Carbon Literacy in Worcestershire Libraries

Picture of the Hive, Worcestershire's largest library.

April 28, 2022

Authors:

Lauren Balukonis

Adam Marsh

Amy Ngan

Blake Pedersen

Carbon Literacy in Worcestershire Libraries

An Interactive Qualifying Project Proposal
submitted to the faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfillment of the requirements for the
degree of Bachelor of Science

Authors:

Lauren Balukonis
Adam Marsh
Amy Ngan
Blake Pedersen

Date:

27 April 2022

Report Submitted to:

Professor Katy Boom, Director of Sustainability
University of Worcester

Dr. Stephanie Jones, Hive Library Manager
The Hive Library

Professor Linda Carre Looft & Professor Fred Looft
Worcester Polytechnic Institute

Abstract

The goal of this project was to promote carbon literacy in Worcestershire using library resources to help reduce the region's carbon footprint. We interviewed and surveyed library managers and users to best understand library demographics and interest in environmental awareness. We also adapted training material from the Carbon Literacy Project (CLP) to create and present four taster sessions at the Hive to receive user feedback on material and delivery methods. We determined there is interest in becoming more environmentally aware and a larger need for carbon literacy training. We recommend partnerships with external organizations, better promotion for sessions held, more sessions for library users to attend, and offering the opportunity to take the accredited CLP training.

Acknowledgements

Our team would like to thank the following people and organizations that provided various support throughout our project and made the experience enjoyable:

- Professors Fred Looft and Linda Looft for their expert guidance, knowledge, and support through the project. They provided insightful feedback on both the project process and the professionalism behind the project. We are extremely grateful for the great experience they created for us.
- Our sponsors, Professor Katy Boom and Dr. Stephanie Jones, for providing us with various information, individuals to further our research, as well as the content adapted for our training.
- The following interviewees who shared information about their library cluster:
    - Jodie Ford
    - Jackie Passey
    - Emma Powell
    - Michelle Campbell
    - Nicki Hitchcock
- Dave Corbett for providing numerous statistics on the various libraries in Worcestershire.
- The Hive for providing us a space to work and to pilot our trainings on Earth Day.
- The University of Worcester and Katy Boom for providing us a place to stay and transportation to Worcestershire libraries.

Executive Summary

Introduction

In response to the United Kingdom's commitment to becoming 'net-zero' by the year 2050, organizations such as the Carbon Literacy Project (CLP) are providing accredited trainings about climate change and the impacts of carbon emissions. The CLP also teaches program participants about the steps to take in their daily life to reduce their carbon dioxide emissions. The University of Worcester partnered with the CLP to create an accredited training that is offered to students and staff. The Hive, the first fully integrated university and public library, is looking to incorporate carbon literacy training into its library as well as the other 23 libraries in Worcestershire. To celebrate the 10-year anniversary of the Hive, which falls on the 11th of July, the library was looking to kick off their 10-week celebration on Earth Day with a sustainability day featuring climate change training programs. This provided an opportunity for the team to pilot the trainings that were created during the project.

Goal and Objectives

The goal of this project was to promote carbon literacy in Worcestershire using library resources to help reduce the region's carbon footprint. To achieve this goal, we created the following four objectives:

1) Document Worcestershire library networks, demographics, and programs offered to the community
2) Identify library user interest in and knowledge about carbon literacy
3) Research how carbon literacy training could be delivered based on identified county needs
4) Pilot carbon literacy training(s) and delivery method(s)
    a) Tailor training topics to the various populations
    b) Provide relevant feedback and testing information for further training improvement

Methodology

To achieve this goal, we conducted interviews with library customer managers in Worcestershire, had discussions with library customer advisors (LCAs), and made observations about library spaces during visits to regional libraries. Using social media, we distributed surveys to library users and library customer advisors seeking information about library structure, programs, and use. Using data obtained from those interviews and surveys, we developed pilot trainings for both adult and family audiences. Lastly, we collected feedback from participants in the pilot carbon literacy trainings.

Findings

Through interviews, informal conversations with library managers and staff, and library users survey data, we gained an understanding of the different populations which use the library, when different age groups frequent the libraries, which session types were needed, and the best times to deliver the carbon literacy training. We also learned which learning styles and program length were preferred. In general, the four key findings were:

1) Different aged populations show a need for both adult and family sessions
2) The best time to deliver Carbon Literacy Training is outside school and working hours
3) There is not one preferred learning method (audio, visual, interactive, reading/writing)
4) The preferred training length was a shorter taster session

Recommendations

We made the following recommendations to the Worcestershire library system:

1) **Worcestershire Libraries should pilot and deliver the training throughout Worcestershire.**

Once the training is revised, we recommend piloting the trainings throughout the county library system, gathering feedback, and adapting the training along the way. This will extend environmental awareness and the training throughout Worcestershire.

2) **The libraries should place more focus on promoting the training sessions**

We recommend focusing on promoting the training sessions. If the library users or the public can have easy access to the sign-up links or are handed promotional flyers, there could be a greater chance for a higher attendance.

3) **The Worcestershire libraries should develop partnerships with other organizations**

We believe that it is important to expand on the relationships these libraries have with schools and other non-profit organizations such as scouting. This will allow the trainings to be administered by different people, who have similar drives and passions for sustainability.

4) **The Hive and Worcestershire Libraries should offer the accredited training at no or minimal cost to the participant**

Our recommendation is to implement the accredited Carbon Literacy Project training into the library system. Providing a free accredited training that is easily accessible is crucial to promoting carbon literacy in Worcestershire. It will also provide those who are already informed on carbon literacy to skip the taster session, and have access to the longer, more in depth training.

Authorship Page

Section Name	Author(s)	Editing Author(s)
Abstract	LB	ALL
Executive Summary	ALL	ALL
1.0 Introduction	ALL	ALL
2.0 Background	ALL	ALL
2.1 United Kingdom Climate Change and Greenhouse Gases	LB, AN (2.1.1-2.1.3)	ALL
2.2 United Kingdom efforts to reach net zero carbon emissions	BP, LB (2.2.1)	ALL
2.3 Worcestershire Carbon Emissions	AM	ALL
2.4 Recent Worcestershire Efforts to Become Net-Zero	AM	ALL
2.5 Carbon Literacy Training	AM, AN (2.5.3)	ALL
2.6 Summary	ALL	ALL
3.0 Methodology	ALL	ALL
3.1 Document Worcestershire library networks, demographics, and programs offered to the community	BP	ALL
3.2 Identify library user interest in and knowledge about carbon literacy	LB	ALL
3.3 Research how carbon literacy training could be delivered based on identified county needs	AM	ALL
3.4 Develop Carbon Literacy Training and Delivery Method(s)	AN	ALL
4.0 Results and Key Findings	ALL	ALL
4.1 Results from Objective One	AM, AN, BP	ALL
4.2 Results from Objective Two	BP	ALL
4.3 Results from Objective Three	AM	ALL
4.4 Results from Objective Four	AN	ALL

5.1 Conclusions	AM, BP	ALL
5.2 Recommendations	AN	ALL
Appendix A	BP	ALL
Appendix B	LB	ALL
Appendix C	LB	ALL
Appendix D	AM	ALL
Appendix E	ALL	ALL
Appendix F	AN	ALL
Appendix G	AN	ALL

Table of Contents

Table of Figures

1.0 Introduction

Ignoring rising greenhouse gas emissions and carbon dioxide pollution will cause major consequences to our planet (Worcestershire County Council 2022). In response to this issue, the United Kingdom (UK) national and local governments have created plans to help reduce greenhouse gas emissions. On a national scale, the UK has enacted a plan to reduce its emissions and become completely net-zero by the year 2050 (UK Department for Business, Energy, and Industrial Strategy (BEIS), 2021). One approach the UK is taking to achieve this net-zero goal is the promotion of carbon literacy.

Carbon Literacy can be defined as "An awareness of the carbon costs and impacts of everyday activities and the ability and motivation to reduce emissions, on an individual, community and organisational basis" (Students Organising for Sustainability). Training people to be carbon literate is one step towards achieving net-zero emissions throughout the world. The Carbon Literacy Project is a UK based non-profit organization that develops training material and programs "to advance the education of the public in the conservation, protection and improvement of the environment through the dissemination of Carbon Literacy" (Carbon Literacy Project 2022). Their training programs cover topics such as greenhouse gases and their impact on the planet, explaining how individuals can have an impact on climate change, and motivating people to pledge to reduce their emissions. Their services end in a certification process for participants to take additional steps in Carbon Literacy education, such as becoming a trainer.

The goal of this project was to promote carbon literacy in Worcestershire using library resources to help reduce the region's carbon footprint. This was accomplished by working with the network of libraries in Worcestershire to gain insight into individual library demographics and how to reach their users. This information allowed us to create programs for specific audiences and helped us develop focused Carbon Literacy training that could be delivered with the support of the Worcestershire library systems. The successful completion of this project will aid our sponsors to develop engaging programs to help inform and educate the citizens of Worcestershire about carbon literacy.

To achieve this goal, we created four objectives to promote Carbon Literacy in Worcestershire.

1) Document Worcestershire library networks, demographics, and programs offered to the community
2) Identify library user interest in and knowledge about carbon literacy
3) Research how carbon literacy training could be delivered based on identified county needs
4) Pilot carbon literacy training(s) and delivery method(s)
    a. Tailor training topics to the various populations
    b. Provide relevant feedback and testing information for further training improvement

The remainder of this report will present background information that served as a foundation for understanding the goal and addressing the objectives of the project. The report explains the methodology used to gather data relevant to the project and the key findings that came from that data. The report concludes with our recommendations for future implementation of Carbon Literacy trainings in Worcestershire libraries.

2.0 Background

This chapter will cover the impact of greenhouse gases on the climate, as well as the UK and Worcestershire's carbon emissions and efforts to reduce them. The chapter also covers the concept of carbon literacy, its potential impact in reducing emissions, and current methods of carbon literacy training in the UK.

2.1 United Kingdom Climate Change and Greenhouse Gases

Climate change is a result of rising greenhouse gas emissions in the atmosphere (UK Department of Business, Energy, and Industrial Strategy, 2014). The emission of carbon dioxide results in the rise of greenhouse gases that trap radiation from the sun causing warming of the planet, otherwise known as the greenhouse effect (UK Meteorological Office, 2021). Greenhouse gas emissions hit its highest point in the UK in 1991, emitting 800Mt of gases, causing the government to start raising concerns about reducing emissions (Climate Watch, 2021).

Over the past couple of decades, the average temperature in the UK has been steadily increasing. The mean temperature in 2019 was 0.5˚C above the 1981-2000 long term average, making 2019 one of the top ten warmest years in the UK since 1884. (Kendon et al., 2020). This trend in rising temperatures is depicted in Figure 1 where the orange line shows a trend line for the change in average yearly temperature, while the darker "zero" line is the 1981-2000 average.

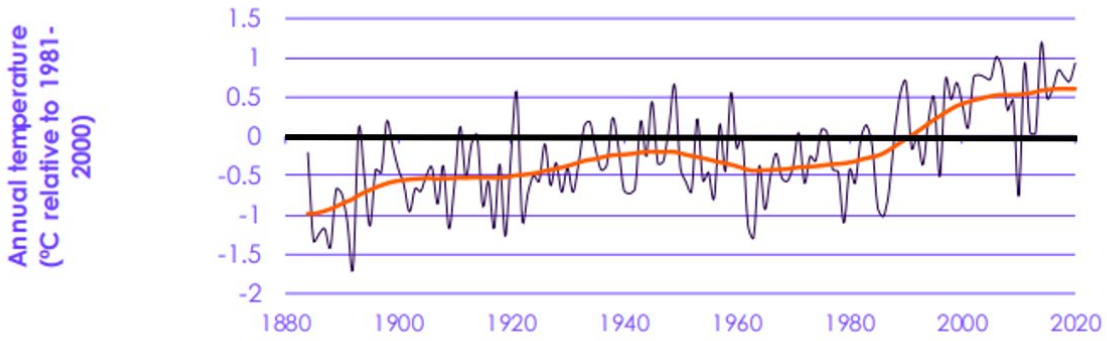

Figure 1. *Rise in annual temperature year 2019 relative to the 1981-2000 average (Climate Change Committee 2021).*

Besides warmer annual temperatures, sea levels are rising at a rate of approximately 2.5cm per decade due to oceans warming and the melting of glaciers and ice caps (Climate Change Committee 2021). Both the rise in annual temperature and rise in sea level contribute to climate change and its impacts on the environment.

2.1.1 United Kingdom's Goals and Achievements

In 2008, the Climate Change Act was established to promote a more sustainable environment throughout the United Kingdom (Organisation for Economic Co-operation and

Development, 2021). Through the Climate Change Act, the UK government set an ambitious goal of net zero for carbon emissions by the year 2050, striving to rapidly reduce or slow down the effects of climate change. The core elements of the act include setting carbon targets and certain budgeting ideas, creating The Committee on Climate Change, and applying certain trading schemes.

The carbon target as stated in the legislation is, "*...to ensure that the net UK carbon account for the year 2050 is at least 100% lower than the 1990 baseline*" (UK Government, 2019). The 1990 baseline includes the net carbon dioxide emissions in the UK for that year as well as the other net greenhouse gas emissions (UK Government, 2019). The legislation states there should be a gradual decline in net greenhouse gas emissions from 1990 forward. To reach that goal, several carbon budgets have been put into place. According to the legislation, a net UK carbon budget should be set in five-year budgetary periods, beginning with 2008-2012 (UK Government, 2019). Within each budgetary period, the Secretary of State set a carbon budget that needs to be lower than 34% of the 1990 baseline (UK Government, 2019).

The UK government set a target to have the carbon emissions 78% lower than the 1990 baseline by 2035 (Gov.UK, 2021). According to the UK Department of Business, Energy & Industrial Strategy (BEIS), "the sixth Carbon Budget limits the volume of greenhouse gases emitted over a 5-year period from 2033 to 2037" (Gov.UK, 2021). If successful, this goal would ensure that the UK is making progress reducing Greenhouse Gas Emissions and is on track to be 75% of the way to their goal of net zero by the year 2050 (Gov.UK, 2021).

To achieve net zero, it is necessary to keep track of current efforts and progress made (OECD, 2021). Progress reports available since the early 1990's show a gradual decrease in greenhouse gas emissions (Figure 2), dropping from 800 $MtCO_2e$ to just above 400 $MtCO_2e$ for total emissions and 600 to 400 $MtCO_2e$ for net carbon dioxide emissions (UK Department for Business, Energy & Industrial Strategy).

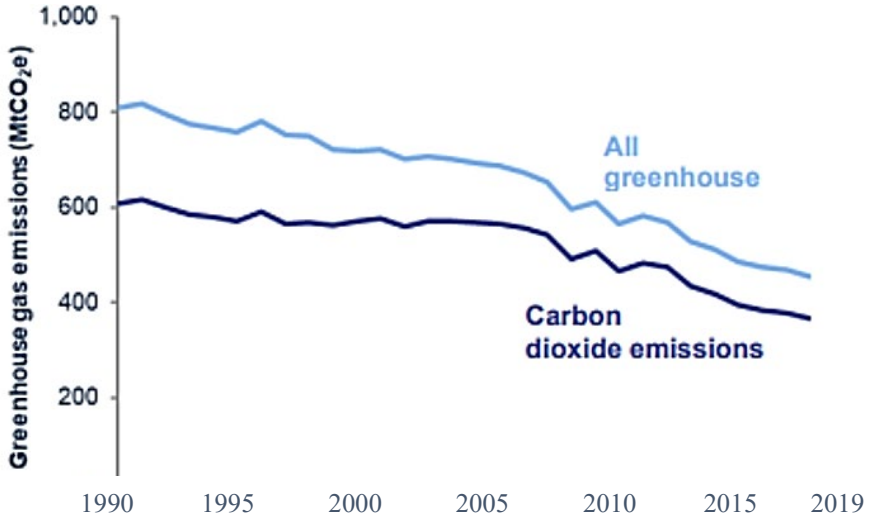

Figure 2. *Declining trend in UK greenhouse gas emissions from 1990 – 2019, (Gov UK)*

2.1.2 Transport Carbon Emissions

According to Ian Tiseo, a researcher at the Statista Research Department, the transportation sector is the primary contributor to carbon and greenhouse gases, an equivalent of 27% of overall emissions (Transportation emissions in the UK, n.d). In 2019, transportation created 122 million metric tons of CO_2 (Transportation emissions in the UK, n.d.). However, in 2018-2019, there was a 2% decrease in emissions, and a 5% decrease since 1990 (UK Department for Business, Energy & Industrial Strategy, n.d.). In comparison to the year prior (2018), there was a 1.8% decrease in carbon emissions, which shows that there has been a slow decline in carbon emission reduction (UK Department for Transport, 2021).

One way to reduce carbon and greenhouse gas emissions produced through transportation is by increasing the number of low emissions vehicles. By the end of 2018, approximately 0.5% of all licensed vehicles in the UK were low emission vehicles (Road Transport and Air Emissions, n.d.). However, according to the Department for Transport with the National Road Traffic Survey, there has been a 29% increase of cars on the road (Figure 3).

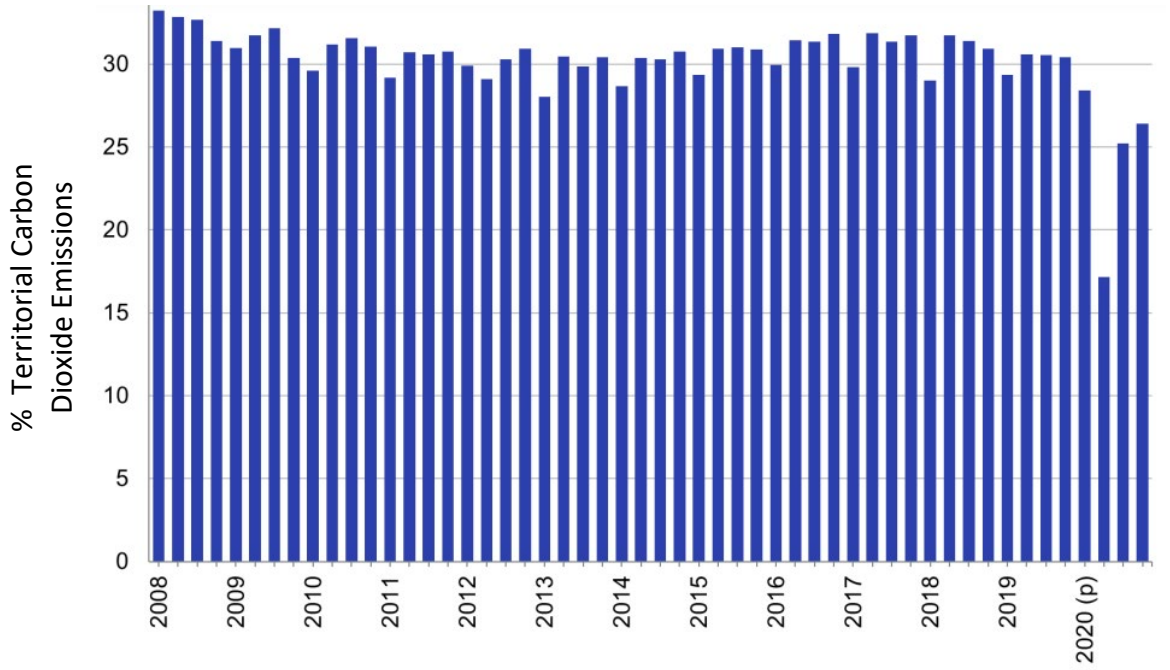

Figure 3. *Quarterly carbon emissions from Transport, UK (Crown, 2021)*

As a result, the amount of fuel and greenhouse gas emissions from the transport sector have been increasing by 6% from 1990 to 2017 (Road Transport and Air Emissions, n.d.). Yet, according to the UK Office of National Statistics, the low 6% increase marked an increase in low emission vehicles, in comparison to what the less fuel efficient vehicles would produce (Road Transport and Air Emissions, n.d.).

2.1.3 The Pandemic's Effect on Carbon Emissions

According to the UK Office for National Statistics, the global covid pandemic resulted in a 10% reduction in greenhouse gas emissions. With a majority of individuals isolating and staying in their own homes, there was a "sharp reduction in personal travel, including commuting to work." (COVID-19 restrictions cut household emissions, n.d.). This resulted in a 15 million ton decrease in carbon dioxide. The reduced household emissions helped with the goal of net zero by 2050 (COVID-19 restrictions cut household emissions, n.d). Figure 4 shows the overall percent change from 2009 to 2020.

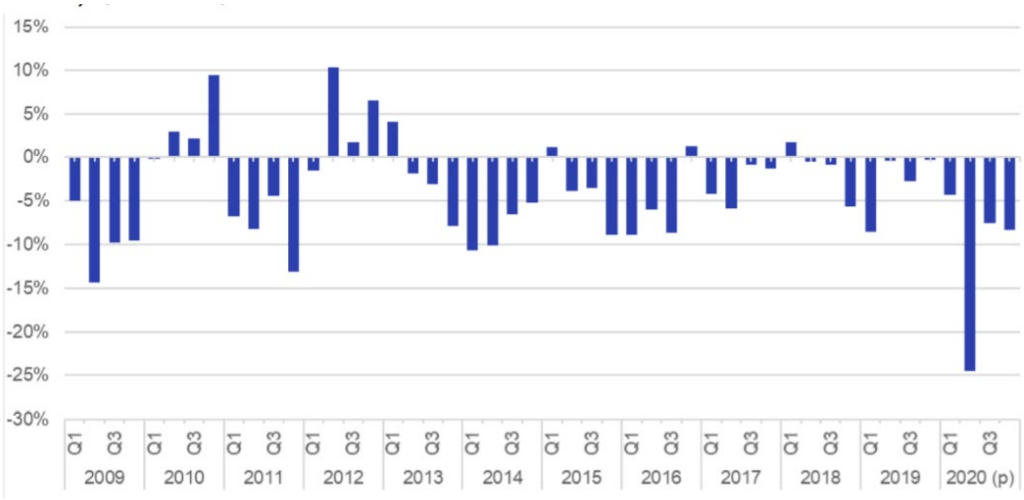

Figure 4. *Percent change in overall quarterly carbon dioxide emissions from 2009-2020, (Crown, 2021)*

2.2 United Kingdom efforts to reach net zero carbon emissions

The global environmental crisis has compelled many nations to establish plans to reduce climate change. The UK is addressing this issue and, in 2020, created a plan called "Net Zero Strategy: Build Back Greener." This strategy outlines the UK's ten-point plan to achieve net zero carbon emissions by 2050:

1) Advancing Offshore Wind
2) Driving the Growth of Low Carbon Hydrogen
3) Delivering New and Advanced Nuclear Power
4) Accelerating the Shift to Zero Emission Vehicles
5) Green Public Transport, Cycling, and Walking
6) Jet Zero and Green Ships
7) Greener Buildings
8) Investing in Carbon Capture, Usage and Storage
9) Protecting Our Natural Environment
10) Green Finance and Innovation

These ten points fall within six categories where the UK can work toward achieving net zero carbon emissions by 2050. The six categories are: Power, Fuel Supply & Hydrogen, Industry, Heat & Buildings, Transport, Natural Resources/Waste/Fluorinated Gases, and Greenhouse Gas Removals. The relationship between the six categories and where the ten points fall within them is crucial to understanding what the UK plans to do to address climate change. For this report, only the main topics of the Ten Point Plan are discussed below as they are most relevant to a general understanding of the UK's efforts for climate change.

Power is the rate at which energy is used, or the ability to produce energy (Cambridge University Press 2022). Currently, the main sources of power production in the world are fossil fuels but due to their harmful effect on the environment, they need to be replaced with cleaner and more sustainable alternatives. Offshore Wind is the production of clean energy through wind turbines located in bodies of water and is pivotal to driving the change from fossil fuels to cleaner energy sources as it can provide sufficient power without the cost of damaging the environment. To put this into perspective, by replacing non-renewable energy sources such as coal and oil with renewable sources such as wind and solar, the UK's total net greenhouse gas emissions from the power sector dropped from 72% to 11%, of the total contribution to greenhouse gases from 1990 to 2019 (HM Government, 2021).The UK is currently producing over half of its power from low carbon technologies (HM Government, 2021) and is in the process of developing wind turbines to help realize "40 GW of offshore wind by 2030 including 1 GW of floating wind" (HM Government, 2021).

The way the UK heats and powers buildings can also be improved by using energy sources and building designs that reduce overall carbon emissions. Green buildings address the way the UK heats buildings and how through installing new heat pumps or using public sector funding for new projects that provide heat decarbonization methods, the UK can lower the carbon emissions impact of buildings. In fact, the UK's goal is to install 600,000 heat pumps each year by 2028 and have the energy efficiency funding backed by the Public Sector Decarbonization Scheme (HM Government, 2021).

With respect to items #4 and #5 from the UK's Build Back Greener Ten Point Plan, Transport is one of the largest categories because most everyone must travel in their everyday life, whether that be for work, school, or other activities. Promoting use of public transport, cycling, or walking will encourage personal change in individuals' carbon footprints, which, in turn, will reduce the UK net carbon footprint. Goods worldwide are dependent on most forms of transportation, so the carbon footprint left by these vehicles falls on all of those who transport the goods. The decarbonization of transportation can be done by accelerating the shift to zero carbon emission vehicles in the UK. The UK specifically will end the sale of diesel vehicles by 2030, phase out diesel heavy goods vehicles, and put £1 billion to support the electrification of cars (HM Government, 2021). The next step is to make common modes of public transport such as buses and trains zero emission and renewable, thus addressing Green Public Transport. The UK plans to achieve this goal by diverting £120 million to introduce 4,000 zero emission buses and billions of pounds to enhance the rail network (HM Government, 2021).

Through implementation of the Ten Point Plan, the UK estimates they will be able to significantly decrease their carbon emissions by 2037 to reach their net zero goal by 2050. Figure 5 shows the predicted downward progression of Metric tons of carbon dioxide equivalent ($MTCO_2e$) emissions in the UK. The graph is based on changes presented in the Ten Point Plan that will be made in each sector to reduce overall carbon emissions. By 2037, the planned changes will put the UK greatly below the baseline emissions, which are based on where emissions would be if there was no change to UK power generation, energy production, and transportation.

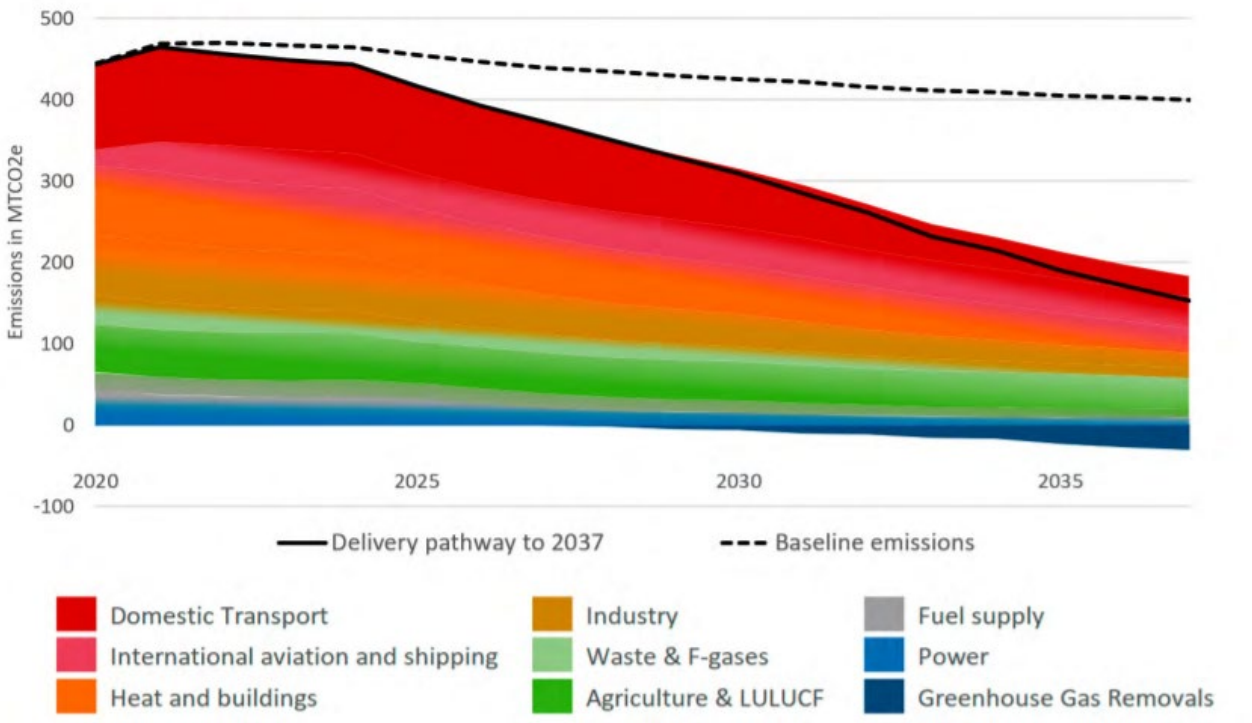

Figure 5. *The UK's estimated decarbonization delivery pathway to 2037 by sector. (Department for Business, Energy, & Industrial Strategy (BEIS) Analysis, 2021)*

2.2.1 Public Attitudes about Climate Change

The UK Office for National Statistics (ONS) issued a Public Attitudes Tracker (PAT) which collects public awareness, attitudes and knowledge towards policies of BEIS, such as net zero, climate change, and renewable energy. As of Winter 2021, 91% of citizens have heard of "net zero"; however, of those citizens, 41% know little to nothing about the concept (BEIS 2021). At the same time, 85% of citizens were "very or fairly concerned" about climate change, as shown in Figure 6 (BEIS, 2021). Of the 85%, only 26% of those citizens have made efforts to change their behavior to reduce their impact on climate change (BEIS, 2021). The results indicate concern about climate change, yet there is a lack of knowledge on the topics and a lack of motivation to address the issue. The statistics infer that educational programs such as carbon literacy trainings would be beneficial.

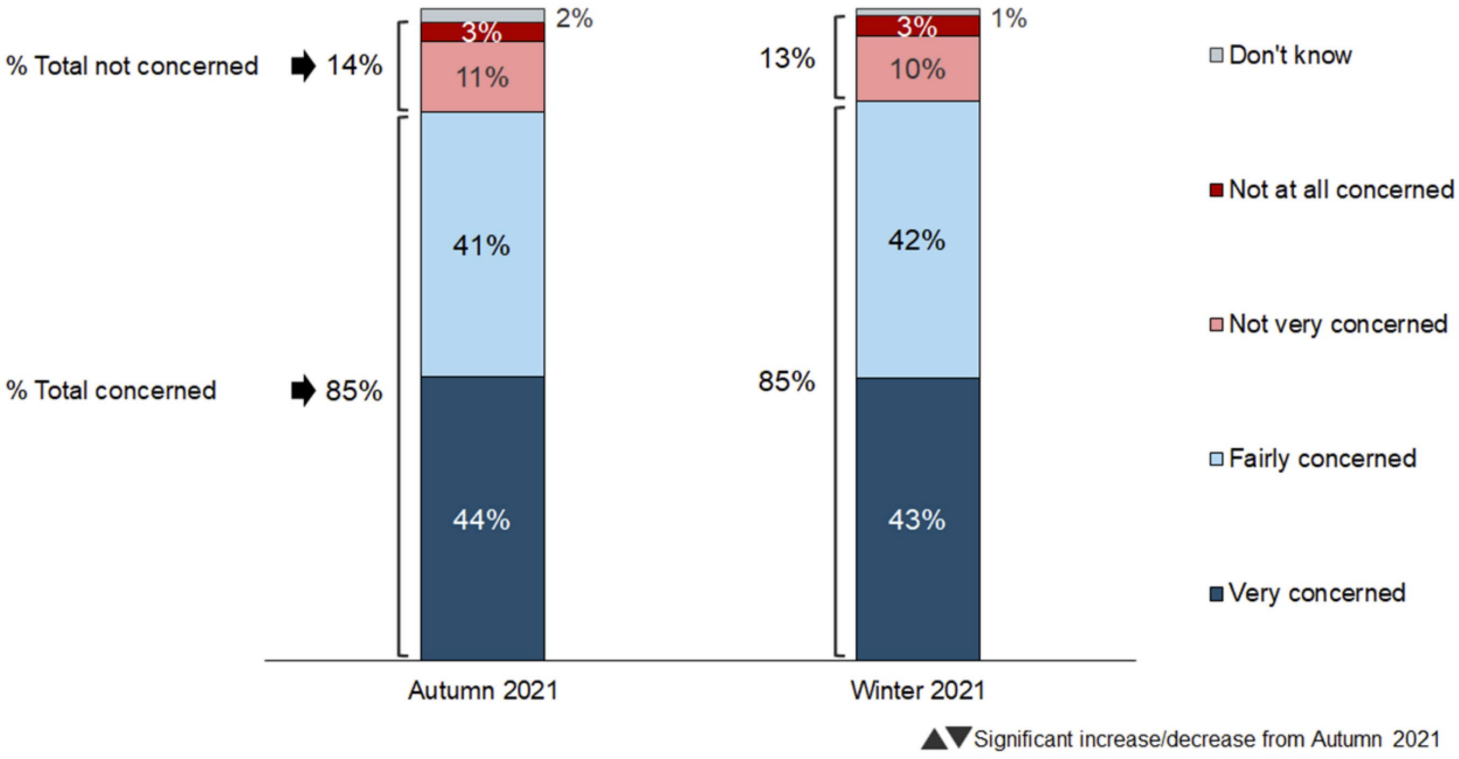

Figure 6. *Percentage of citizens who are concerned about climate change (Department for Business, Energy and Industrial Strategy, 2021).*

2.3 Worcestershire Carbon Emissions

Worcestershire (Red Outline, Figure 7) is located in the Midwest region of England and has a population of over 600,000 people (Worcester County Council 2021). Worcester (Red Dot, Figure 7) is one of the county's largest cities and is located in the central part of Worcestershire. Worcestershire has adopted the same net zero goal as the United Kingdom and has developed similar policies to reduce carbon emissions since 2002.

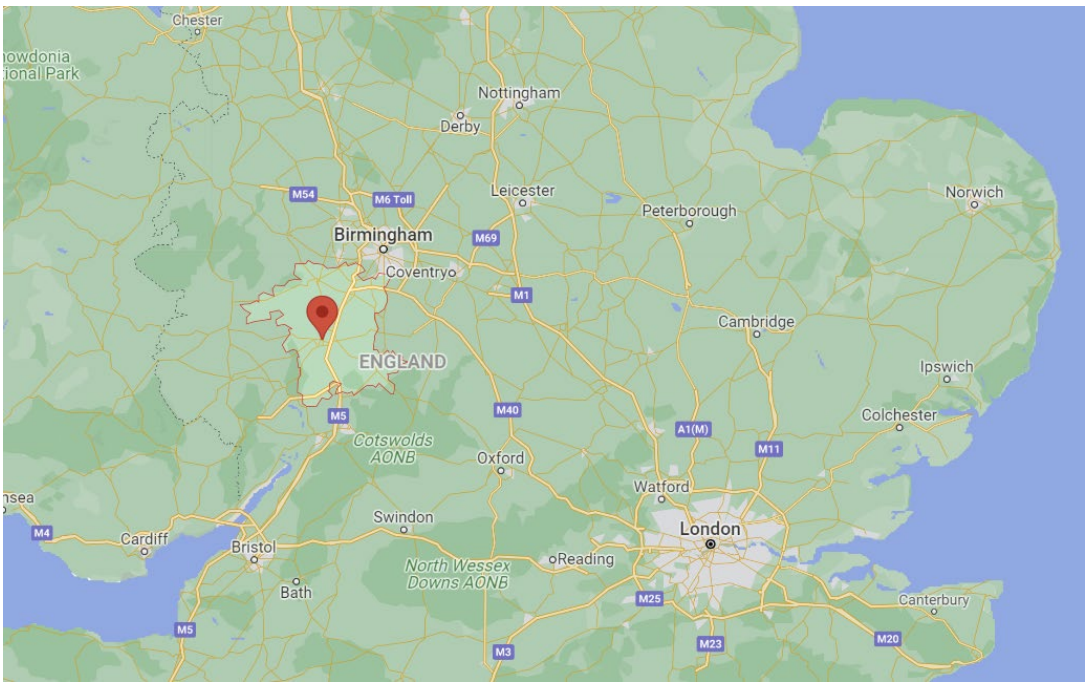

Figure 7. *Map Indicating Location of Worcestershire County with Worcester Marked (Google Maps 2022)*

Figure 8 shows the reduction of emissions from Worcestershire from 2005 to 2018. According to the data provided in the county's net zero reports, the local CO_2 emissions dropped 32% during that period, from 3.3 million tons to 2.6 million tons (Worcestershire County Council, 2020).

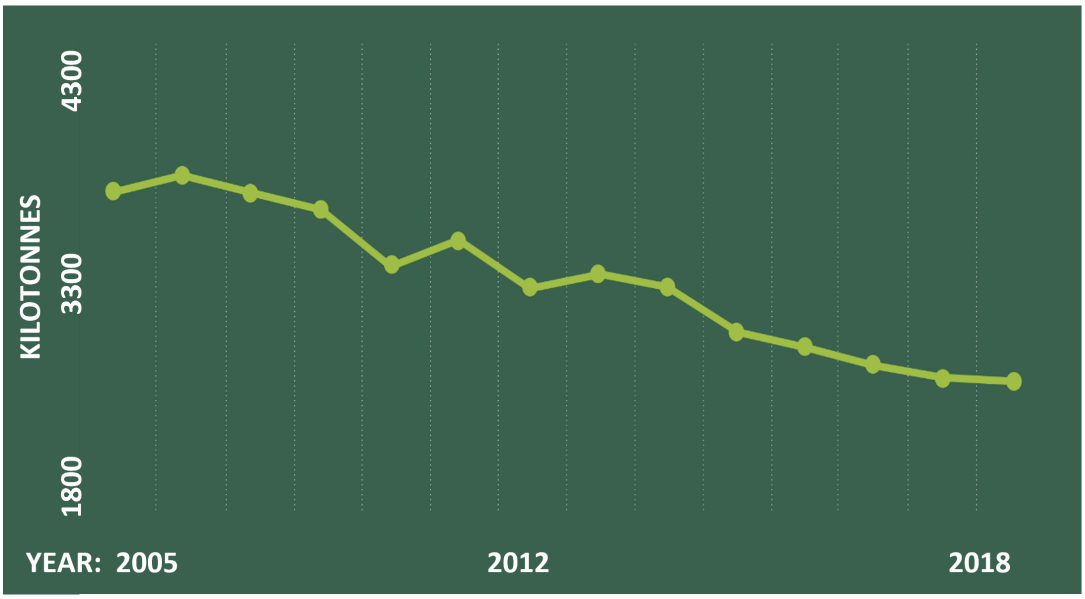

Figure 8. *Locally influenced carbon (CO_2) emissions from 2005-2018 (Adapted from Worcestershire County Council 2020)*

In addition, the Worcester City Council's emissions were reduced by 49% from 2009 to 2021 by implementing net zero strategies which are detailed in the next section. Table 1 looks at the emissions of the council from 2009/10 to 2020/21 and compares the net change over the decade. These data indicate the decrease in emissions within the city and the positive outcomes of the community's collective efforts.

Table 1. *Net Greenhouse Gas Emissions from the City of Worcester (Adapted from Worcester City Council 2021)*

	Absolute GHG (tonnes/CO_2^e)	**Absolute GHG (tonnes/CO_2^e)**	**Absolute % Change from baseline**
	2009/10	**2020/21**	**Percentage change (non-Degree Day corrected)**
Direct emissions from council activities	4,598	2,480	46%
Indirect emissions from electricity use	16,672	5,273	68%
Other indirect emissions	55,266	36,637	31%
Total Greenhouse Gas Emissions (tonnes/CO_2^e)	76,536	44,390	42%

2.4 Recent Worcestershire Efforts to Become Net-Zero

In July 2021, the Worcestershire County Council declared the county was in a "climate emergency" (Worcestershire County Council, 2021). Councilor Tony Miller, cabinet member for environment, stated "This [declaration] agreed at Council yesterday will allow us to build on the great progress we have made in recent years in addressing climate change and reducing the Council's emissions." (Ibid). This emergency was declared to bring the already established plans from the previous decade (from 2002) into the spotlight. Even though the data in the previous section shows a reduction of emissions in the county, there is still more action needed to get to net-zero emissions and stay on track for the future (Ibid).

The Worcester City Council enacted a revised strategy in 2020 to reduce carbon emissions which follows the United Nation's (UN) Sustainable Development Goals. Their plan contains three key approaches and then discusses how to embed the strategy into the city's operations. The first is through key commitments, vowing to use their influence to help reduce emissions under their direct control. This entails the council holding themselves accountable as public leaders to bring about change in the city and the county, as well as reducing their emissions as a council. The second is through engagement and partnerships. This approach is to "give individuals and organisations opportunities to engage with the delivery of the strategy" (Corrall 2020) and to "enable effective partnership working to ensure the visions of the strategy can be realized" (Ibid). The Council aims to work with Worcester residents to educate them about their strategy and to help the citizens understand how to reduce carbon emissions in the city. The third is through governance, working to create policy that helps with strategy implementation and effectiveness.

The University of Worcester has enacted a plan similar to the city of Worcester, basing their strategy on the UN Sustainable Development goals as well. It is organized by four themes that incorporate the UN's goals. These themes are:

1. Promote sustainability, social responsibility, and wellbeing
2. Integrate sustainability through knowledge, skills, and experience
3. Mitigation, adaption, and resource efficiency
4. Global sustainability ethics, partnerships, and leaderships (Boom, Jenkins 2020)

The first two themes relate to this project by promoting and integrating a commitment to sustainability across the campus community. To meet these goals, programs and trainings should be created and implemented throughout the community. The third theme focuses on reducing the campus' emissions and using their resources efficiently. The fourth theme is to become pioneers and leaders in sustainability through their international partnerships and research.

To promote and embed sustainability throughout the community, The University of Worcester, UK, is partnering with the Hive to promote a carbon literacy training. The Hive, a low energy building, which opened in 2012, and is the largest library in Worcestershire (University of Worcester 2022). The Hive is the first fully integrated university and public library in the UK (Feilden Clegg Bradley Studios 2022). The idea of a joint library was formulated between the Worcestershire County Council and the University of Worcester in the early 2000s (Ibid). The

Hive was developed as a central hub for the public and the students in the area. The Hive includes a library and an archive which houses historical documents and artifacts. The library replaced the original Worcester City library building that was identified as no longer fit by the public library service. The Hive also served as the university's expansion of the City Campus, as well as offering resources for the entire university, replacing the old University of Worcester library. Another goal of the building was to create a connection between the city and the University of Worcester (Ibid). This project looks at the other libraries located in Worcestershire and implementing carbon literacy in those locations. Figure 9 shows a map with the locations of the county libraries. These libraries serve many demographics and cataloging those communities' needs will be key to the success of this project.

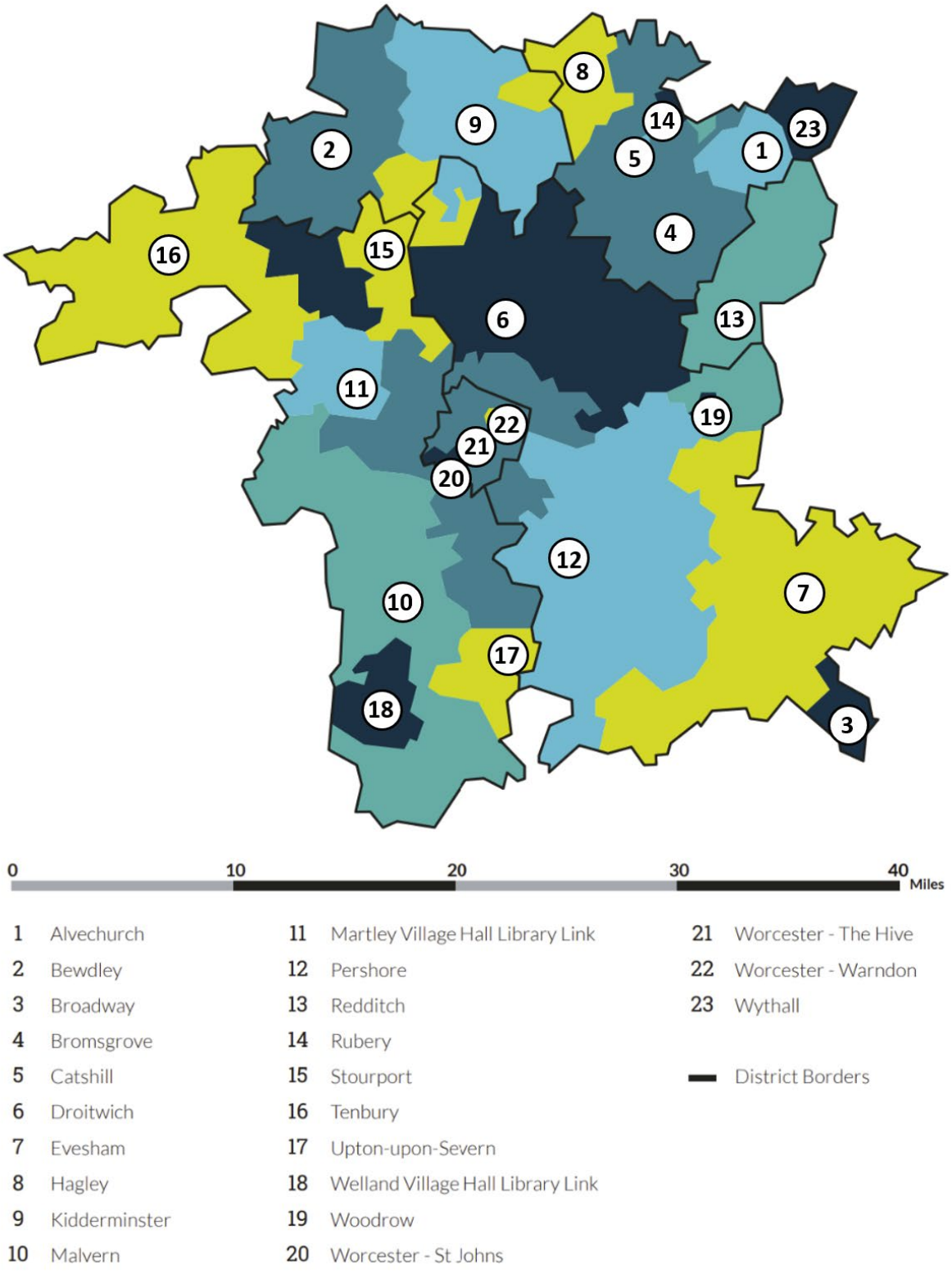

Figure 9. *Map of the Library System in Worcestershire County UK (Worcestershire County Council, 2020)*

2.5 Carbon Literacy Training

One step toward achieving net zero carbon emissions is educating the population about carbon costs and raising awareness about these issues. To that end, carbon literacy training programs have been developed and delivered across the United Kingdom. Carbon Literacy is defined by the organization Students Organizing for Sustainability (SOS UK) as: "An awareness of the carbon dioxide costs and impacts of everyday activities, and the ability and motivation to reduce emissions, on an individual, community and organisational basis" (Students Organising for Sustainability).

2.5.1 What is the Carbon Literacy Project?

The Carbon Literacy Project is a UK based charity that helps educate people and organizations about how to reduce their carbon footprints. Within their programs, the trainees will learn about "The basics of climate change science, what's already happening globally and locally, how [their] actions may be affecting climate change and what [they], as an individual, can do to help" (Carbon Literacy Project 2022).

The Carbon Literacy project outlines their trainings by four core elements to follow when designing and delivering a training: Learning Method, Knowledge, Values, and Action (Carbon Literacy Project 2022).

The learning method section of the Carbon Literacy Project (2022) training covers four topics: local learning, delivery by peers, group inquiry, and positivity. This section provides resources on how to deliver the training and engage the audience. It offers the person delivering the training resources and suggestions about how to efficiently help the audience learn the core material. The local learning aspect covers how the training makes the material relevant to the learner's community (i.e., how climate change affects them personally). Delivery by peers and group inquiry cover how the training should be interactive and how to have group engagement throughout the training. Positivity is meant for the trainer to use content that shows hope for the future of climate change and how emission reduction will benefit the planet. The section also provides various carbon footprint calculators to help the trainer motivate the audience members. The knowledge element focuses on the content taught and covers eight separate topics. The beginning of the training is intended to educate the audience about greenhouse gases and their effects. The content then touches on how the climate is changing and how this change will affect the local area, the UK, and globally. Then, the training focuses on the individual and their actions by showing how their actions impact the emissions of greenhouse gases and the area around them. The next step shows how an individual can reduce their impact and benefits behind it. After that, the training shows the audience what is being done to reduce emissions both locally and nationally, and resources available to them. Finally, the training goes into detail about how to motivate others to take the same steps as the audience to develop carbon literacy and reduce emissions. Table 2 shows a detailed breakdown of the various topics of the training.

Table 2. *Breakdown of the Carbon Literacy Project Concepts. Adapted from (Carbon Literacy Project 2022)*

Greenhouse Gases:	– Carbon Dioxide is the main GHG produced – Methane and other gases should be mentioned as well – The Greenhouse Effect should be shown
Climate Change:	– History of earth's climate – Climate changes effects globally and locally – Teach misinformation of climate change – Teach about the rising temperature of the earth – Climate change and natural disasters
Individual Impacts:	– Teach carbon impacts of everyday activities – Carbon footprint calculation activity – Embedded emissions: How everything we do has an impact (small or large) – Benefits of acting regarding emissions (business, organizational, and personal)
Outside Resources:	– Offers many resources for activist organizations and groups worldwide that are taking action for carbon reduction – Talk about numerous countries taking action and sustainability – Also cover local organizations as well
Motivation of Others:	– Aims to have the learners reflect on the training in hopes to have them take action and talk to others about the content of the training

The Carbon Literacy Training aims to instill values in its participants. The first value is to help the trainee believe "the action of individuals can and does make a difference" (Carbon Literacy Project 2022). This reiterates the importance of individuals behaviors and how they can create the change needed. The second value is "we need to work with others to create change" (Ibid). This is intended to encourage cooperation and falls in with motivating others to act. The third and fourth values explain how the changes needed will better the world and how equity and fairness are intertwined with those changes.

The last core element is the action aspect of the training. This section of the training aims to help the individual create pledges that help reduce emissions. The first aspect is to create a pledge the learner can take as an individual. These actions include things such as eating less red meat, throwing away less food, and using clean energy in their life (Boom 2021). The second aspect is to create a pledge to involve other people to help reduce the collective footprint, such as volunteering with an organization (Ibid).

An example of a training delivery can be found at the University of Worcester. The university partnered with the Carbon Literacy Project to produce an accredited training in 2021. Figure 10 shows the breakdown of the four training sessions offered at the university and the topics covered in each session.

	Session 1 - Science	Session 2 - Impacts
The Problem	• Learn about the science of climate change • Your individual carbon footprint	• Examine the impacts of climate change • Explore the distribution of impacts and reflect on climate justice • Consider possible future scenarios

	Session 3 – Action 1	Session 4 – Action 2
The Solutions	• Learn about action on climate change (including mitigation and adaptation) at various scales • Compare high and low carbon footprint actions • Devise high impact individual strategies	• Consider 'multisolving' climate solutions • Devise high impact group strategies

Figure 10. *Breakdown of the four sessions of the carbon literacy training. (Boom 2021)*

In the figure, all the key concepts required by the Carbon Literacy Project are covered. Regarding how the actions are taught, the training illustrates the carbon costs of normal daily activities. To show how various modes of travel impact carbon emissions, the training details a scenario of travelling to a work meeting and the various carbon costs of travel methods to said meeting. This shows the audience the impacts of their everyday activities (Ibid).

2.5.2 The Outreach and Effectiveness of the Carbon Literacy Project

The Carbon Literacy Project has already certified over 30,000 citizens and 2,535 organizations as carbon literate (Ibid). According to the Carbon Literacy Project's website (2022), they also have had over 60,000 actions pledged by their trainees. These pledges have helped reduce carbon emissions by an average of 5-15% carbon savings per person in their training, with that number based on individuals' estimations of their carbon emissions in surveys (Moody 2021). Also, many people that have taken the training feel motivated to take actions and measures in order to reduce the effects of climate change. According to data from the 2017 E-Learning Effectiveness Report, published by the Carbon Literacy Project (seen in Figure 11), the self-reported motivation of the participants to take action increased after taking the carbon literacy course. The CLK in the graph is for "Carbon Literacy: Knowledge", the title of the developed training. The participant data also showed that more people wanted to work with their

organization to create change. According to the same report, "95% of learners felt either 'fairly' or 'very confident' in taking action within their organisation" (Richards 2017).

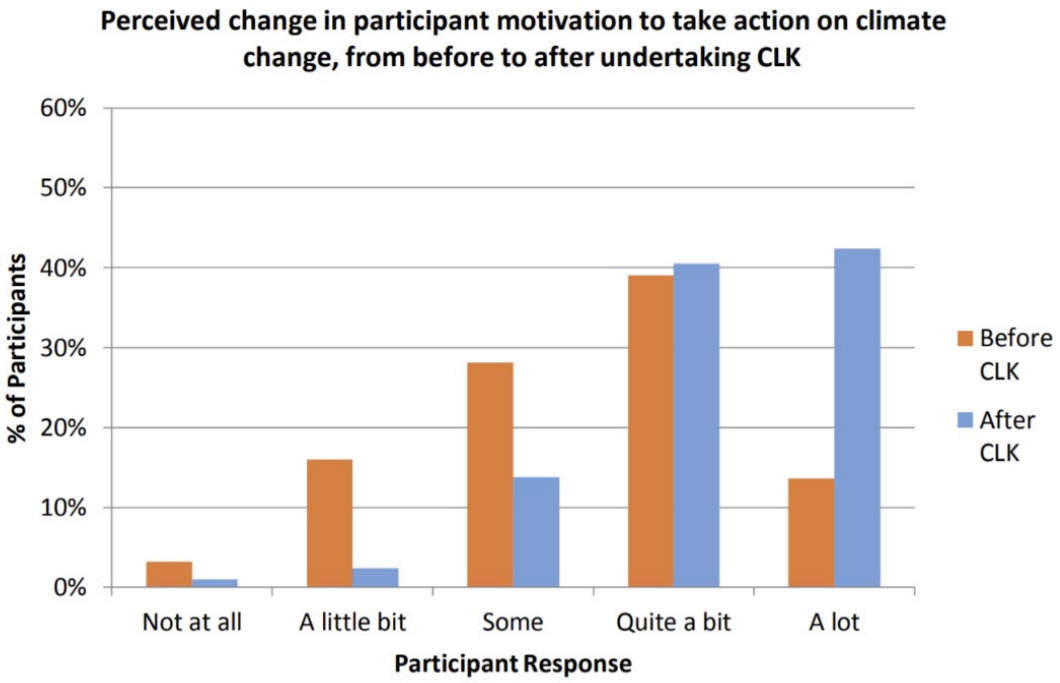

Figure 11. *Change in Participant Motivation to Act on Climate Change (Richards 2017)*

2.5.3 Other Training Programs

There are other training programs which promote carbon literacy. For example, Students Organising for Sustainability (SOS UK), offers programs with the following learning goals:

- "Understand the basic science behind climate change"
- "Realize the interconnectivity between social equity & climate change"
- "Develop a toolkit to act on climate change, including strategies and skills for communicating action on climate change" (SOS UK 2022).

The training is open to all members of the community, allowing for the understanding of proper sustainability (SOS UK 2022). The program is youth-based, which means that it is student led, and the program provides an introduction to climate change and how carbon emissions are impacting the world around them. The organization also helps the individual develop a way to act on climate change, by educating them about topics such as recycling and reusing. The overarching goal of the program is to provide the learners with a way to implement more sustainable actions in their own home. The overall requirement time is around fourteen hours, which includes in person and online modules (SOS UK 2022).

If an individual seeks further information about the topic or issue at hand, there is a student switch off ambassador training as well as the green impact project assistant training offered (SOS UK 2022). The ambassador training is designed to help an individual spread information and raise awareness on sustainability and its impact on the Earth. This is similar to studying to be a trainer who continues to spread the word about the importance of climate change.

2.6 Summary

This preliminary background research serves to highlight the carbon emission goals made by the UK in order to address climate change. The information in these sources demonstrates how the UK plans to handle these issues through legislation and instrumentation in all aspects of public life. We will continue to analyze these sources amongst others to ensure a deeper grasp on effective approaches to implement a carbon literacy training program in Worcestershire libraries. This background information aided the creation of four objectives to complete the project and methods to be carried out to gather further information about carbon literacy training.

3.0 Methodology

The goal of this project was to promote carbon literacy training in Worcestershire using library resources, in order to help reduce the region's carbon footprint. Figure 12 is a visual representation of the methods used to accomplish each of the objectives.

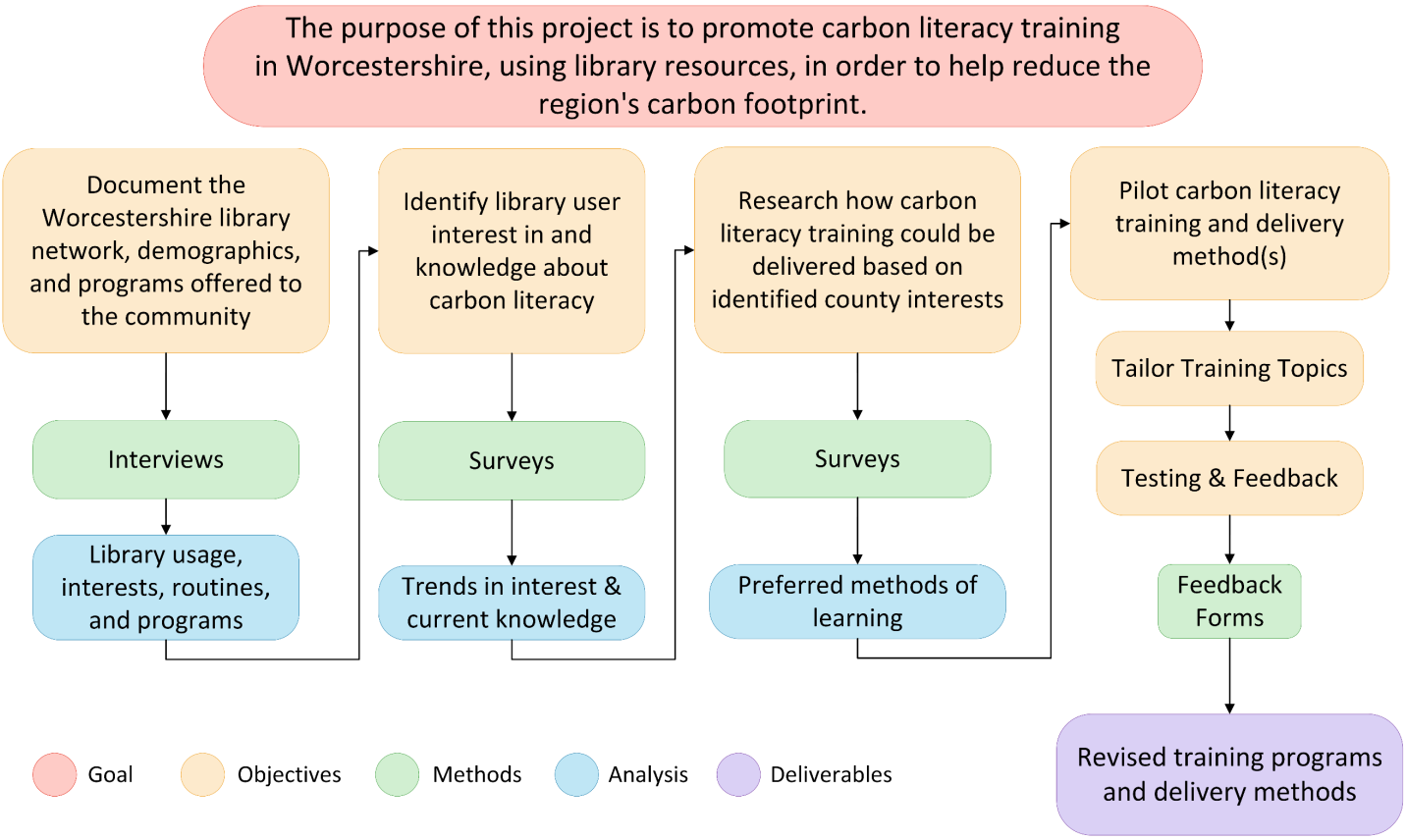

Figure 12. *Overview of Project Objectives and Methods*

3.1 Document Worcestershire library networks, demographics, and programs offered to the community

We travelled to select libraries in Worcestershire to tour the library facilities and interview library customer advisors (LCA). Topics included how the library is organized/structured and how citizens and community groups use the library's resources. The results from these interviews established a baseline of how each library engages with the local population and helped guide suggestions for carbon literacy training techniques and delivery methods.

We conducted virtual interviews with five library cluster managers and asked LCAs, at each library visited, to discuss their perceptions of community library usage. A list of the general

topics covered during library staff interviews included user demographics, time of visits, reason for visits, and group use of library resources. This provided a baseline of current programming and helped guide how future carbon literacy trainings could be delivered. A more detailed list of topics covered in interviews is illustrated in Appendix A.

We surveyed LCAs to further understand library demographics. A list of topics covered in the survey included user demographics, general library usage, programs offered, and environmental awareness of users. A detailed list of questions can be found in Appendix B.

3.2 Identify library user interest in and knowledge about carbon literacy

Information gathered from the library manager interviews was used to develop a survey that gauged the interest and knowledge of library users related to carbon literacy and climate change. Survey topics included user demographics, knowledge about climate change, practices related to carbon footprint reduction, and interest about becoming carbon literate. We surveyed library users through multiple forms of social media communication including Facebook, Instagram, and Twitter. The survey utilized the Likert scale and consisted of various statements about climate change where respondents could choose a number on a scale of strongly disagree to strongly agree based on the extent they agree with each statement. A sample survey to gauge library user knowledge and interest in carbon literacy education is provided in Appendix C.

3.3 Research how carbon literacy training could be delivered based on identified county needs

Data about library user interest and knowledge about carbon literacy was used to develop a survey to understand the region's preferred methods of learning. The data gathered during this survey helped to identify training opportunities and needs for specific library populations. The survey also helped identify appropriate delivery methods that can be utilized for the county library system as well as individual libraries and populations.

This survey was combined with the survey that was distributed in Objective 2 as an additional section. The survey asked the user questions about their learning style and how they learn new information. The user was also asked about their prior experience with library events and preference for a training structure. The survey utilized multiple choice options and short answer questions to gather data efficiently and to make the survey easy to complete. The short answers also allowed the user to express their opinions and give feedback for choices that were not provided. A detailed breakdown of the questions and options given is outlined in Appendix D.

3.4 Pilot Carbon Literacy Training and Delivery Method(s)

Data acquired from surveys and interviews was used to develop and evaluate delivery method(s) for carbon literacy trainings to present at the Hive's 10-year anniversary sustainability

kick-off event. Recommended trainings and delivery methods will be provided to Worcestershire libraries.

Sub-Objective 1: Tailor training topics to the various populations

We used interview and survey data to alter training content provided by the University of Worcester and the Carbon Literacy Project. The knowledge from the preliminary sessions was condensed and changed to fit the needs of various populations and ensure that new knowledge was gained. Delivery methods were developed to appeal to all learning styles.

Sub-Objective 2: Provide relevant feedback and testing information for further training improvement

To receive feedback on our piloted training, we presented our training session to our Worcester UK cohort as an initial test. The cohort consisted of 12 other students and our 2 advisors. We presented an abbreviated version of the adult presentation and gathered feedback through a survey detailed in Appendix E. The survey enabled us to edit and finalize the session for the final pilots. We then hosted four taster training sessions during the Hive's kickoff sustainability event on April 23, 2022. The sessions were geared towards older populations and families with young children. The adult session was a presentation utilizing pictures/videos along with interactive activities. The family session was a three-part program consisting of a story time, drawing activity, and bird feeder craft. We received feedback at the end of these sessions to improve the training and delivery methods and gave our final recommendations to Worcestershire libraries. The adult session feedback form is found in Appendix F, while the family session form is found in Appendix G.

4.0 Results and Key Findings

This chapter discusses the results gathered from the methods conducted over the seven weeks of the project. The results discuss common themes that enabled the creation of the pilot sessions and the future recommendations for the project.

4.1 Results from Objective One

Through two separate methods, we gathered information regarding the libraries' structure, network, and programs offered to help the formulation of pilot trainings and recommendations for the implementation of carbon literacy training in the future. The questions for the Library Cluster Manager Interviews can be found in Appendix A, and the LCA survey questions can be found in Appendix B.

4.1.1 Library Cluster Manager Interviews

The following section is organized by common themes identified through responses to interview questions posed to Library Cluster Managers.

User Demographics:

From the Cluster Managers responses, we learned the two primary demographics in Worcestershire libraries are children aged 14 and under, and older adults aged 60+. Both the library managers and library customer advisors made it clear that they wanted to reach the demographic group that was in between these two age groups. This demographic was 20-50-year-olds. The managers noted this demographic has jobs and family responsibilities that made it difficult for them to visit the library often. With this information, our group determined it would be best to host two sessions of carbon literacy trainings: one focused on middle-aged adults and one on young families. One session would be designed for people 18 years and older who want to learn more about climate change and what can be done both individually and collectively to address it. The family session would be an interactive program designed for families that want to learn more about our environment and how we can protect it.

Resources Used:

The main resource used by library users in the Worcestershire library system was general library use. In other words, users would check books out and use the physical book stock more than anything else in the library. Computers and laptops were the second most used resource. People do not always have access to a computer or Wi-Fi, and all they need to use a library computer is a library card. We were given the data on Worcestershire libraries from 2018 to 2022. This data included library visit numbers, members, active users, and computer usage, but there was no data on web visits and webpage views. The workspaces and common areas were also frequently used in the libraries which gave us the idea that people would be okay attending a training or event in those spaces as they are already comfortable there. While touring the libraries, we learned that most libraries have a separate function space where a training could be

conducted. The sizes of the rooms varied, from those large enough to accommodate a 20-person training to those that could only hold about 8 people.

Environmental Awareness Interest:

Through interviews, we learned there is general interest in environmental awareness within the various libraries. The participants added there is more of an interest in environmental awareness when the public are aware that climate change is affecting their community and them personally. This data helped us tailor our trainings by giving us a way to connect the issue with the learner by discussing how climate change is impacting their local area.

Programs Offered at the Libraries:

The libraries throughout the counties offer various programs, but only some offer sustainability and environmental awareness programs. This data also helped show there is a lack of programs within the county which deal with environmental awareness and that the implementation of one may be taken up by the users. Some useful information gained is how the library programs are managed. Interviewees stated their adult oriented trainings and events were more lecture based with interactive activities involving the audience. In regard to children's events, the majority of managers mentioned those sessions are generally hands-on activities such as crafts, and/or events that involved competition to keep the kids interested. This information was beneficial as it helped us come up with ideas for our own pilots and ultimately, our recommendations to the libraries.

Outreach to the Public:

The libraries use many different forms of outreach to promote their programs. The interviews established there is a common use of email, social media, mailing lists, flyers, and word of mouth to promote various library-based events. The most popular forms of promotion are social media and word of mouth. One word of mouth approach is the use of table set-ups at locations such as supermarkets or schools to speak to the public about events at the library. The Library Customer Advisors also promote events when users approach them for other reasons. This information helped us determine how to promote our pilots and distribute surveys.

Partnerships with Outside Organizations:

Most of the libraries are engaged in community partnerships and are looking to be involved with more organizations. Some of the organizations mentioned by the managers are groups such as scouting organizations or students from local primary and secondary schools. The managers were fond of mentioning schools as that would encourage that population of users into the libraries. This information helped develop a recommendation for implementing a training in the libraries utilizing different partnerships to deliver said training.

Popular Times in the Library:

Through the interviews we were able to establish the most popular times users visited libraries throughout the day and on the weekends. During the week, all the managers said they see increased traffic in the mornings and then again in the afternoon after school lets out. They also see increased traffic on the weekends, with more families coming in to use the libraries at

that time. This information allowed us to choose times for our pilot sessions and helped frame feedback to the libraries about the best times to conduct a specific training.

4.1.2 Library Customer Advisor Survey

The following section is organized by the common themes that were found in the responses from the Library Customer Advisor Survey. The themes are based on the 27 responses received. The survey responses reiterated similar questions asked during the library tours, and further probed the library cluster manager's claims on demographic, programs offered in their library, and if there is a desire for a sustainability session or training as well.

Demographic of Users:

According to the LCA survey data, the three main demographics for the libraries are: children aged 14 and under, working age adults aged 23-59, and retired adults aged 60 and over. As seen in Figure 13, 29% of the recorded responses (72[1]) were for children. The second highest response was retired adults with 29%. The data showed that young adults (ages 15-22), with only 10% of the responses, do not come to the library as often. The libraries are interested in attracting younger adults to come in and take use of the library's resources. The majority of the advisors mentioned there has always been a desire for a community-based environment, where mostly retired adults will come and gather to socialize and connect with others. With this information, we determined the target population for the sustainability training should be families with younger children and adults/senior citizens.

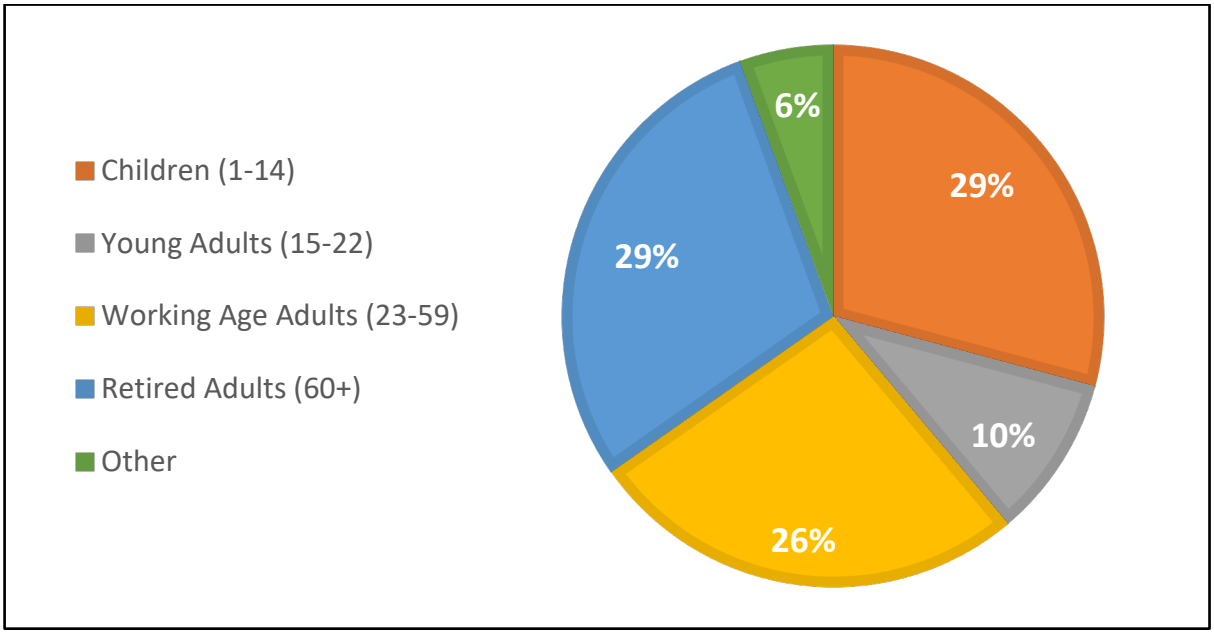

Figure 13. *Demographics in Worcestershire Libraries*

[1] The higher number of responses is due to the survey participant being allowed to select multiple options

Weekends/Weekdays:

The advisors open-ended response answers indicated, weekends are often busier, and Saturdays specifically tend to attract more families. The days with scheduled programs and events also tend to attract a higher attendance as those programs offer activities families can do together. This information allowed us to understand which days were best to conduct the training event.

Certain Times of the Day:

Higher foot traffic in libraries occurs in the morning (7am – 12pm) as well as the mid-afternoon (2pm – 4pm). As seen in Figure 14, the morning and mid-afternoon made up almost 75% of the 43[2] responses. According to the LCAs, the mid-afternoon increase in foot traffic is likely due to children being let out of school. The LCAs said the main population using the library in the morning is retired aged individuals. This data enabled us to properly decide the best times to conduct the sustainability trainings if they are offered during the weekdays, showing that the training for families and children should be outside school hours.

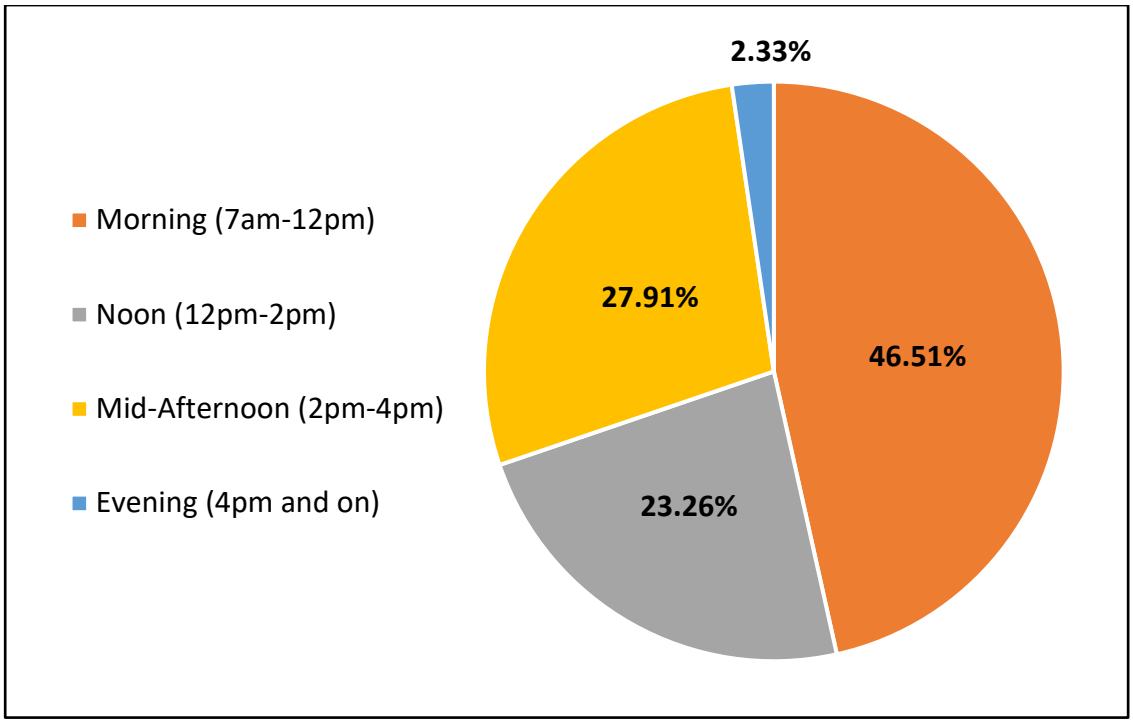

Figure 14. *Popular times throughout the day at Worcestershire Libraries*

[2] The higher number of responses is due to the survey participant being allowed to select multiple options

Programs Offered:

According to the respondents, many of the libraries offer a similar range of programs such as story time, children's singing, and rhyme. However, there are also many clubs meeting for board games, jigsaw, adult crafts, and Legos. There also appears to be family-oriented programs such as toy time, craft activities and trails, and singing.

Promotion of events/programs:

According to the LCAs open-ended responses, social media and word of mouth were the most popular ways to communicate to the community. Social media was the most popular with 19 of the 27 respondents mentioning the words 'social media.' This helped us determine how to promote our training by creating a post that would best fit both Facebook and Instagram to reach as many people as possible in the shortest amount of time.

Interest in Environmental Awareness:

According to the survey, the libraries' users may be open to the idea of learning about sustainability. Through the survey, interest in and learning about environmental awareness was gauged. According to the survey results (Figure 15), about 96% of respondents said their users are interested or may be interested in environmental awareness. Figure 16 (Next figure) shows what the LCAs thought about whether their users would take a future training to learn about environmental awareness. According to this data, every one of the LCAs who responded thought their population would potentially be interested (70%) or would be interested (30%) in learning about environmental awareness.

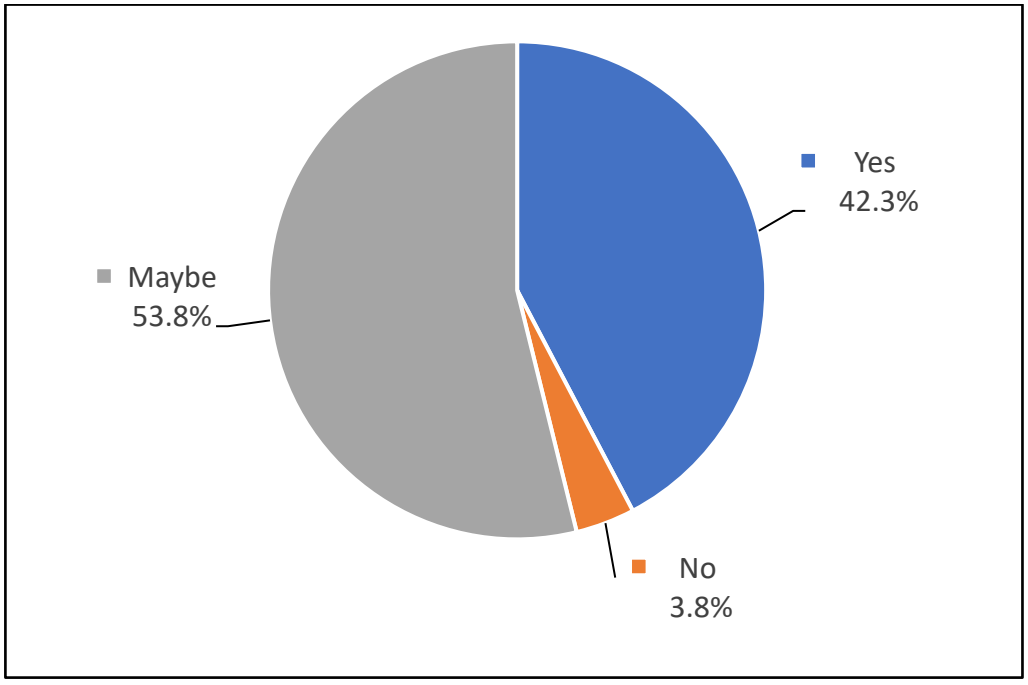

Figure 15. *General Library User Interest in Environmental Awareness*

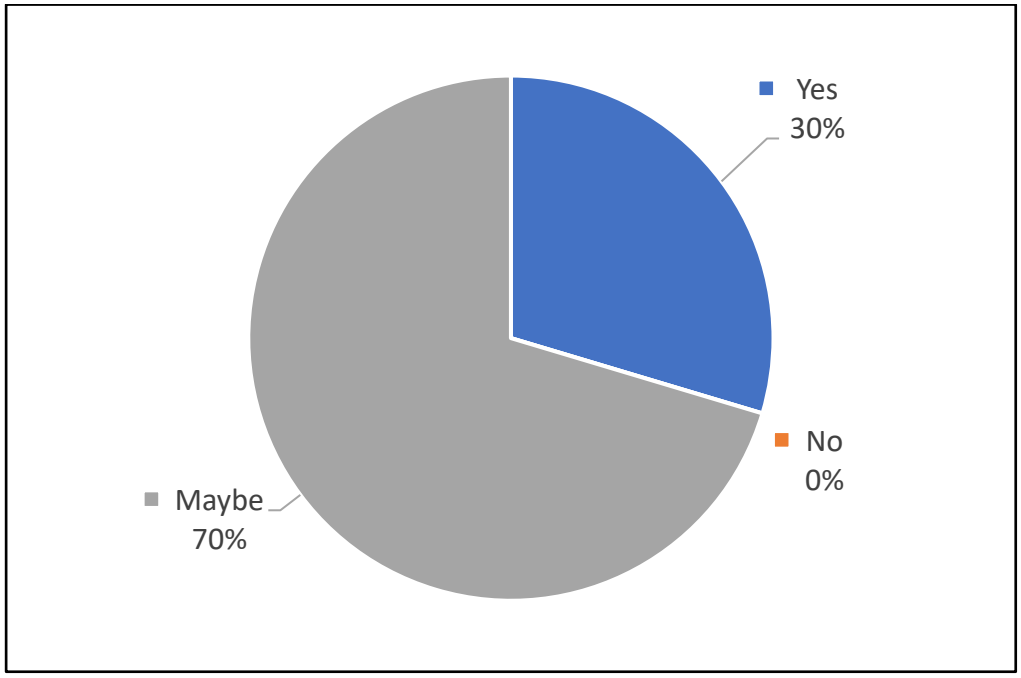

Figure 16. *User Interest in Learning about Environmental Awareness*

Training Structure:

The LCA data provided information which helped us design our trainings and to determine how long the sessions should last. The data in Figure 17 indicated the majority of the LCAs, 52%, thought a 30-minute taster session would be the most preferred structure for the training. The next highest, 42%, was an hour-long session. The other suggestion for training delivery was to place a stand on the library floor in a high traffic area and speak to people as they pass by. We chose a training length of forty-five minutes followed by a fifteen-minute buffer time at the end. This buffer will act as time for any discussion points brought up during the session and allow us time to prepare for the next session.

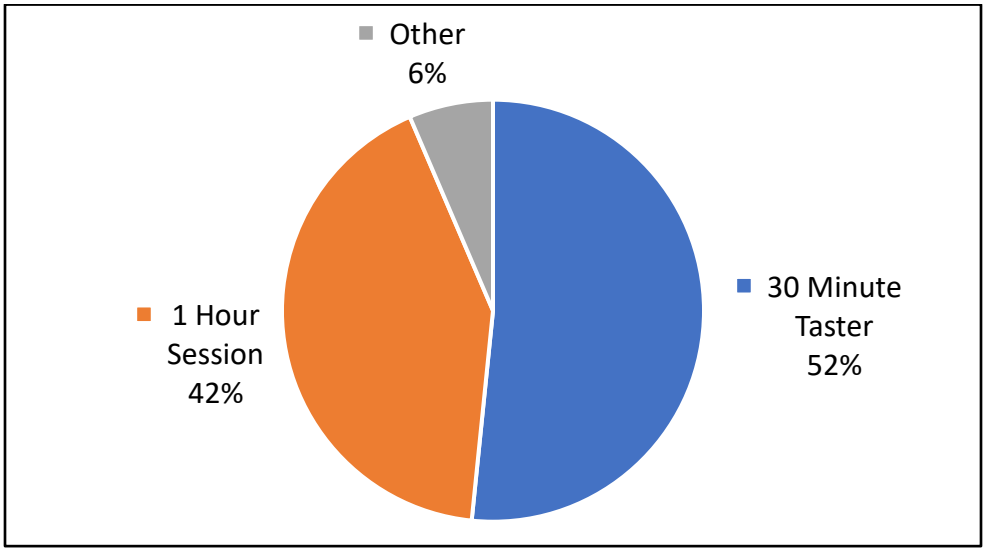

Figure 17. *Preferred Training Session Structure*

4.2 Results from Objective Two

Through a survey sent to library users, we obtained information on the demographics, prior knowledge, and interest in climate change of library users. Survey questions can be found in Appendix C.

Demographics:

Of the twelve responses, two respondents are in the age range of 26-35, four in 36-45, four in 46-55, and two were 55 and over. The data shown in Figure 18 shows the distribution of the resposes to our demographic question within our user survey.

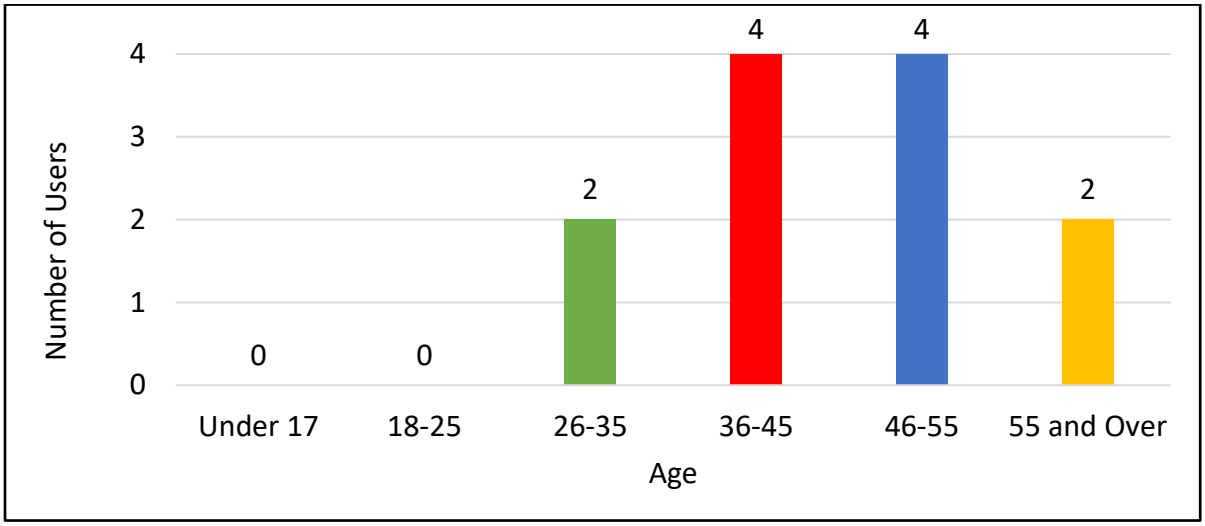

Figure 18. *Age groups of Worcestershire Library Users*

For the categories that best describe the respondents, there are two full time workers, six part-time workers, three parents, one stay at home parent, two retired people, and one university student. This data presented in Figure 19 gives us a more accurate measurement of who the patrons are that visit and use Worcestershire libraries. What makes this data important is that it gives us an idea of what times a training could work best.

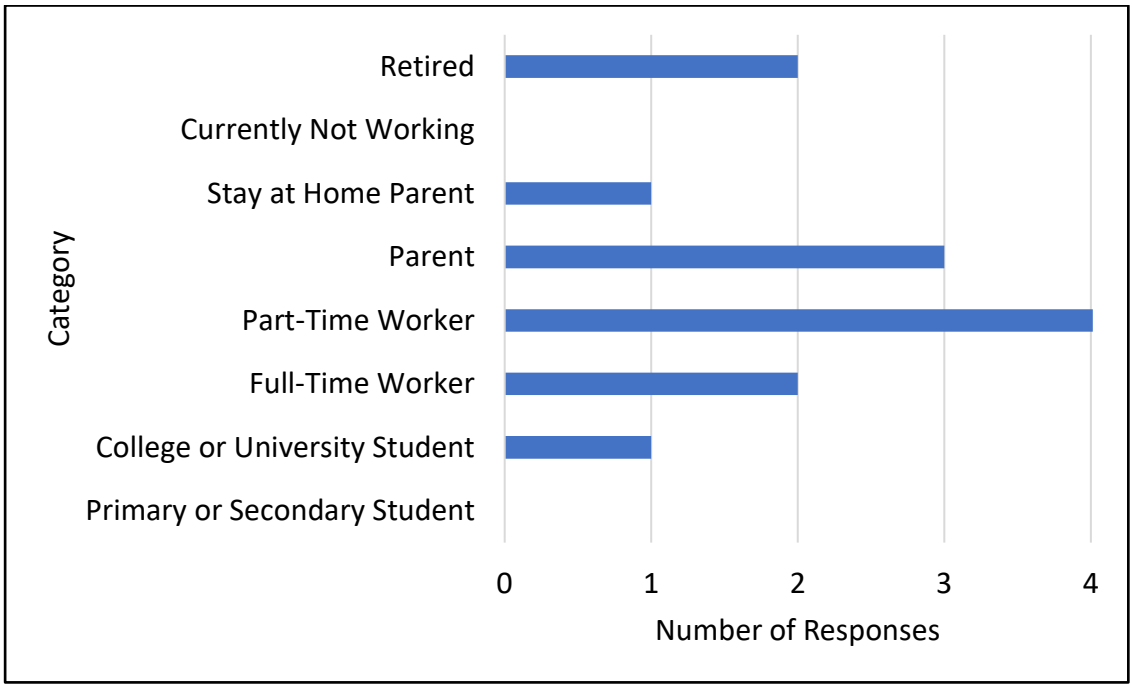

Figure 19. *Demographics of Worcestershire Libraries (Current Life Status)*

The following themes are adapted from a section in the survey asking questions about the library users' interest about climate change and interest in learning more about it. Figure 20 shows the distribution of the responses for those questions. The users were asked to agree or disagree with a statement on a scale from strongly disagree to strongly agree. The statements were as followed:

Q1: I believe our climate is changing
Q2: I am concerned about global climate change
Q3: Climate change will impact me in the next 10 years
Q4: Climate change is caused by human activities
Q5: The actions people take can positively affect climate change
Q6: Having awareness about national policies is important
Q7: I currently take actions in my daily life to be environmentally friendly (such as recycling, walking/biking, etc.)
Q8: I would be interested in learning more about climate change
Q9: I would be interested in learning more about my impact on the environment
Q10: I would be interested in learning more about what I can do to help the environment

Figure 20. *Interest and Knowledge Questions*

Prior Knowledge:

Based on the survey responses in Figure 20, a majority of library users think the climate is changing and responses show that people are concerned about climate change. Half of responses state that they are very concerned (Strongly Agree) while the other half vary between Agree and Slightly Agree. The responses were split between Strongly Agree, Slightly Agree, and Agree for the statement that climate change will impact them in the next 10 years, with the last response to that question being neutral. Most responses were on the positive side when asked whether actions can positively affect climate change, with the other response being neutral. This indicates that the Worcestershire population is aware of the climate change situation at hand and that their actions can help the environment. The data also shows that people are aware that climate change will be impacting them in the future.

Interest in Training:

For the three statements asking about interest in learning about new topics (climate change, impact on environment, and actions to help the environment), all three of the statements had at least 67% of the respondents strongly agree or agree. The rest of the responses varied between neutral and slightly agree on all topics, with statements 8 and 9 receiving one disagree response each. This data, although with one user uninterested, does show that there is a majority interest in wanting to learn more about topics that cover climate change, personal impact on the

environment, and personal actions to help the environment. The data shows that people want to learn more about specific topics that would be covered in a carbon literacy training.

4.3 Results from Objective Three

To determine various learning preferences and preferred training structure of the users, the same survey from the previous section was used. The responses to the survey provided information on how the library users learn new information and what length of session they would prefer. The section is organized by results from the questions asked. Survey questions can be found in Appendix D.

New Information on a Topic of Interest*:*

According to the survey responses in Figure 21 (23[3] total), the majority of responses (10) showed that individuals choose to do a search on their phones to learn new information on a topic of interest. The next highest was a split between checking out a book or searching on their own computer. The "other" response was to attend a webinar from a knowledgeable expert. This data is important as it would infer that a majority of library users prefer using technology to learn new information. For those who do prefer using technology, an online training within their schedule could be a good option.

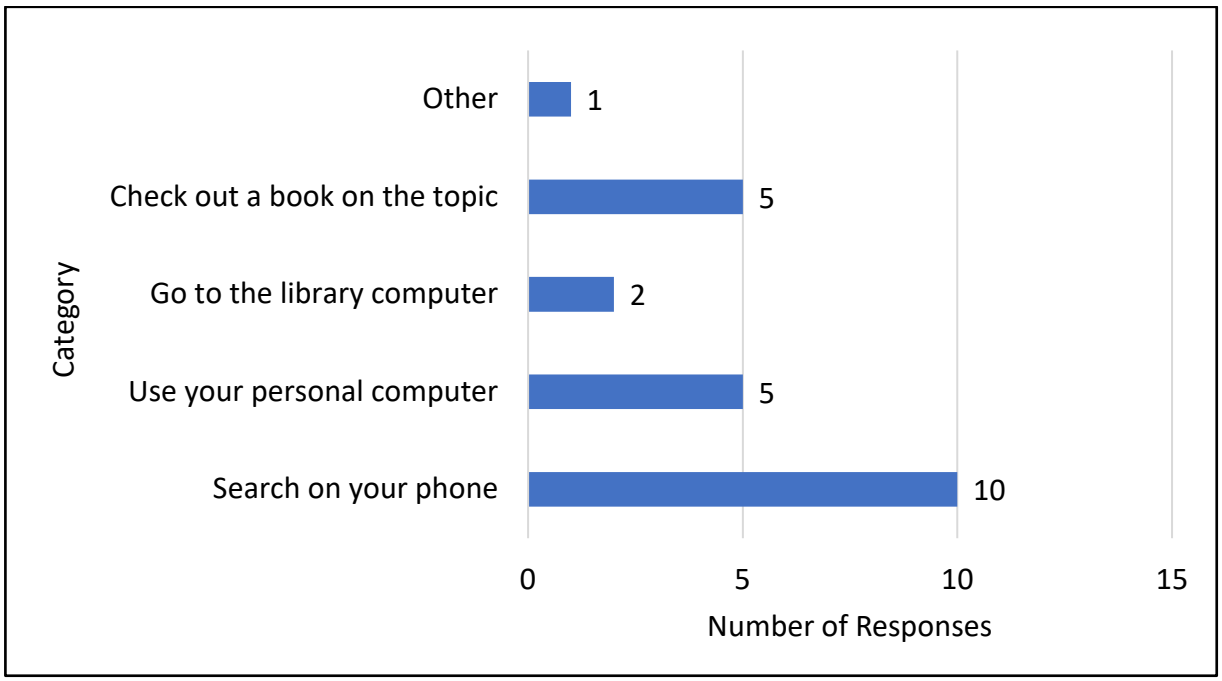

Figure 21. *Methods to Gain New Information*

[3] The higher number of responses is due to the survey participant being allowed to select multiple options

Learning Styles:

Another aspect that our survey probed was the learning styles of the individuals using the libraries. Figure 22 shows the distribution of responses for the users when asked how they best learn new information. The option with the most responses (9) was listening to a speaker present the information. Following that was a split between informational leaflet and interactive/hands on learning, both with 7 responses. Pictures and videos were close behind with 5 responses. This data showed us the learning styles (audio, visual, interactive/hands-on, and reading/writing) that were preferred by library users. Using the data, we decided what methods to incorporate into our training. Due to everything having responses, we incorporated every type of learning style into the adult training so that everyone would be accommodated for. These included interactive activities, videos and figures, presentation style slides, and handouts to the audience.

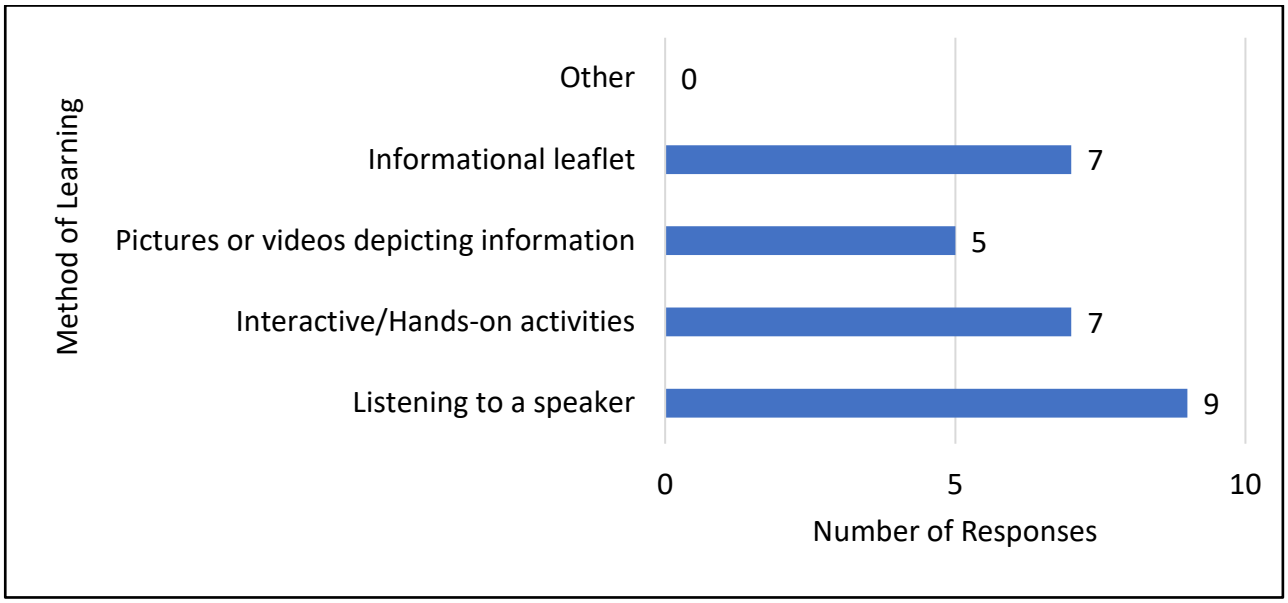

Figure 22. *Different Methods of Learning Information*

Learning Session Times:

Figure 23 shows the preference of training structure by the library users. The figure shows that the majority of the users (50%) agreed that thirty-minute sessions were the best option for a learning session. Only 5 of the 18[4] responses showed interest in a training session longer than an hour. This information contrasts with the training that was originally given to our group by the Carbon Literacy Project. The CLP training was four modules, each two hours long and would not be the right fit for Worcestershire libraries based on survey feedback. The data

[4] The higher number of responses is due to the survey participant being allowed to select multiple options

showed that a shorter training was wanted by the public, which is why we chose 45 minutes for our designed pilot.

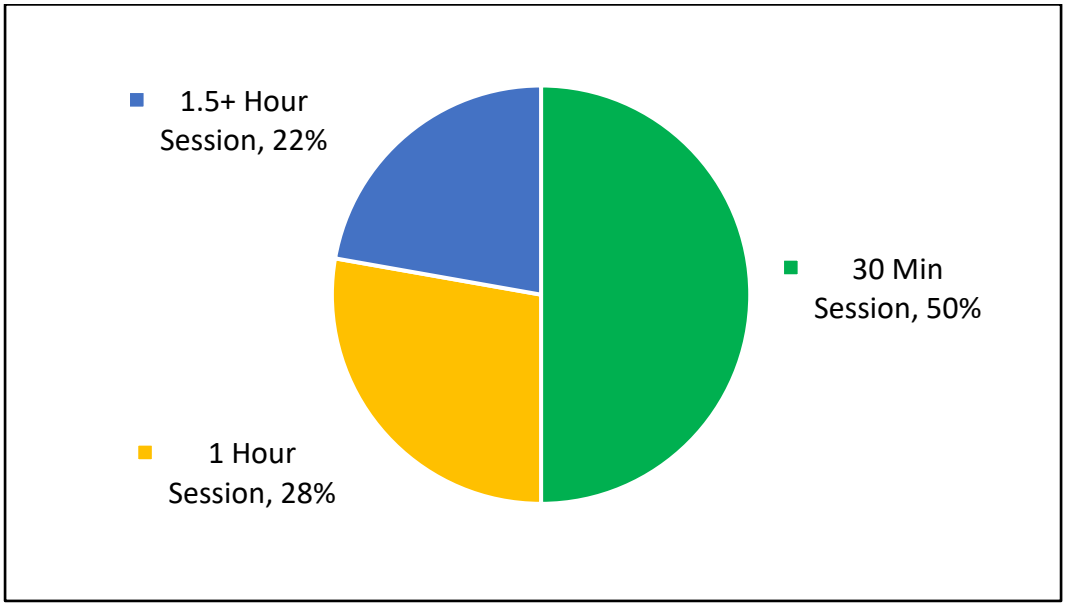

Figure 23. *User Learning Session Structure Preference*

4.4 Results from Objective Four

Feedback on the pilot sessions were gathered through two separate means. The first was through a pilot session presented to our cohort prior to the Earth Day celebration. Feedback was then gathered from the four sessions hosted on Earth Day. The feedback form for the Cohort Pilot Session can be found in Appendix E. The Pilot Session Feedback forms can be found in Appendix F and Appendix G.

4.4.1 Cohort Pilot Session

Feedback was gathered through an online survey that was given to our cohort of 12 students and two advisors after the shortened pilot session. The feedback form covered slide design, presenter notes, information location, and can be found in Appendix E.

The cohort made the following suggestions:

- The presentation should not have a lot of small text, rather more pictures and animations.
- One presenter should hold the clicker to avoid any distractions which was suggested to improve the fluidity of the presentation.
- Change the location of the video to an earlier time
- Explain the activities with further instruction.

4.4.2 Feedback from the pilot sessions

Feedback was gathered following the pilot sustainability training sessions at the Hive @ 10 event. The adult and the family sessions were each taught twice throughout the day and were structured so the family sessions were both right before and after midday. This allowed adults and families to have freedom to choose which section(s) they wanted to attend. The feedback forms asked the audience what they had learned, what can be improved and what they enjoyed from the session. This allowed for a general understanding of modifications within the training content and delivery.

The responses helped finalize our recommendations to the county libraries. This also provided further guidance for training alterations to direct trainings toward the population's specific needs and interests.

Once the adult session concluded, the trainees were provided a feedback form, displayed in Appendix F. The results written below are from the adult training session.

Material Covered and Organization:

All trainees agreed the material presented was well organized and was clearly defined.

Time allotted for the training:

The feedback forms indicated that all attendees thought that the time allotted for the training was not too much nor too little. They thought the forty-five-minute time frame with a fifteen-minute discussion was enough for the taster session offered.

The amount of material covered:

Each individual that attended the pilot sessions agreed that the amount of material covered was not too much. However, there was a split between the number of people who thought that there was too little information covered versus those who believed the amount covered was just enough. Out of the seven feedback forms, three respondents believed there was too little information in the presented training. Four out of the seven disagreed there was too little information taught.

Overall Takeaway:

Six individuals agreed the main takeaway of the training was that it is important to continue to learn about carbon literacy and that there are changes that can be taken to help the environment. One response stated a key takeaway was to watch their food consumption and to use the food calculator.

Favorite aspect of the training:

Many of the attendees liked the discussion at the end, as well as the activities presented during the training. Another successful activity was the food calculator. Most attendees were shocked to learn that the food they consume can produce carbon emissions equivalent to that of a petrol car.

Least favorite aspect of the training:

There were few responses to this question. However, one person acknowledged there was not enough attendance within the training session.

General improvements:

For improvements, one person suggested to add more in-depth information as most people are already aware of climate change. Some people wanted more graphs and images in the presentation and one person thought that switching out the word "change" in "climate change" to "catastrophe" would send a more aggressive and stronger message. Following the first adult training, one of the attendees emailed feedback and suggestions for general improvements. They stated it would be beneficial to create another training for those who already know a great deal about carbon literacy. Another suggestion was to set up a round table for an informal setting if the attendance is rather small. Providing a point of contact for follow-up communications or about future trainings was also recommended. This will allow trainees to have another way to provide feedback outside of our initial form.

*Feedback from the family sessi*ons:

The information below was collected from the family sessions. Families were given an activity that consisted of three questions to finish with their children. This demonstrated what the child already knew or learned from the session. On the back of the sheet, there was a section for the parents to complete. This would help us understand what they enjoyed and what they want to see for future programs. The feedback form can be found in Appendix G.

Three question activity:

For the last activity of the session (following the story time, drawing activity, and bird feeder craft), we provided the families three questions, one involved another quick drawing activity. The first two questions were multiple choice and asked which options were good and bad for the environment. The drawing activity asked the children to draw what they already do to help the planet. All thirteen forms had the questions filled out correctly.

Favorite part of the event:

Many of the families enjoyed the drawing activity as well as the bird feeder activity. Nine out of the thirteen families enjoyed making the bird feeder. Two families said they enjoyed story time, and three loved the drawing activity. One family expressed that they loved that the event was free and open to the public.

Activities for next time:

Five families wanted more arts and craft activities. One suggestion was to add child friendly videos to explain the concepts. Four families also wanted composting and recycling activities incorporated into the event. One family also suggested incorporating physical activities such as singing and dancing.

5.0 Conclusions and Recommendations

This chapter outlines the conclusions made based on the results from our methodology and analyzing the data detailed in the previous chapter. The chapter also outlines the team's recommendations for future work on this project.

5.1 Conclusions

5.1.1 The different populations show a need for an adult session and a family session

Based on responses from the user survey, it was found that the common users were part-time workers, full-time workers, and parents. The LCA survey data indicated children and the 60+ community were common users of the library as well. Thus, we concluded two separate programs were needed: one for an adult audience and the other for families. The adult session was targeted for people 18 years or older and included more detailed coverage of the Carbon Literacy content using a more traditional training approach. The family session was designed for parents to participate in a program with their children which offered learning about the environment and how they can protect it.

5.1.2 The best time to deliver Carbon Literacy Training is outside school and working hours

Survey data showed the popular times in the libraries are from 07:00–12:00 and 14:00–16:00. In addition, library users are a mix of parents and full and part-time workers, as well as seniors (60+). We concluded the best time for a training delivery would be outside of school or work hours. This could include hosting events in the early evening just after work lets out or on the weekends, allowing for parents to attend with their children.

5.1.3 There is not one preferred learning method amongst the demographics.

Based on our surveys, we concluded that, when given multiple ways to learn, the population was split on the four options given. The learning styles provided were Audio (Listening to Speaker), Interactive/Hands-on activities, Visual (Pictures/Videos), and Reading/Writing (Informational leaflet). Therefore, we implemented all the above learning methods into our carbon literacy training sessions so that every learning style was addressed.

5.1.4 The preferred training length by users was a shorter taster session

According to the results, it was shown that both library customer advisors and library users preferred either a 30-minute or 1-hour long session for any learning session. This data contrasts with the accredited training developed by the Carbon Literacy Project, that is comprised of four 2-hour long modules. As a result, we designed the content for our trainings from the accredited training to be 45 minutes instead of 2 hours as a compromise for those who preferred 30-minute sessions and 1-hour sessions.

5.2 Recommendations

This section will detail a set of recommendations to the Hive and Worcestershire Libraries about carbon literacy trainings.

1) Worcestershire Libraries should pilot and deliver the training throughout Worcestershire.

Since this project concluded with our team only piloting the trainings at the Hive, we recommend piloting the trainings throughout the county and gathering feedback for further training improvement. This could be done through the partnerships developed, allowing for young adults to take on the role of introducing carbon literacy to children, for example. There could be non-profit organizations, teachers, and professors taking the training and implementing it into their lectures and coursework. Future Interactive Qualifying Projects could expand upon piloting the taster sessions and how to better implement the trainings into Worcestershire libraries.

2) The libraries should place more focus on promoting the training sessions

One key element was a lack of focus on promoting the training sessions. We recommend better publicity and developing more efficient ways to reach the public. This could include posting the sign-up links to the training in areas that are easily accessible, ensuring that the links work, and placing flyers and posters up weeks in advance. Another suggestion would be to post about the sustainability training event a few weeks prior, and as the event week comes around, consistently post it on social media stories, and have the library customer advisors mention it as they are checking out books to the patrons. Lastly, we suggest seeking out newspaper coverage or media releases.

3) The Worcestershire libraries should develop partnerships with other organizations

Through speaking with the library cluster managers and the library customer advisors, it appeared that the libraries had only a few partnerships with other organizations such as scouts and other schools in the area. We believe it is important to expand on these relationships. Scouts can be provided the opportunity to take and conduct the trainings themselves. Also, teachers and university instructors can take the trainings and implement them in their own classroom lectures. This would help with expanding carbon literacy, teaching children at a young age, with the hope they can take the knowledge and carry out basic sustainable practices in their everyday lives. The libraries could also partner with different companies or local non-profits that have a focus on sustainability, where other individuals can take on the trainer role and help others start becoming or continue to be carbon literate with the taster training session for adults.

4) The Hive and Worcestershire Libraries should offer the accredited training at no or minimal cost to the participant

After the trainings have been delivered and piloted to the public, it is important to offer a pathway and the next steps needed for participants to further their carbon literacy education. We recommend determining a way to implement/offer the accredited training within the Worcestershire libraries. As of right now, the only option to further carbon literacy education outside of the University of Worcester is the paid training through the CLP website. A possible barrier could be the cost to take the accredited training. We believe that making the accredited training low-cost or free and easily accessible is essential to promoting carbon literacy in Worcestershire. Due to a couple of attendees being more knowledgeable on carbon literacy, offering the accredited training will allow them to skip over the basic training session. This provides more options that an individual can choose from, and not just the taster training session.

Recommendation for Future Projects:

Future Interactive Qualifying Projects could expand upon piloting the taster sessions and how to **better implement the trainings into Worcestershire libraries. They could also refine the training so it can be readily incorporated it into the Worcestershire education system, allowing teachers and professors to use it in their lectures and curriculum.**

References

Boom, Katy. (2021, November 10). *Carbon Literacy Training*. Susthingsout. https://susthingsout.com/carbon-literacy-training/

Boom, Katy, & Jenkins, Will. (2020, September 11). *Sustainability Strategy 2020-2030*. The University of Worcester. https://www.worcester.ac.uk/documents/sustainability-strategy-2030.pdf

British Geological Survey. (2021, June 4). *The greenhouse effect*. British Geological Survey. Retrieved February 7, 2022, from https://www.bgs.ac.uk/discovering-geology/climate-change/how-does-the-greenhouse-effect-work/

Cambridge. (n.d.). *Power*. Cambridge Dictionary. https://dictionary.cambridge.org/dictionary/english/power

Carbon Literacy Project (2022). *The Carbon Literacy Project*. Carbon Literacy Project. https://carbonliteracy.com/faq/

Climate Change Committee. (2021). *Independent Assessment of UK Climate Risk*. https://www.theccc.org.uk/wp-content/uploads/2021/07/Independent-Assessment-of-UK-Climate-Risk-Advice-to-Govt-for-CCRA3-CCC.pdf

Climate Watch (2021). *Climate Watch Historical GHG Emissions*. [Data Set]. Washington, DC: World Resources Institute. https://www.climatewatchdata.org/ghg-emissions.

Corrall, Ruth (October 2020). *Worcester City Council's Environmental Sustainability Strategy 2020-2030* [PowerPoint Slides]. Worcester City Council. https://www.worcester.gov.uk/component/fileman/file/PDF%20Documents/Sustainability/Environmental%20Sustainability%20Strategy.pdf?routed=1&container=fileman-files

COVID-19 restrictions cut household emissions - Office for National Statistics. (n.d.). Www.ons.gov.uk. Retrieved March 30, 2022, from https://www.ons.gov.uk/economy/environmentalaccounts/articles/covid19restrictionscuthouseholdemissions/2021-09-21#:~:text=Total%20household%20emissions%20%2D%20including%20personal

Crown copyright. (2021, March 25). *2020 UK greenhouse gas emissions, provisional figures - GOV.UK*. 2020 UK greenhouse gas emissions, provisional figures. Retrieved February 7, 2022, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/972583/2020_Provisional_emissions_statistics_report.pdf

Department for Transport. (2021, October 19). *Transport and environment statistics: Autumn 2021*. GOV.UK. https://www.gov.uk/government/statistics/transport-and-environment-statistics-autumn-2021/transport-and-environment-statistics-autumn-2021

United Kingdom Department of Business, Energy and Industrial Strategy. (2020. May 7). *BEIS Public Attitudes Tracker.* Department of Business, Energy and Industrial Strategy.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/884028/BEIS_PAT_W33_-_Key_findings_Final_.pdf

United Nations Department of Economic and Social Affairs. (2022). *The 17 Goals*. United Nations. https://sdgs.un.org/goals

Environmental Protection Agency. (2021, November 19). *Overview of Greenhouse Gases*. EPA. Retrieved February 7, 2022, from https://www.epa.gov/ghgemissions/overview-greenhouse-gases

Feilden Clegg Bradley Studios. (2022). *The Hive, Worcester Library*. Feilden Clegg Bradley Studios. https://www.fcbstudios.com/work/view/Worcester-Library

Google. (2022). Map of Worcestershire County and Worcester. https://www.google.com/maps/place/Worcester,+UK/@51.9526217,-2.275112,7.75z/data=!4m13!1m7!3m6!1s0x48704258776c199d:0x6ef16f39262bec07!2sWorcestershire,+UK!3b1!8m2!3d52.2545225!4d-2.2668382!3m4!1s0x4870505800bbccd5:0xab9aa4f4d0da911c!8m2!3d52.1936136!4d-2.2216415

GOV.UK. (2021, April 20). *UK enshrines new target in law to slash emissions by 78% by 2035*. GOV.UK. https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035

HM Government. (2021). *Net Zero Strategy: Build Back Greener.* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf

Kendon, M., McCarthy, M., Jevrejeva, S., Matthews, A., Sparks, T., & Garforth, J. (2020). State of the UK climate 2019. *International Journal of Climatology*, *40*(S1), 1–69. https://doi.org/10.1002/joc.6726

Kweku, D., Bismark, O., Maxwell, A., Desmond, K., Danso, K., Oti-Mensah, E., Quachie, A., & Adormaa, B. (2018). Greenhouse effect: Greenhouse gases and their impact on global warming. *Journal of Scientific Research and Reports*, *17*(6), 1–9. https://doi.org/10.9734/jsrr/2017/39630

Manchester Metropolitan University (2022). *Carbon Literacy*. Manchester Metropolitan University. https://www.mmu.ac.uk/sustainability/carbon-literacy

Met Office. (2021). *What is climate change?* Met Office. Retrieved February 7, 2022, from https://www.metoffice.gov.uk/weather/climate-change/what-is-climate-change.

Moody, William. (2021, May). *2021 Cambridge Carbon Literacy Impact Report*. University of Cambridge. https://carbonliteracy.com/wp-content/uploads/2021/08/May-2021-Cambridge-Carbon-Literacy-Impact-Report.pdf

NOAA National Center for Environmental Information (2022). *Climate at a Glance: Global Time Series*. [Data Set]. NOAA National Centers for Environmental Information. https://www.ncdc.noaa.gov/cag/.

Richards, Emma Charlotte (June 2017). *Carbon Literacy: Knowledge (CLK) E-learning Effectiveness Report*. Carbon Literacy Project. https://carbonliteracy.com/wp-content/uploads/2018/09/CLK-E-learning-Effectiveness-Report-Online-Format.pdf

Road transport and air emissions - Office for National Statistics. (n.d.). Www.ons.gov.uk. https://www.ons.gov.uk/economy/environmentalaccounts/articles/roadtransportandairemissions/2019-09-16#greenhouse-gas-emissions-from-road-transport-make-up-around-a-fifth-of-uk-greenhouse-gas-emissions

Students Organising for Sustainability. (n.d.). *Carbon Literacy - Learning Academy training: SOS-UK*. Students Organising for Sustainability UK. Retrieved February 7, 2022, from https://www.sos-uk.org/learning-academy-trainings/carbon-literacy#:~:text=Carbon%20Literacy%20is%20defined%20as,%2C%20community%20and%20organisational%20basis.%E2%80%9D.

The United Kingdom's pioneering Climate Change Act. (2021, October 6). OECD. Retrieved February 7, 2022, from https://www.oecd.org/climate-action/ipac/practices/the-united-kingdom-s-pioneering-climate-change-act-c08c3d7a/

Topic: Transportation emissions in the UK. (n.d.). Statista. https://www.statista.com/topics/6270/transport-emissions-in-the-uk/#topicHeader__wrapper

Worcestershire County Council (2021, July 16). *County Council Has Declared a Climate Emergency*. Worcestershire County Council. https://www.worcestershire.gov.uk/news/article/2586/county_council_has_declared_a_climate_emergency

Worcestershire County Council (2021). *Population Statistics and Projections* [Data Set]. Worcestershire County Council. https://app.powerbi.com/view?r=eyJrIjoiYWZkNmM2ZDktMGFkOC00YjljLThhNjUtZDUxZTgyMDg3NjJiIiwidCI6ImFjZjQxODg3LWJkMzctNDVkMy05ZTY1LTQ3Y2RlNDhkYzg1YSIsImMiOjh9

Worcestershire County Council (2020/21). *Worcestershire County Council Annual Greenhouse Gas (GHG) Emissions Report 2020/21.* [Data Set]. Worcestershire County Council. https://www.worcestershire.gov.uk/download/downloads/id/11644/greenhouse_gas_ghg_emissions_report_2020_to_2021.pdf

Worcestershire County Council (2020). *Worcestershire County Council's Net Zero Carbon Plan 2020* [PowerPoint Slides]. Worcestershire County Council. https://www.worcestershire.gov.uk/download/downloads/id/13821/net_zero_carbon_plan_2020.pdf

GOV.UK , (March 2020), 2019 UK Greenhouse Gas Emissions: Summary -. Department for Business, Energy & Industrial Strategy. Retrieved February 6, 2022, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957687/2019_Final_emissions_statistics_one_page_summary.pdf

Worcestershire County Council. (*2020*), *Library catchment areas*. Worcestershire County Council. https://www.worcestershire.gov.uk/download/downloads/id/12160/worcestershire_library_strategy.pdf

UK Government. (2019). *Climate Change Act 2008*. Legislation.gov.uk. https://www.legislation.gov.uk/ukpga/2008/27/contents

United Kingdom Office for National Statistics. (2021, November 5). *Three-quarters of adults in Great Britain worry about climate change.* Office for National Statistics. https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/threequartersofadultsingreatbritainworryaboutclimatechange/2021-11-05

University of Worcester. (2022). *About the Hive.* University of Worcester. http://www.thehiveworcester.org/about-the-hive.html

Appendix A
Interviews with Library Directors

We are the Carbon Literacy IQP team consisting of Lauren Balukonis, Adam Marsh, Amy Ngan, and Blake Pedersen. We are identifying criteria and delivery methods of carbon literacy trainings that could be implemented into Worcestershire County Libraries as part of our Interactive Qualifying Project in D22. We believe that an interview with you will provide us with a better understanding of how your library operates and what the population of your library is.

Firstly, it is important to let you know that this interview is voluntary, and you may withdraw at any time. We expect that this interview will last approximately 15-20 minutes. Your name and title will be used as a reference point in our research, and you can remain anonymous if you choose to be so. If at any point you feel uncomfortable with the questions or interview, the question can be skipped, and the interview can end.

By agreeing to participate in this interview, affirm that you give your consent for Lauren Balukonis, Adam Marsh, Amy Ngan, and Blake Pedersen to record this interview and to use your responses in our research.

If you have any concerns or questions about your rights as a participant in this research, you can contact the Worcester Polytechnic Institute Institutional Review Board at irb@wpi.edu.

Do you confirm that you are over 18 years old? Do you give your consent to participate in this interview?

___ **YES** I agree to participate in this interview.
___ **NO** I do not agree to participate in this interview.

Below are the questions that will be asked in the interview:

A1) What is your official job title at this library? Did you have any positions before this?

A2) How long have you been in your position at the library?

A3) What are the types of demographics that you see use this library?

A4) Is there a certain demographic that seems to be more common compared to others?

A5) Do weekdays or weekends make a difference on how many people visit in person vs. online?

A6) Are there certain times of day that are more popular than others? This goes for both in person and online users.

A7) How many people visit this library in person and use the physical resources offered?

A8) How many people visit the library's website and access the online resources?

A9) Are there certain areas around the library that are more popular than others?

A10) What are the current forms of outreach to the public through the library?

A11) Do most of your users have a library card?

A12) Do you host guest speakers or educational workshops for different topics? Are there any online trainings offered?

A13) What are the most well attended events?

A14) Do you have any data on these events and attendance records? (Where are they held?)

A15) What do participants like/dislike according to feedback?

A16) Is there a general interest in environmental training, field trips, guest speakers?

A17) Do you currently have any partnerships with any organizations? Boy Scouts?

A18) Have you hosted a training here before? If so, please elaborate.

A19) What kinds of events or workshops would you offer if you had the necessary resources?

A20) What further resources would you need to do so?

A21) Do you have any questions?

A22) Is there any staff you recommend we talk to?

Appendix B
Library Structure and Programs Survey

Hello! We are the project group from the United States consisting of Lauren Balukonis, Adam Marsh, Amy Ngan, and Blake Pedersen. We are working to research criteria and delivery methods of carbon literacy trainings that could be implemented into Worcestershire Libraries as part of an exchange project through the University of Worcester. We are also based out of the Hive and looking to provide feedback on how the trainings can be developed across Worcestershire. This survey is meant to provide us with information about your library's structure and the programs you offer.

The survey will take approximately 4 minutes to complete.

We thank you for taking time to complete this survey for us.

B1) Name

B2) What library or libraries do you represent?

B3) What are the types of age demographics that you see use the library the most? (Select all that apply)

a) Children (1 – 14)
b) Young Adults (15 – 22)
c) Working Age Adults (23 – 29)
d) Retired Adults (60+)
e) Other:

B4) Do weekdays or weekends make a difference on how many people visit the library?

B5) Are there certain times of day that are more popular than others? (Select all that apply)

a) Morning (7am – 12pm)
b) Noon (12pm – 2pm)
c) Mid-Afternoon (2pm – 4pm)
d) Evening (4pm and on)

B6) What programs or events are offered at your library?

B7) How do you promote your events or programs to your community?

B8) Would you say there is a general interest from you users for environmental awareness?

a) Yes
b) No
c) Maybe

B9) Would your users be interested in learning more about environmental awareness through a training session?

a) Yes
b) No
c) Maybe

B10) Which of the following training structures would best fit your demographic?

a) 30 minute taster session
b) 1 hour session
c) 1.5+ hour session
d) Other:

Appendix C
Survey of Interests and Knowledge of Library Users

Consent and Preamble:

You have been asked to complete this survey as part of a research project conducted by, Lauren Balukonis, Amy Ngan, Adam Marsh, and Blake Pedersen, a student project group at Worcester Polytechnic Institute in Worcester, Massachusetts, USA.

This study is designed to determine the prior knowledge and awareness about climate change and sustainability. Your participation will help inform Worcestershire Libraries about how to develop effective carbon literacy programs. Your responses are entirely voluntary, and you may refuse to complete any part or all of this survey. This survey is designed to be anonymous.

By completing and submitting the survey, you affirm that you are at least 18 years old and that you give your consent for the Carbon Literacy Team to store and use your answers in their research.

If you have any questions about this research before or after you complete the survey, please contact the Carbon Literacy Team at gr-uk22-cl@wpi.edu.

If you have any concerns or questions about your rights as a participant in this research, please contact the Worcester Polytechnic Institute Institutional Review Board at irb@wpi.edu.

Having read the above preamble, you understand that by checking the "Yes" button below, you agree to take part in this study.

___ **YES** I agree to participate in this survey.
___ **NO** I do not agree to participate in this survey.

We would like to start with a few demographic questions:

C1) What is your gender?

Female; Male; Other (Describe)

C2) What is your age group?

17 and under; 18 to 25; 26 to 40; 41 to 59; 60 and older

C3) Choose up to two of the following categories that best describes you.

School Children; Student; Full Time Worker; Part Time Worker;

Parent; Stay-at-Home Parent; Currently Not Working; Retired

C4) What is the highest level of education you have completed?

Some Secondary School; Secondary School; Some University;

University; Post-University

The next section of this survey will show various statements about climate change. Choose a number between 1(Strongly Disagree) and 7(Strongly Agree) corresponding to the extent you agree with each statement.

C5) I believe our climate is changing.

Strongly Disagree			Neutral			Strongly Agree
1	2	3	4	5	6	7

C6) I am concerned about global climate change.

Strongly Disagree			Neutral			Strongly Agree
1	2	3	4	5	6	7

C7) Global climate change will impact our environment in the next 10 years.

Strongly Disagree			Neutral			Strongly Agree
1	2	3	4	5	6	7

C8) Climate change is caused by human activity.

Strongly Disagree			Neutral			Strongly Agree
1	2	3	4	5	6	7

C9) The actions of individuals can make a positive difference in global climate change.

Strongly Disagree			Neutral			Strongly Agree
1	2	3	4	5	6	7

C10) Having an awareness about environmental issues is important.

Strongly Disagree			Neutral			Strongly Agree
1	2	3	4	5	6	7

C11) I currently take actions in my daily life to be environmentally friendly.

Strongly Disagree			Neutral			Strongly Agree
1	2	3	4	5	6	7

C12) I would be interested in learning more about the science behind climate change.

Strongly Disagree			Neutral			Strongly Agree
1	2	3	4	5	6	7

C13) I would be interested in learning more about my impact on the environment.

Strongly Disagree			Neutral			Strongly Agree
1	2	3	4	5	6	7

C14) I would be interested in learning more about specific actions I can take to help the environment.

Strongly Disagree			Neutral			Strongly Agree
1	2	3	4	5	6	7

Appendix D
Survey Questions for Collecting Learning and Delivery Preferences

D1) How would you find new information on a topic of interest? (Select all that apply)

a. Search on your phone
b. Use your personal computer
c. Go to the library computer
d. Check out a book on that topic
e. Other

D2) Have you ever attended library events?

Yes
No

D3) If so, what specific event(s) have you attended?

D4) What did you like or dislike about the event(s)?

D5) Which of the following would help you learn new information? (Select all that apply)

a. Listening to a speaker
b. Interactive/Hands-on activities
c. Pictures or videos depicting information
d. Informational leaflet

D6) How would you prefer to be contacted about events/activities?

a. Email
b. Phone
c. Mail
d. Social Media

D7) What structure for a learning session would you prefer? (Select all that apply)

a. 30 Minute Session
b. 1 Hour Session
c. 1.5+ Session

Appendix E
Feedback form Given to Audience at Cohort Session

E1) Did you learn new information from this training session? (Please Specify)

E2) What did you like about the training session?

E3) What did you dislike about the training session?

E4) What would you change about the training session?

E5) Other Comments:

Appendix F
Adult Session Feedback Form

Sustainability Training Evaluation Form

Thank you so much for attending our carbon literacy taster session. It would be greatly appreciated if you could take some time to fill out this feedback form

Course Evaluation:

F1) The material covered was clearly defined and met

Strongly Agree Agree Neutral Disagree Strongly Disagree

F2) The content was organized and easy to follow

Strongly Agree Agree Neutral Disagree Strongly Disagree

F3) The time allotted for the training was too much

Strongly Agree Agree Neutral Disagree Strongly Disagree

F4) The time allotted for the training was too little

Strongly Agree Agree Neutral Disagree Strongly Disagree

F5) The information taught was too much

Strongly Agree Agree Neutral Disagree Strongly Disagree

F6) The information taught was too little

Strongly Agree Agree Neutral Disagree Strongly Disagree

F7) This training was useful and the content will be carried out in my day-to-day life

Strongly Agree Agree Neutral Disagree Strongly Disagree

What was your overall takeaway from the training?	
What was your favorite aspect of the training?	
What was your least favorite aspect of the training?	
What do you believe could be improved upon?	
What did the trainer(s) do well?	
What can the trainer(s) do to improve your experience for the training?	
What is one thing that you learned in this training that you can implement and practice in your life?	

Appendix G
Family Session Feedback Form

ACTIVITY

G1) Which is good for the environment? (*Select all that apply)*

a. Recycling
b. Composting
c. Eating Too much Meat
d. Leaving your lights on overnight

G2) Which is bad for the environment? (*Select all that apply)*

a. Littering
b. Wasting food
c. Reducing

G3) Draw what you do already to help the planet!

For the parents:

Thank you for attending the sustainability training with your kids! It would be greatly appreciated if you could take a few minutes to fill out this feedback form so that we know what to improve on!

What was your favorite part of the event?	
Which activity was your favorite?	
What kind of activity would you want next time?	
What did you learn today?	