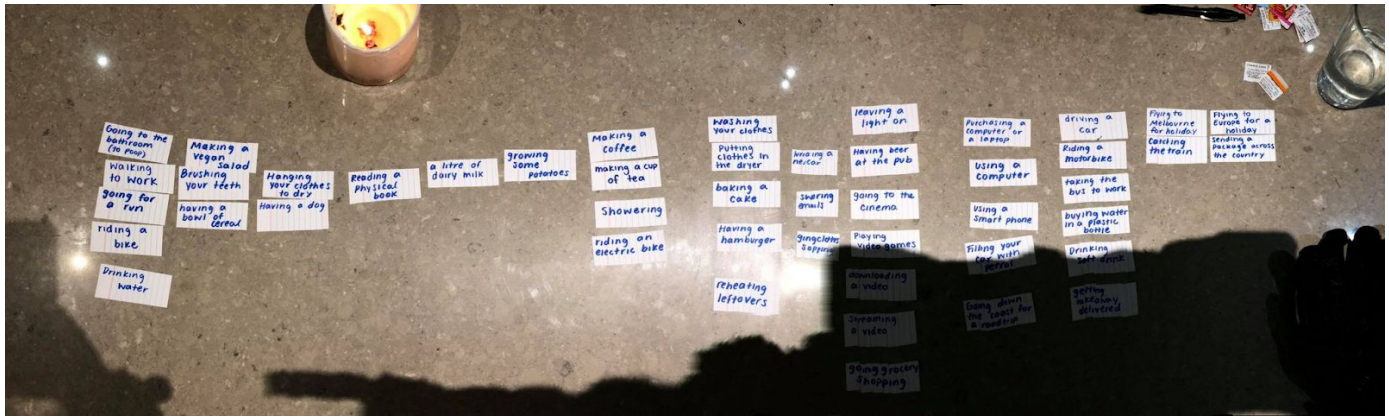
Appendix 4A - Christian exercise 1

Appendix 4B - Christian exercise 2



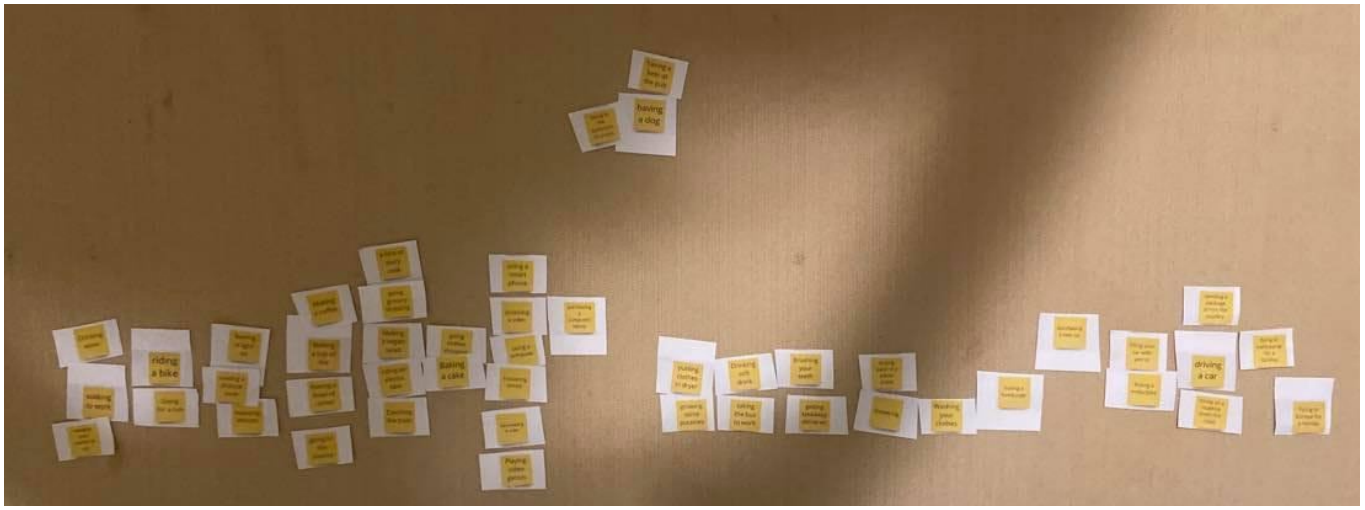
Appendix 4C - Alannah exercise 1

Appendix 4D - Alannah exercise 2



Appendix 4E - Tom exercise 1

Appendix 4F - Tom exercise 2



Appendix 4G - Tom exercise 3

Appendix 5 - Transcripts

No.1

Group of two

#1: How far back in the supply chain do we need to go?

Me: That's for you to determine

#1: Well that's an important aspect to it

Me: You tell me how far back you are going

#2: How many groups?

Me: As many as you want

#1: Hes go things like 'drinking water'

#2: That's obviously a good thing. Riding a bike?

#1: Well no hang on. It depends how far back you go. It depends on the CO2 of the action or the production.

#2: Yeah ok. I guess we just have to assume its tap water and youre drinking it at your home. So that's quiet a good thing not a bad thing.

#2: Where as drinking a soft drink would be a worse thing because its much more supply chain.

#1: It depends on if riding a bike includes the CO2 for making the bike.

Me: Its subjective. Its what you decide.

#2: Having a dog, they fart a lot but that's probably ok.

Me: You don't think drinking water should be in that good group?

#1: It depends what we decide to interpret. Well come back to it.

#2: Making a coffee would be worse than drinking water assuming youre drinking water out of a tap. Making a cup of team is probably like making a coffee

#2: Searching on google and sending an email. I don't know how bad that would be. I guess it depends how long. I don't think its too bad.

#2: Purchasing a computer, that's bad. Cause youre buying something tangible.

#2: Getting take away delivered is probably worse than walking down to the shop but im not sure. maybe it would be worse if it was in a plastic container.

#2: How bad is streaming a video? Its probably like leaving a light on

#1: It depends what elements you use

#1: Riding a motorbike. Bad. Because youre in a bikey gang. Bikey gangs produce a lot of CO2.

#2: Reading a physical book. You've got to print the book you see.

#1: Riding an electric bike that's terrible

#2: Noooo its there. Its middle. How can that be as bad as driving a motor bike.

#1: you've got to charge the battery.

#2: but no that's low

#1: but it comes ffrom fossil fuels

#1: youre putting everything in the middle

#2: put clothes in the drier that's bad

#1: not if you don't turn it on

#2: purchasing… that's not great

#1: I think im interpreting these things completely the opposite to you

everyone laughs

#2: Having a hamburger that's not so great

#2: Making a vegan salad, that's probably the middle. Actually ill put it here cause you've got to eat something and vegan is good apartently.

#2 These are ridiculous

#2: Going clothes shopping it depends. Im interpreting this as fast fashion

#2: Brushing youre teeth. Surely you can brush your fucking teeth

#2: Hanging your clothes out to dry has go to be middle.

Me: You've made three groups here…

#2: How is baking a cake bad!

#1: hmmm? You've gotta *inaduble process*

#2: I would put that in the middle. Its no different to making a coffee its probably better than buying a packaged one

#1: Yea but making a coffee takes 5 seconds baking a cake takes hours

#2: What about going to the cinema?

Me: On the record #2 has done the whole thing

Me: Ok so #1 you have an issue with this drinking water one. Whats your issue with it?

#1: well is it the action of picking up the vessel or is it about where the water comes from?

Me: Whichever one you want it to be

Me: it's the process of taking you bup to the tap and filling it. Where would you put it?

#1: Where does the water come from?

Me: base on your knowledge of those things where would you put it?

#1: well its probs comes from a dame, then they treat it. Lots of treatment. It could be recycke. Could be a lot of co2 then. So imma put it in the opposite categorie

Me: ok so now you guys are thinking opposite.

Me: whats up with baking a cake?

#2: I thinking baking a cake is middle ground. But #1 didn't want it there he wanted it up here.

#1: It cant be middle ground

Me: for the record what are your categories.

#2: not so bad, your good category

#1: so flying to europes ok?

#2: no, I didn't put that.

#1: its like brushing your teeth, flying to Europe

Me: whats this middle one?

21: not so bad

Me: the last one?

#2: the bad stuff

Me: and the cake?

#2: that's the we cant decide category

#2: I didn't put that one there?

Me: #1 things its low co2 and #2 thinks its high co2?

#2: yea

#1: its no co2

Me: using a dryer to dry your close wherw would you out it?

#1: highish

Me: you guys could agree on the putting clothes in the dryer. Discuss.

#1: that's like baking a cake that one.

#2: but isn't it better to bake a cake at home with natural ingredients… oh no maybe not… I don't know

#2: what about with an air frier where its very quick? And uses little energy

#2: I cant imagine baking a cake can be a cause of rgreat carbon emissions

#1: I think it can

Me: I want you to come to an agreement on these ones.

#2: how can drinking water be bad?

#1: well it depends where it came from

#2: yes but we need some water

Me; so you think in most situations drinking water is bad? Is that what youre suggesting?

#2: well it's the same with driving a car. You need categories don't you?

Me; maybe you should make more categories

#2: maybe we need to make more categories

Me: lets finish with this one first (baking a cake)

#2: personally id put it in the middle

#1: na its stronger than the middle

Me: significantly?

#1: its depends ion the type of cake

#1: if it was a Christmas fruit cake that would take a lot of co2 and oven time

#2: but what about a 15 minute cupcake?

#1: it doesn't say it's a 15 minute cupcake

#2: is it better to make it with the natural ingredients rather than it being manufactured an packaged

Me: lets say it's a druit cake. Do you think its co2 is equivlant to flying to Europe? Im only saying that one cause its at the top

#1: no I think its like using a drier

Me: ok lets pair those two then

#2: lets make a new category

#2: I don't completely agree ith those pairings but ok

#2: I would say having a hamburger is equivlant there. Flying to Europe is a lot worse

#1: yea but there is a lot of people on a plane whereas onlty one person eats a hamburger

#2: but its still bad init

Me: does that stop you from pytting them with flying to Europe?

#2: take it in a literal sense. Its your carbon. Your contribution.

Me: wats your vibe?

#1: put it in the top category then

#2: id put the hamburger here. Actually its not the same as baking a cake cause of red meat so maybe not

#2: riding a bike isn't as bad but its similar. I don't thinka litre of milk is as bad as having a hamburger

#1: flying to Melbourne is way worse than a hamburger

#2: hmm I dunno but ok

#2: you've got to draw a line somewhere otherwise well have 40 groups

Me: ok what about purchasing a computer/laptop?

Me: are you happy? Are you calling it done?

#1 and #2: no

#1: we should have high medium low

#2: we had that and you didn't like it

lots of deliberation unaudible

#2: are we happy with this column?

#1: beer! Lots of co2 in beer

#2: move it then

#1: are there any low ones? riding a bike? Is that the action of riding it or the process of buying it?

#2: riding it

No.2

1 person

#1: I'm looking for one specific one

Me: which one

#1: idk

#1: I feel like having a hamburger is quiet high because it involves cow and cows are bad

#1 some of these im… im trying to relate them to emissions but im over thinking it. There are some things that im trying to link to its actual source. Not the thing itself

#1: I don't know. I cant think

#1: going on a road trip is pretty bad

#1: this is my low side

me: walking to work low, hanging your clothes low

#1: im not sure…

#1: im gonna put purchasing a new car at the top but its not as bad as driving a car or going on a road trip but tis still a new car which will cause emissions

#1: going for a run. Lower

#1: I don't know where clothes shopping would fit. Fast fashion would be worse than ethically source

#1: riding a motor bike would probably be at the top

#1: I don't know if I should put a litre of milk high cause its related to cows and cows arnt great but its just a litre of milk…

Me: whats wrong with cows?

#1: cows create a lot of emissions

#1: I think the carton that it comes in, the plastic is worse but cows also need to be taken care of

#1: I think all the computer stuff arnt that bad because they aren't pysuical things and they arnt producing fumes

#1: I know leaving a light on is bad but I don't do it

#1: filling a car with petrol is probably high

Me: why?

#1: because it’s a car and they release co2 and petrol also isn’t greta. And combines its really bad

Me: but its not worse than driving a car?

#1: oooooh… idk

#1: its probably not… idk

#1: I have no idea about beer at the pub because I don’t drink beer and its in a glass container and its at the pub but I don’t know how the beer making process involves so I have no clue

Me: so youre gonna make an I have no clue catergory

#1: ok

Me: lets just say that was having a cider at the pub wwould you beable to answer it?

#1: idk I guess

Me: where would it go

#1: I think the lower half.

Me: and if it’s a beer you cant answer it?

#1: yea

Me: ok

#1: shower im gonna put in the kiddle… but idk why

#1: half of these things im thinking. Shoering is water and water is precious but does it produce carbon I don’t know

#1: im not well educated in relam of carbon and air pollution but I should be and im really not

Me; why arnt you more educated?

#1: idk I don’t look into it and I should

#1: washing machine would be in the lower end, its probably worse than shower cause you put detergent on it and when it runs off its polluted water. With showering you can pick good soaps which arnt harsh for the environment or it just doesn’t mean a lot of soap

#1: I don’t know about purchasing a computer laptop. Cause its not like youre making one youre just purchasing one so its already premade and not your choice if it was produce or not. Its creates demand but I dunno

Me: sorry say that again

#1;if you were purchasing a specific computer , a custom one would be worse than buying a premade on at JB so you cant stop its production

#1: I have no idea about using a smart phone cause its not creating pollution but idk. I don’t think its that bad. I cant explain why but its not bad

#1 Im going to put having a dog in the same category with the beer

Me: what if it as having a cat?

#1: I think having a cat would be worse than having a dog. I have no idea what pollution my cat makes

#1: making a vegan salad I think will be on the lwower side I might but it a bit high cause vegetables take but water and pesticides

Me: what if it wasn't vegan?

#1: a bit further up

Me: what if it had beef strips?

#1: a bit further up

#1: baking a cake, theres a lot that could happen. It could be a non dairy cake

Me: assume youre making it was a mix

#1: lower end

Me: lets say you fucked up and left a light on, where wuld it be?

#1: probs a bit high cause electricity is made from coal and coal is not great

#1: reading a physical book. I don't do that.

Me: is that a non answerer

#1 : Ive done it before. I don't think its that bad

Me: what would be good or bad about it?

#1: reading it is fine but the book itself… trees? You could be cutting down a tree which help with emissions

#1: I dunno about this one, going to the cinema cause I don't know whats involved? Does it include the food?

Me: would that change it significantly?

#1: I think getting food might be a little bit higher

#1: I think drinking water is totally ok cause it's a nessesity for life and yes its water but its part iof life you don't have an option

#1: drinking softdrink would be a bit high cause of cans and production

#1: I dunno about the poop one, it's a product of me but…

#1: *moves flying to Melbourne down a bit* its not as far, that's the only difference

#1: grocery shopping is not as bad aas clothes shoppinh but its still shopping. You could be buying meet which is ssupply for demand that's why theres so much emat cause people keep buying it. But bleaching clothes is worth with a lot of extra stuf… emisisions

#1: I think flying somewhere is worse than driving somewhere. Lots of duel in planes

#1: I have no idea with the dairy milk

#1: reheating leftovers is better cause its not buying the food itself

#1: I guess a bus is worse thana train… unless it's a steam train

mE: a steam train is worse

#1: yea cause you need coal

#1: oh… trains now are electric and electricity comes from goal

#1: buses makes immediately emissions but trains themselves are not it's the electricity

Me: why are these your lwest ones

#1: cause water you have to do it, I know its probably not good but we have no choice

#1: I dunno why riding a bike is worse cause it's the same thinkg. I think the difference is walking to work you had the options but you decided to walk but a bike isn't to avoid emissions

#1: asme with hanging, youre avoiding emissions from the drier but hanging them

No.3

1 person

#1: going to Europe for a holiday that's pretty…

#1: going to work, going for a run, pretty low

Me: why?

#1: cause youre just walking. It because they don't involve building anything

#1: purchasing a new car, pretty high. Cause the co2 cost of manufacturing

#1: catching a train would be more

#1: riding a bike im gonna out int low

#1: reading a physical book. Does that involve the making of it

#1: leaving a light on is pretty high

#1: potatoes, low

#1: pub, middle

#1: would a litre of dairy milk be more than washing my clothes, probably not

#1: having a dog! I guess theyre pretty expensive you gotta buy meat for them and they poop. Im gonna put it with a beer at the pub. No that's deffinetyl higher

#1: if we compare a vegan salad with a hamburger its gonna be less

Me: why?

1: cause meat causes a lot of co2

1: tea, you have to use a kettle and theyre pretty high

1: god this is getting hard

1: imma sort them into 4 categories otherwise its gonna get too hard

No.4

Seb
Well, how would downloading a video contribute to carbon emissions?

Having a dog playing video games. Making a cup of tea.

Liam
None of those things require carbon emissions, I'm not burning fossil fuels to brush my teeth. If you're making a vegan salad they're against animal cruelty, so I'm not using fucking shit that's gonna require electricity because it's got to be fucking handmade. So that's not gonna cost anything. taking a shit not gonna cost anything...

Seb
answering emails apparently causes carbon emissions

Liam
walking to work causes none...

Seb
Hanging your clothes to dry? There's no really big ones. It's all just like miniscule stuff

Liam
You didn't specify how to wash the clothes

Alannah Frankel
in the washing machine.

Liam
Are you sure how do you know it's not hand washing?

Alannah Frankel
Okay, it's meant to be in the washing machine.

Seb
How accurate is fine to Melbourne for holiday? I'm from Darwin it's a longer trip to go to Melbourne.

Alannah Frankel
Assume that it's from here.

Liam
A push bike or a motorbike?

Alannah Frankel
this one's a push bike. there is motorbike in here somewhere and there's also an electric bike.

Liam
What do you mean electric bike?

Alannah Frankel
There's an electric bike a bike and then a motorbike

Liam
A solar powered electric bike? if you don't get to give me specifics How am I supposed to make an informed decision?

Seb
isn't downloading a video the same as streaming a video cuz he's technically still downloading it

Liam
Well if it's one of those ones then I'm going to use a little bit because you still got to make those parts

Seb
Reading a physical book?

Liam
She wants you to think deeply...like how was the book made?

Okay drinking water is pretty chill

Seb

How long is the video game? Playing video games...are you playing like 30 minutes

Liam
Am I playing a full playthrough of The Witcher? Yeah

Alannah Frankel
well you tell me what you think and then you put it there

Liam
Flying to europe for a holiday, that's pretty high

I've seen how much fucking shit goes into this keeping the trains up so idk maybe it's close to flights to europe.

Seb
A litre of dairy milk...How does that cause carbon emission?

Liam
Beer at the pub. Sounds pretty good, doesn't it?

Seb
I feel like beer on the pop is significantly more because it's not just a beer because you gotta get an uber

Liam
Neither of them emit carbon emissions. Unless you go so far to death that creating a bike makes carbon emissions in which cases fuckin I'm gonna be here forever.

Alannah Frankel
So you think driving a car and riding a motorbike are the same?

Seb
It's still causing emissions. But I'm not causing a grand scale literally

Because you have more fun on the motorbike so you'll go further and faster send more missions burn more fuel.

Liam
Okay done.

Alannah Frankel
Thanks

Transcribed by https://otter.ai

No.5
Alannah Frankel
And then think out loud as you're doing it.

Alex
Leaving a light on I don't think that's that bad for the environment. purchasing a computer.

Having a dog, good for the environment. Best thing you can do for the environment

purchasing a car, probably not that great

having a hamburger, yeah probably not that great. Probably more closer to that side

Unknown Speaker
filling your cup

Alex
is there to know who's rushing the tea.

Alannah Frankel
Catching the train.

Alex
Can't go into the bathroom to poop.

Making a vegan salad

going for a run.

growing some potatoes

Unknown Speaker
stuck together

Alex
reading a physical book. Hmmmm....

Alannah Frankel
After you place them make sure you say what you're thinking. Like not that bad kind of bad.

Alex
Reading a book is not bad, but it is printed on paper so probably better to read a digital book. So maybe put that with purchasing a laptop.

Going down the coast for a road trip. Depends on how you get there. You could be like biking it

Alannah Frankel
assume that it's driving.

Alex
in the middle then. Hmmm having a beer at the pub.

Probably not too bad. I suppose drinking a soft drink is probably worse for you. Put that between going on a road trip and purchasing a computer and drinking water depends on if you bought the water or is it coming down to the sink? You got to be more specific here....flying to Melbourne

eating a hamburger go into the cinema.

Gosh, how am I supposed to know that?

Alannah Frankel
just your first instincts.

Alex
downloading a video streaming a video.

Downloading or streaming is not the same. No. streaming video downloading a video or getting a takeaway delivered.

riding a motorbike...

using a smartphone

or streaming video hanging your clothes out to dry... probably like brushing your teeth. Buying water in a plastic bottle. Yeah, that's probably not good for the environment. answering your emails...

It's like going to the bathroom to poop. going grocery shopping isn't for the environment.

Probably better to grow your own food. Using a computer is the same?

Taking the bus to work... better than having your own car I suppose.

Alannah Frankel
But you think it's worse than catching the train?

Alex
Yes.

Maybe not two times worse *moves it closer*

Going clothes shopping more depends on where you buy your clothes at the thrift store or at Gucci.

You gotta be more specific.

Alannah Frankel
Well just tell me which one you choose and then put it accordingly.

Alex
Suppose I'm

washing your clothes well how are you washing your clothes by hand with a washing machine?

Alannah Frankel
No, but the washing machine?

Alex
Well, you should put that on there.

I guess washing your clothes isn't great. But how else are you supposed to do it? we aren't in prehistoric time. baking a cake really?

Who knows. It's probably just like drinking water. Having a bowl of cereal. Well, you don't have to bake anything. So it's probably better than baking a cake. Sending a package across the country... uhh

How was he supposed to get something across the country? great for the environment. I don't know.

riding an electric bike.....hmmm It's probably better than getting a car but less than a motorbike.

reheating leftovers. Depends on how you reheat it.... in the microwave.?

showering...just like washing up clothes I guess. playing a video game is like streaming a video..... okay flying to Europe for a holiday....It's probably just as bad as putting clothes in the dryer...probably pretty bad. Riding a bike.

It is like going out for a run to the work making a cup of tea right here.

Alannah Frankel
So you think driving a car riding a motorbike is the same?

Alex
Mhmm.

Alannah Frankel
Oh, okay, thanks.

Transcribed by https://otter.ai

No.6

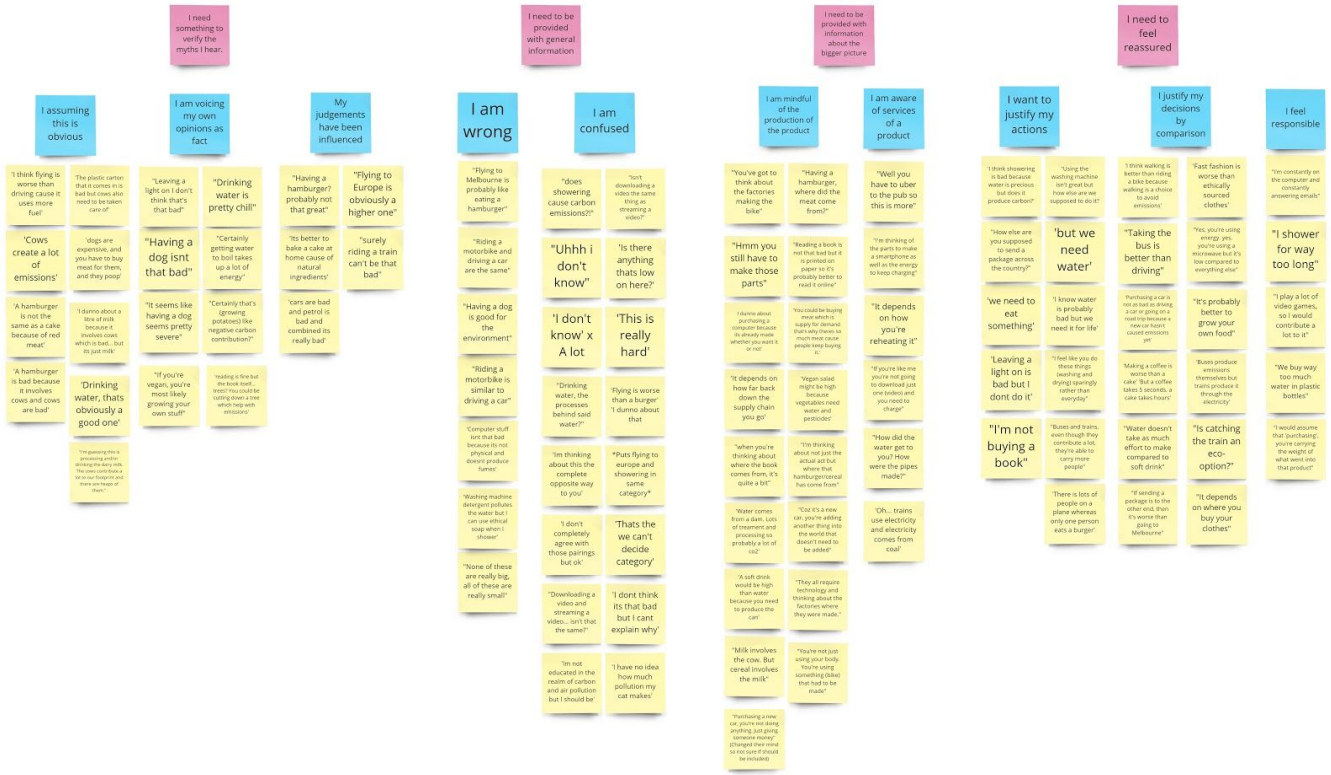
- Right now, out of everything that's here, these (flying to Melbourne/Europe) seem like the things that would contribute most to carbon footprint
- Brushing your teeth I don't feel contributes as much as flying to Melbourne for a holiday
- Europe is further than Melbourne, so that's why i put more towards the top
- I've putting your clothes in a dryer, which is more than brushing your teeth
- I feel like taking a bus to work and going to the cinema are like that
- Reading a physical book doesn't really do anything, but then when you think about where the books coming from and you take that into consideration; factories, the paper. I would put that, let's say here with the dryer, because I'm considering where the books coming from.
- Using a smartphone, you've got to think of the factory that actually make the smartphone, and if you're using the smartphone, then you're constantly charging it
- A litre of dairy milk, I'm assuming this is processing and/or consuming
- Cows contribute a lot to our footprint and there are a lot of them, so I'll put this just under flying to Melbourne for now
- I do know it is one of the highest factors contributing to said emissions
- This is hard
- You're actually growing your own things (potatoes). You're not going to a grocery
- I'm gonna put catching a train with the bus
- I'm mixing these all up because there's some I don't really know right now
- Downloading a video, I'm gonna put that in the same category as reading a book
- Implies you're using some sort of technology, technology needs to be charged
- If you're like me, you're not going to download just one video
- Right now I'm just assuming they all take as much and contribute as much as each other.
- Riding a bicycle, you have to think about the factories making the bike
- Having a dog, my thought process here is you've got to give them food, generally you get it from a store
- Reheating leftovers, yes you're using energy, yes you're using a microwave, but on the scale of things it's low
- Same as going to the bathroom, yes it uses water but in the scope of things its nothing
- Playing video games I'm going to squeeze him right here, because it's with the use of other devices
- Might even move up, because if you're like me, you spend a lot of time playing
- Having a hamburger, where did the meat come from?
- Drinking water, what are the processes behind that providing us with said water
- I'm going to put (and this is probably an overestimation), purchasing a new car with the road trip down the coast, and this is because with a new car, you're adding another thing into the world that doesn't need to be added.
- I'm gonna put purchasing a new laptop with purchasing a new car because of the same reason
- We buy way too much water in plastic bottles, so dare I say I'm gonna put it with the litre of cow milk
- Busses and trains, even though they contribute a lot, I feel that they can carry more people
- All the things that require more technology, you have to think of like a tv and electricals, which means more power

- I feel like you do these things sparingly (dryer and washing clothes), compared to things you do everyday
- I do one big load to use the least amount of water, but I'm always on my laptop and writing emails
- I'm trying to match what I think is demanded by these actions together
- I feel like everyone showers for way too long
- If you're vegan, you're probably growing your own stuff

No.7

- Purchasing a new car, nothing's happening. You're just giving someone money
- I think the point of this is that everything you do has a carbon footprint
- Implies the car had to be made and manufactured
- I feel like purchase a car is up on the high end
- Riding a motorbike is surely similar to driving a car
- Is catching the train like an eco option?
- Is it just one person or a group of people?
- Where are we going from? Are we based in France?
- Drinking water, surely this consumes zero
- I would assume that purchasing, you're carrying the weight of using that product
- I feel like flying to Europe is the worst thing
- Are we getting the water out of the tap?
- Surely water is not a highly polluting thing
- How did the water get there? How did the pipes get there?
- You're growing potatoes, so surely that's a negative net carbon emissions
- Making tea and coffee, you're using a kettle and a stove
- Surely getting water to boil consumes a lot of energy
- How long am I leaving the light on for?
- Sending a package across the country, I think this is similar to flying to Melbourne
- I feel like downloading isn't as bad as playing games
- I'm starting to feel like having a dog is pretty severe
- Surely baking a cake consumes less energy than washing your clothes?
- I feel like transport just all sucks
- Having a bowl of cereal inherently must then be worst than a litre of milk
- You're a monster for buying a car

Appendix 6 - Affinity Diagram of Cardsorting Insights



Appendix 7A - Competitor analysis 1/3

Variables	1 - NY Times- How Much Do You Know About Solving Global Warming?	2 - global environment outlook single page website	3 - Swedish Meteorological and Hydrological Institute - website	4 - Climate Adaptation Game	5 - Domino effect: biodiversity loss and why it matters
reliability	8.5 - Information based on the book 'Drawdown' by environmentalist Paul Hawkens. No in the context of Australia tho. https://www.drawdown.org/solutions/table-of-solutions	10 - cant get more ethos than the un	9 - the organisation and the sources used are reliable and easy to access.	9 - the organisation and the sources used are reliable and easy to access.	10 - its by the UN
informative	6.5- The quiz doesn't go into much depth or explain much or explain the source very well	8.5 - uses a lot of graphs and well explain information to understand the topic	9 - there is lots of information on lots of different topics	8 - there is good information but you can only obtain what you use	7 - the site could explain more about its topic
understandable	8 - very clear and in understandable terms. Minus points for sacrifice of information	9 - accessible to the general public without sacrificing information. The use of visualisations helps with this.	7.5 - the graph, articles and games are generally in an accessible language	7 - despite being designed for kids the information is not explained well and the game is hard to use	9 - easy to work out the topic, how to use and the topic is explain in simple terms
actionable	8 - embracing the information is the call to action at it is clear	6 - the call to actions is subtle and not obvious	6.5 - the actionable depends on what part of the site you go to. It's hard to find specific games, graphs or articles specifically explaining how to act.	6 - the app is more about explain and doesn't explain a lot about how the general public can act	7 - what the public can do is written at the end
engaging	7 - it's quite engaging but not much to engage with	6.5 - it works and flows very well but it takes a long time and requires a lot of reading.	7.5 - there is a lot of things to go and see on the website which makes it engaging	7 - the game requires lots of reading and is pretty boring because its quiet complex	9 - easy to use and understand. The content is short and simple so one could become engaged
relevant	9 - it's covers out topic pretty much dead on	7 - it's in our problem area but doesn't focus on the same aspect, the general public.	7 - amongst over things it does cover our problem area but not the same aspect	8.5 - the topic is about adapting society to climate change which aligns with our topic	6 - the topic focuses in climate change effect on animal species from around the world which doesn't align massively with our topic

Appendix 7B - Competitor analysis 2/3

Variables	**6 - AAP FactCheck**	**7 - THE EYE | Virtual Reality Game**	**8 - share the science - VR mobile app**	**9 - WWF Free Rivers - AR app**	**10 - NASA's Earth Now - mobile app and website**
reliability	7.5 - uses lots of sources so would depend on the article. The site is part of murdoch media which has questionable reliability	N/A - source not made clear	N/A - source not clear	9 - governmental organisation	9 - government organisation
informative	8.5 - full of sources and information	6 - subjective	9 - went in depth about climate change and processes	8 - covers the topic well	9 - lots of information including stats, visualisations and information
understandable	8 - easy to follow and well explained	9 - the immersion allows the user to make their own sense on the topic	10 - gave visual and audio explanations of processes	8 - the ar element helps improve the users ability to relate to the content	6 - the visualisations are understandable but the numbers and explanations are complex and hard to understand
actionable	6 - subjective	5 - the app is more about explaining the topic rather than explaining what to do about it. But it is raising awareness and highlighting the importance.	4- gave advice on what to do to help	7 - covered but only as a side not and not a major part	4 - not directly covered
engaging	6 - there isn't much to engage the user	10 - the games and the medium is fun and people want to use it	7- vr walkthrough space and farms	10 - the experience is incredibly engaging	6 - the method of presenting the information is engaging but doesn't incentive personal reflection
relevant	8 - the relevance is dependent on the articles. There are a few they align a bit to our topic. The misinformation part is target to a great extent	N/A - not about our topic	7 - covers our topic to some extent	7 - were not focusing on rivers	7 - covers our topic area but doesn't go into the depths of our problem area

Appendix 7C - Competitor analysis 3/3

Variables	**11 - global oneness project - website and mobile app**	**12 - United Nations Climate Change - website and mobile app**	**13 - Our World In Data - CO2 Data Explorer**	**14 - EcoCitizenaustralia - carbon footprint calculator**	**15 - Carbon Footprint Calculator**
reliability	7.5 - reliable but it depends on the maker of the fim	10 - UN	8 - data is reliable but not 100% accurate as it makes predictions	8 - reliability is hard to determine	9 - government organisation
informative	7.5 - informative but could be more	9 - covers a lot of topics with thorough explanations	7 - no explanations only data	8 - provides context and information	9.5 - good info and breakdown of answers
understandable	8 - the medium and presentation is easy to understand	7 - can be a bit complex and hard to understand	9 - effective data that is easy to understand and present its point	5.5 - app is borderline impossible to use the information required no one has access to	9 - easy to understand how to use
actionable	7 - depends on the topic but isn't the focal point	9 - has a specific area on how to act	5 - not specific call to action	6 - if you are able to finish the app then you will know you maybe should change but it doesn't help you do it	8.5 - doesn't go into specifics but lets you know where you could improve and how much you need to change
engaging	9 - full of unique and interesting films that are well made and engaging	6 - biggest area to improve upon. Good information but little desire to use the site	8 - not a whole lot to engage with	4 - nothing engaging	8 - as opposed to other quizzes its more engaging due to nice visuals and animations
relevant	7 - covers our topic to some extent	8 - covers our topic	7 - not specific to our problem area that we are addressing	9 - covers our area very closely	9.5 - the closet example