University of Southampton

Creativity & Carbon

Creating a toolkit for exploring the environmental impact of cultural and creative authentic assessment

CHEP

WORK FUTURES Research Centre

CONTENTS

SUMMARY

This report outlines and shares findings and recommendations from *Measuring the environmental impact of cultural and creative sector authentic assessment* – a project funded by the Centre for Higher Education Practice (CHEP) at the University of Southampton. This project connects higher education's learning and teaching focus on sustainability with cultural and creative sector initiatives to examine how students can measure and reflect on the environmental impact of authentic assessment activities. Part one states the aims, contexts and activities. Part two outlines the carbon calculator development process and current version. Part three shares feedback and reflections. Part four gathers together the project outputs.

Funding

This project was funded through the University of Southampton Centre for Higher Education Practice (CHEP) Enhancement Development Fund 2023-24.

Ethics

This project ran from September 2023 to July 2024 and received ethical approval from the University of Southampton: 88745.

Achnowledgements

The project team acknowledge and thank the following:

Professor Simon Kemp and Professor Ven Tauringana for participating in interviews during the development stage.

Academic staff, technicians, and students from the Department of Fashion and Textiles at Winchester School of Art (University of Southampton) for their time and participation.

Participants in the workshop delivered during the CHEP 2024 festival for their feedback and suggestions.

PART 1: CONTEXT

1.1 Aim

This project connects higher education's learning and teaching focus on sustainability with cultural and creative sector initiatives to examine how students can measure and reflect on the environmental impact of authentic assessment activities.

1.2 Project Team

The project was developed by Professor Daniel Ashton, Professor Clio Padovani and Professor Amanda Bragg-Mollison.

The project team was Professor Daniel Ashton, Professor Clio Padovani and Michael Kurniawan.

1.3 Research Question

This project addresses the following research question:

How can the environmental impact of cultural and creative sector authentic assessment activities be measured and reflected on within learning and teaching?

1.4 Research Contexts

This project connects the following contexts:

- → Education for Sustainable Development (ESD)
- → Authentic Assessment
- → The Cultural and Creative Industries

Education for Sustainable Development (ESD)

This project engages with Education for Sustainable Development (ESD), defined as 'the process of creating curriculum structures and subject-relevant content to support and enact sustainable development' (Advance HE and QAA, 2021: 8). As the report sets out, 'the education sector has a key role to play in ensuring its graduates are ready for the environmental, economic and social challenges the world faces. ESD and the competencies and skills on which it rests will play a crucial part in achieving this aim' (Advance HE and QAA, 2021: 4).

At the University of Southampton, sustainability is an integral part of the **Education and Student Experience Strategic Plan** through the goal 2 of 'ensuring our curriculum design, content and education practices reflect our University's priorities on equality and inclusivity, and sustainability', and **Sustainability Strategic Pla**n goal 4 to 'ensure that sustainability is a part of every University education programme by 2025.'

This project takes these ESD priorities and approaches and connects them to authentic assessment. Whilst issues of sustainability and environmental impact are relevant across education and student experience, authentic assessment stands out for sustained investigation given the ways it can position students to apply their learning in different settings.

Authentic Assessment

Authentic assessment is a way for students to engage with societal challenges and explore possibilities for a better future. Examples of this include professional scenarios and simulated learning (Nguyen, 2022). It is essential that authentic assessments which position students to engage with different societal scenarios to apply their learning are attentive to the sustainable development challenges of these scenarios and are engaged with opportunities for learning and reflection.

McArthur (2023) critically evaluates the development of authentic assessment, noting the diversity of uses and some of the contradictions and conflations around innovative assessments and real-world learning. Noting the rare exception of Forsyth and Evans (2019) who use authentic assessment to address decolonialisation, McArthur (2023: 87) summarises that 'the promotion of authentic assessment is generally linked to innovative approaches to higher education teaching, learning, and assessment.' In turn, McArthur (2023: 93) proposes three key principles:

1. Move from thinking of the real world or world of work to thinking in terms of society
2. Move from a focus on the task, to the reason for doing the task

3. Embrace a transformative relationship with society, with authentic assessment not just perpetuating what already exists, but propelling us on to a better future for all

McArthur's (2023) approach to rethinking authentic assessment and these three key principles provide a compelling and practical way for this project to connect together ESD and authentic assessment. It helps frame the problem or challenge in how students engaging in their learning and authentic assessment activities can understand and reflect on the impact of what they are doing.

Fawns et al. (2024) also offer insightful cautionary notes in their discussion on the judicious use of the concept of authentic assessments. In their consideration of preparing students for their futures, Fawns et al. (2024: 2) summarise how 'authentic assessment aims to foster adaptable, lifelong learners equipped to navigate increasingly unpredictable futures, through enhancing relevance and application of learning to future professional, personal and social contexts.' They go on to note four critiques around the relationship between authenticity in assessment and preparing students for the future – two of which are particularly pertinent in framing this project.

Firstly, they note that 'students' future contexts are often uncertain and unknown, which makes it problematic to define authentic, future-oriented practices' (Fawns et al., 2024: 3). Recognising uncertainty in how sustainability and environmental impacts might relate with different industry sectors that students could work within, the research question for this project focuses on how students can understand and reflect on their decisions rather than develop a checklist or toolkit of current 'best' practices.

Secondly, Fawns et al. (2024: 3) state, 'we do not want authentic assessment to simply replicate potentially problematic practices.' They go to suggest how this means 'looking beyond a focus on replicating "real world" work contexts [...] to prepare and equip graduates for knowledgeable and agentic action in a future yet to be shaped.' In this respect, the priority for this project was to explore how students might gain an immediate understanding of the challenges associated with the environmental sustainability of their practices and decisions. In doing so, their transition into industry contexts would already be underpinned with both an awareness off and experience in negotiating possible futures rather than fixed ways of working.

This project identifies the need to enable students to both understand and reflect on the impact of authentic assessment activities. Whilst ESD focuses on inter-connected environmental, economic and social challenges and these challenges are all relevant across higher education subject areas, this project proposes a targeted focus on environmental impact and the cultural and creative industries (CCIs).

The Cultural and Creative Industries (CCI)

The Creative Industries Policy and Evidence Centre commissioned report Creative Industries and the Climate Emergency establishes the environmental impact of different sectors (e.g., fashion, music, publishing) and the different roles for the CCIs, including decarbonisation, new products and infrastructures, and in relation to attitudes and behaviours. In terms of environmental impact, the report notes that, 'an important part of industry activity is the development of a number of industry toolkits for calculating carbon emissions and to assist businesses in implementing climate strategies' (Creative Industries Policy and Evidence Centre, 2022: 6).

Perhaps the most well-known toolkit is Julie's Bicycle **Creative Climate Tool** which is used by Arts Council England National Portfolio Organisations in their environmental reporting. There are also sector specific approaches and resources, for example the **Theatre Green Book** and the Albert Toolkit for screen industries. Alongside existing resources, the **Creative Catalyst Fund** is a fund to the 'finance research and development of an innovative new product/system or process that decarbonises or reduces waste within the Creative Industries, reducing impact on our climate and/or leading us towards net zero.' There are also accreditation schemes such as the 1-3 star certification by **Albert** for those 'actively taking steps to reduce [a] production's carbon footprint' and the **B Corp Certification** for 'companies verified by B Lab to meet high standards of social and environmental performance, transparency and accountability.'

Returning to the local context for this research, this project draws the connections between the University of Southampton's **Sustainability Strategic Plan** goal 2 to measure emissions footprint, wider initiatives to conceptualise the impact of higher education institutions on sustainable development (see Findler et al., 2019), and steps in the CCIs to develop toolkits, resources and certification. This project specifically engages with the University of Southampton's **Sustainability Strategic Plan** goal 2 and the recommendation from the Creative Industries Policy and Evidence Centre's (2022: 44) Creative Industries and the Climate Emergency on 'promoting the use of tools and sharing learnings on their design.' In doing so, this project furthermore aligns with the University's **Sustainability Strategic Plan** goal 5 to 'make sustainability a cornerstone of UoS' research and societal impact.'

1.5 Approach

The project was structured around an iterative design and feedback process. There were five main stages:

1. Exploring existing carbon calculators

An extensive desk survey was undertaken (see section 2.1 and Table 1) in which carbon calculators developed within a variety of contexts were accessed and reviewed. Given the project's focus, there was particular emphasis on cultural and creative sector calculators (12 out of the 24 calculators in Table 1). As considered more in part 3, the focus is limited to UK-based calculators and there is vital and necessary further research required to understand different forms of knowledge production and different approaches to carbon calculating.

2. Exploring carbon reporting approaches

Interviews with University of Southampton colleagues - Professor Ven Tauringana on sustainability reporting (see: Small and Medium-sized Enterprises (SMEs) Sustainable Growth) and Professor Simon Kemp on carbon footprint (see: 'Towards a universal carbon footprint standard: A case study of carbon management at universities'). These interviews enabled further insights into carbon reporting and carbon calculators. The also included feedback on initial ideas and, alongside the desk survey, fed into prototyping a carbon calculator.

3. Prototyping a carbon calculator for CCI authentic assessments

Bringing together the insights from the review of existing calculators and the interviews, version 1 of the carbon calculator was developed. Through ongoing dialogue and feedback with Winchester School of Art colleagues (see part 2.2), version 2 was developed for piloting.

4. Piloting the carbon calculator with Winchester School of Art staff and students

An invitation to participate in a pilot was circulated to undergraduate and postgraduate Programme Leaders at Winchester School of Art.

The aims for the pilot were introduced as:

1. Explore how/if the environmental impact of assessments can be measured using the prototyped carbon calculator.
2. Support students in reflecting on the environmental sustainability aspects of their assessment activities/ submissions.
3. Evaluate how engaging with the carbon calculator might inform future staff and student practices and curriculum development.

Given circumstances, four programmes from the Department of Fashion and Textiles were positioned to participate:

- → BA Fashion Design
- → BA Textile Design
- → MA Fashion Design
- → MA Textile Design

The pilot process had four steps:

1. Draft version of toolkit shared with Programme/Module Leaders for initial feedback: What is covered? What is missing? What should/should not be measured.
2. Each programme participated in a briefing meeting that included a demonstration of the carbon calculator and a discussion of how the pilot could be integrated into programmes.
3. Programme/module leaders identified one session in semester 2 (February to May 2024) in which the project team could introduce the carbon calculator to students. Considerations for choosing the module: Are there any modules/learning outcomes where environmental sustainability features? Which module assessments include a creative output, exhibition, etc.?
4. Programme/module leaders reminded, encouraged and supported students to engage with the carbon calculator during the module and their assessment.

Following the pilot, there was an evaluation stage.

5. Evaluating the carbon calculator

The project included three evaluation methods:

1. a questionnaire for students.
2. a focus group with programme teaching teams.
3. the project team presented at the University of Southampton Centre for Higher Education Practice Festival 2024.

These are discussed in part 3 (Feedback and Reflections).

PART 2: CARBON CALCULATORS

2.1 Existing carbon calculators

There are various guides, resources, tools, and carbon calculators to measure and report carbon emissions. A desk-based study identified the following:

No.	Toolkit's name	User	Accessibility	Type
1.	ISO 14000 family of standards, especially the ISO 14001: criteria for Environmental Management System (EMS)	All types of organisations	Pay	Certification
2.	Global Reporting Initiative (GRI) Sector Standards	All types of organisations	Pay	Certification
3.	Greenhouse Gas Protocol	All types of organisations	Pay	Carbon Calculator & other resources
4.	Carbon Management Tools and Resources by Creative Carbon Scotland	Public	Free	Carbon Calculator & other resources
5.	Footprint by WWF	Individual daily lifestyles	Free	Questionnaire
6.	Carbonfootprint	Individual daily lifestyles	Free	Carbon Calculator
7.	Carbon Calculator by Climate Hero	Individual daily lifestyles	Free	Carbon Calculator
8.	Climate Interactive	Public	Pay	Training course
9.	Sustainability Tracking, Assessment & Rating System (STARS) by the Association for the Advancement of Sustainability in Higher Education (AASHE)	Education sector	Pay	Certification
10.	SusTEACH Carbon Calculator by the Open University	Education sector	Free for members of the university	Carbon Calculator & training course
11.	University of Southampton Sustainability Solutions	Education sector	Free for members of the university	Guide & other resources
12.	Creative Climate Tools: carbon calculator by Julie's Bicycle	Art & cultural sector	Free for a cultural organisation's staff	Carbon calculator, guides, & other resources
13.	Gallery Climate Coalition Carbon Calculator	Art & cultural sector	Free membership	Carbon calculator
14.	Theatre Green Book	Art & cultural sector	Individual or organisational membership	Toolkit, guides, & other resources
15.	LIVE Green	Art & cultural sector	Free	Guides & resources
16.	Albert's Production Toolkit by BAFTA	Film & TV industry	Free for a cultural organisation's staff	Carbon calculator, guides, & other resources

No.	Toolkit's name	User	Accessibility	Type
17.	Green Screen Environmental Productions	Film & TV industry	Pay	Toolkit, guides, & other resources
18.	Ad Green Carbon Calculator	Advertising industry	Paid company membership	Carbon calculator
19.	Carbon Calculator and Material Matrix	Publishing industry	Paid membership	Carbon calculator, guides, & other resources
20.	The Design Value Framework	Interactive leisure software industry	Paid membership	Network & training
21.	The Green Games guide	Interactive leisure software industry	Paid membership	Network & training
22.	Worldly: The Higg Index by the Sustainable Apparel Coalition/ Cascale	Fashion industry	Paid membership	Carbon calculator, guides, & other resources
23.	Textiles 2030 Roadmap	Fashion industry	Free membership	Guide & resources
24.	PEF Apparel Footwear	Footwear industry	Free	Toolkit, guides, & other resources

Table 1. Sample of various standards, frameworks, toolkits, carbon calculators, guides and resources on sustainability and carbon emissions.

Most of these are sector-specific and require the user to be a member or staff of an organisation or pay a membership fee to access them. The challenge lies in designing a carbon calculator that is universal enough to be used by students of various disciplines at Winchester School of Art and accommodate their varied learning activities, while also being comprehensive yet simple enough to help students develop a holistic understanding of the issue concerning sustainability, carbon emission measuring, reporting, and how it can influence their practice.

To address this, the project deconstructed various models of carbon calculators that are widely used, accessible, and most relevant. The desk-based study (stage 1) analysed six carbon calculators. The following figures provide an overview concerning the types of data that each calculator is gathering to calculate carbon footprint:

1. Footprint by WWF (See Figure 1.)
2. Carbon Calculator by Climate Hero (See Figure 2.)
3. Creative Climate Tools: carbon calculator by Julie's Bicycle (See Figure 3.)
4. Gallery Climate Coalition Carbon Calculator (See Figure 4.)
5. SusTEACH Carbon Calculator by the Open University (See Figure 5.)
6. Carbon Management Tools and Resources by Creative Carbon Scotland (See Figure 6.)

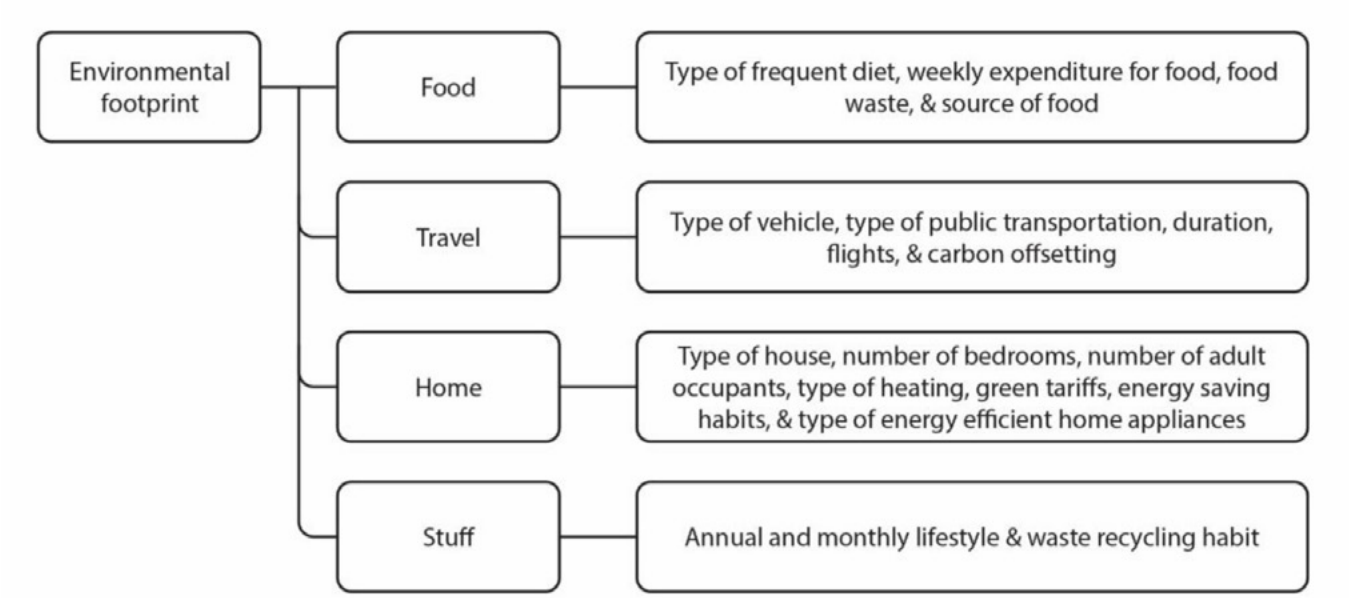


Figure 1. Model of carbon calculator for individual daily lifestyle based on the Footprint-WWF.

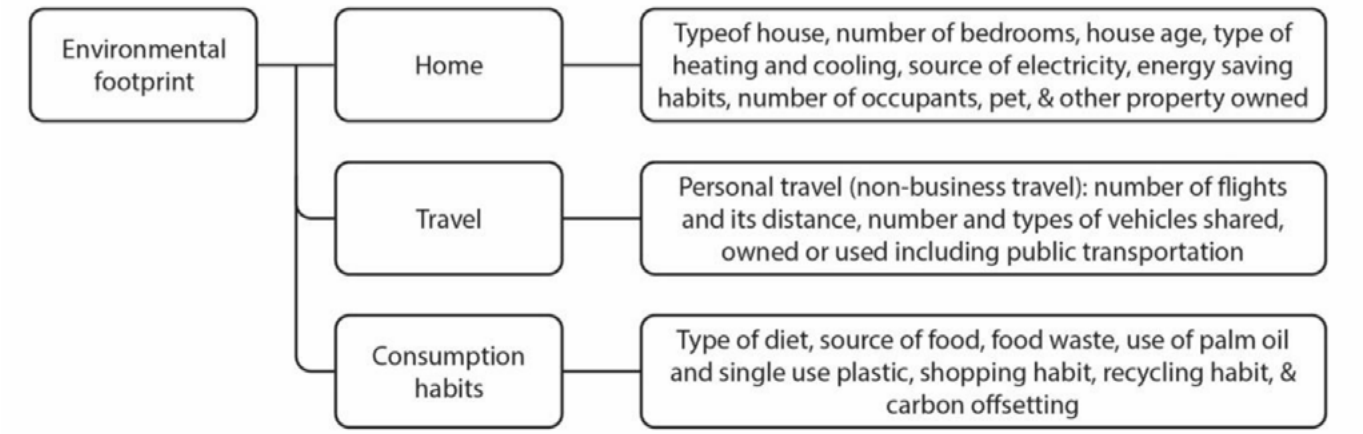


Figure 2. Model of carbon calculator for individual daily lifestyle based on the ClimateHero.

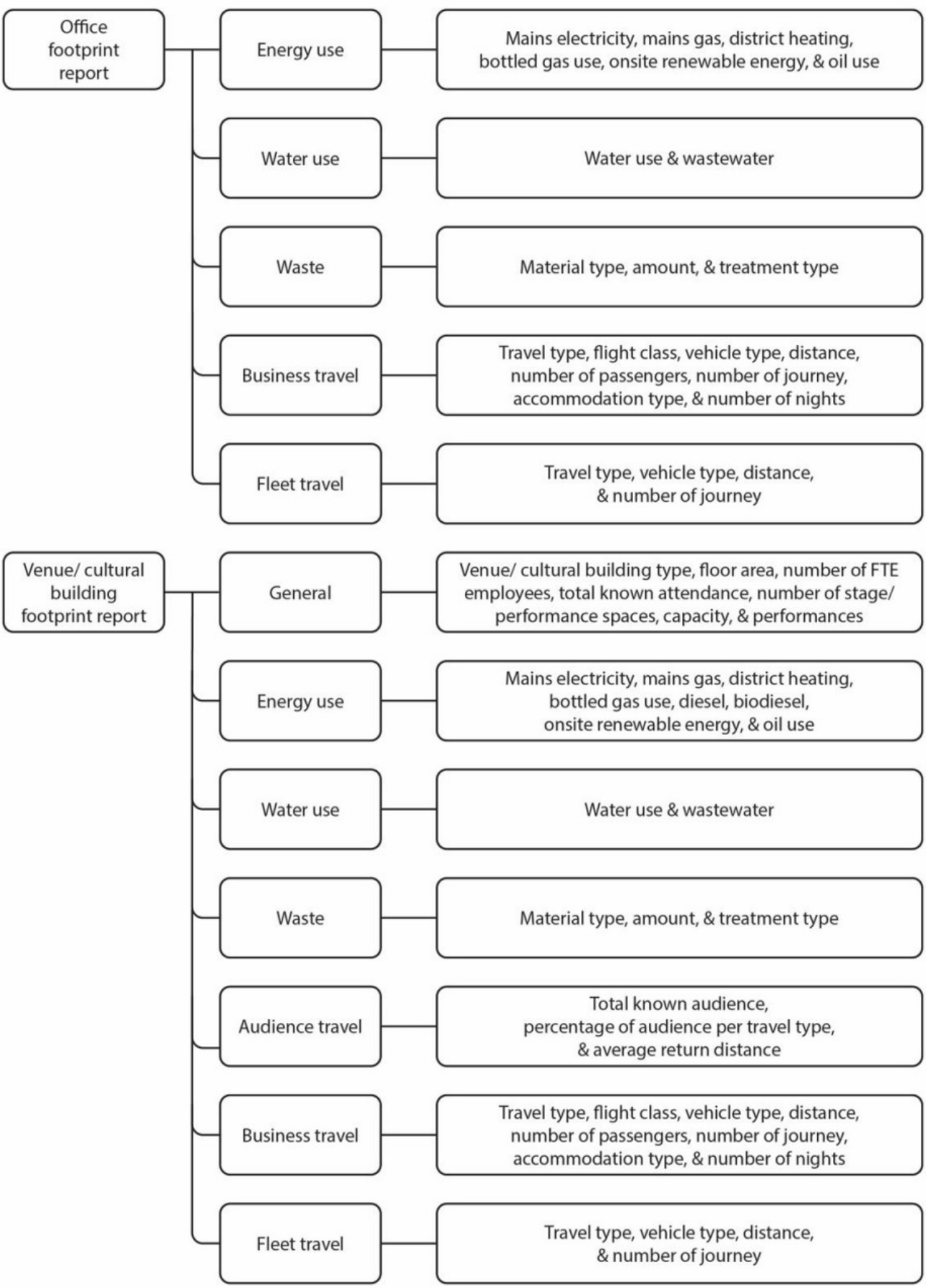
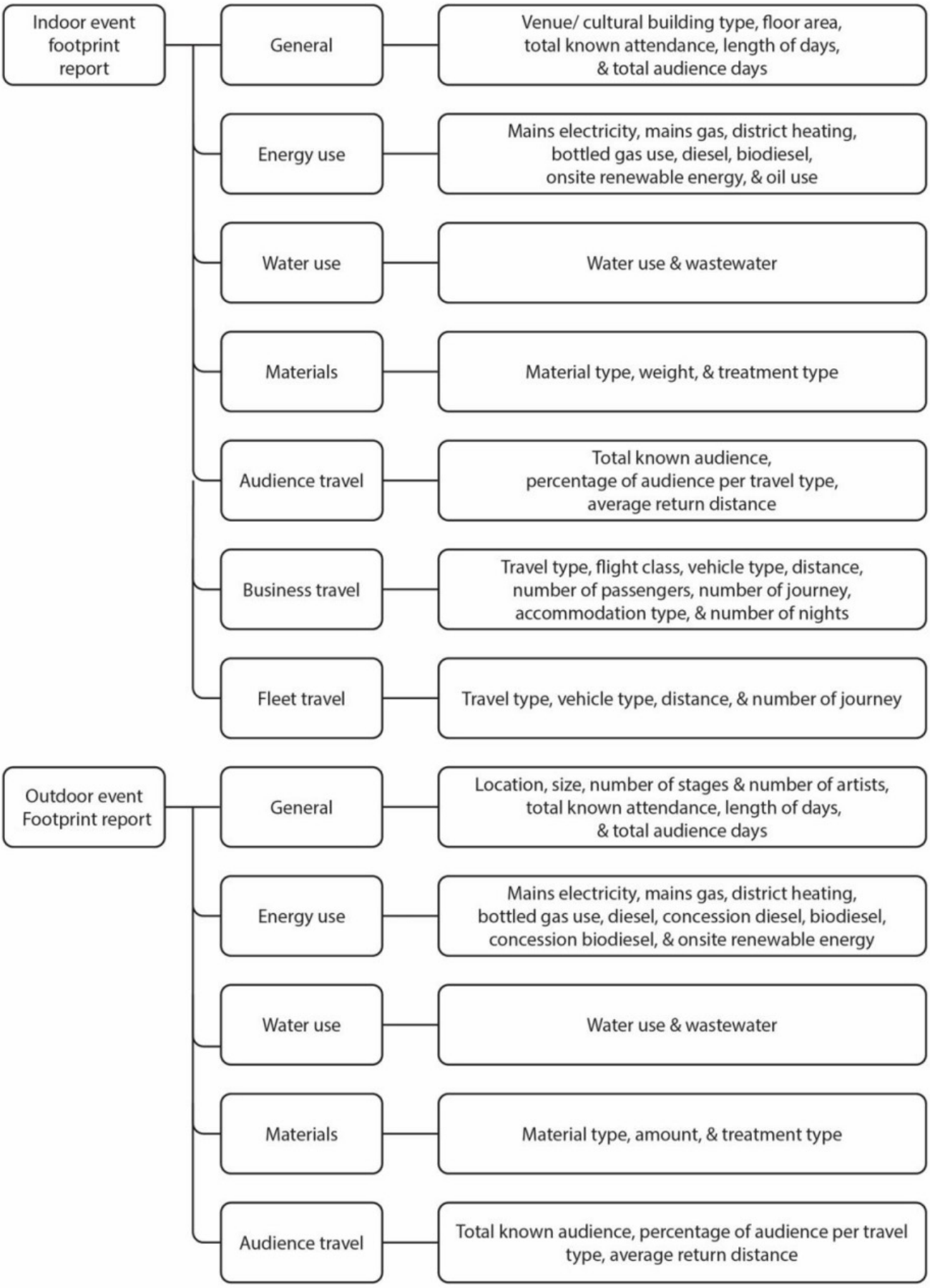


Figure 3. Model of carbon calculator for cultural sector based on the Julie's Bicycle.


Indoor event footprint report
General
Venue/ cultural building type, floor area, total known attendance, length of days, & total audience days
Energy use
Mains electricity, mains gas, district heating, bottled gas use, diesel, biodiesel, onsite renewable energy, & oil use
Water use
Water use & wastewater
Materials
Material type, weight, & treatment type
Audience travel
Total known audience, percentage of audience per travel type, average return distance
Business travel
Travel type, flight class, vehicle type, distance, number of passengers, number of journey, accommodation type, & number of nights
Fleet travel
Travel type, vehicle type, distance, & number of journey
Outdoor event Footprint report
General
Location, size, number of stages & number of artists, total known attendance, length of days, & total audience days
Energy use
Mains electricity, mains gas, district heating, bottled gas use, diesel, concession diesel, biodiesel, concession biodiesel, & onsite renewable energy
Water use
Water use & wastewater
Materials
Material type, amount, & treatment type
Audience travel
Total known audience, percentage of audience per travel type, average return distance

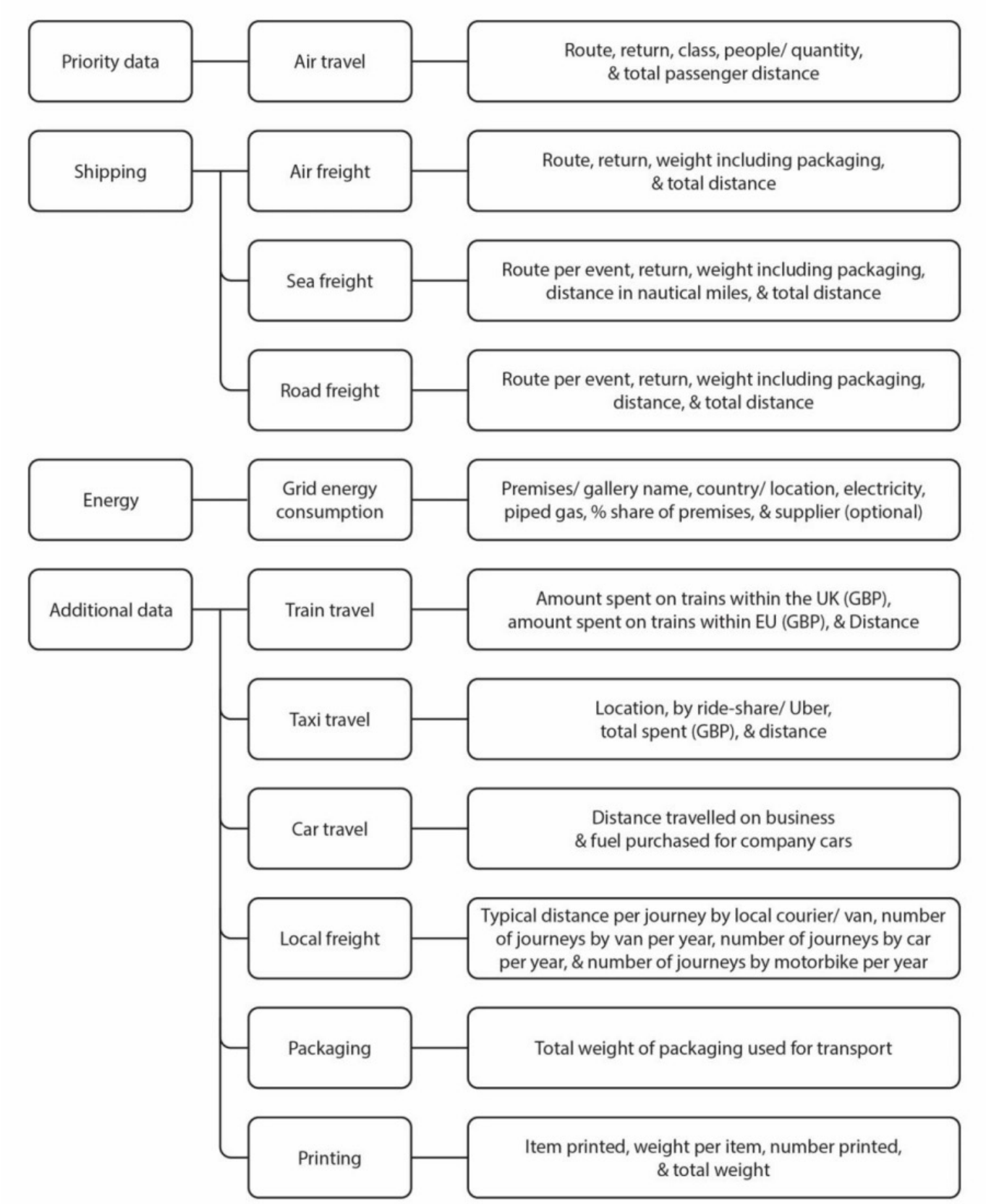


Figure 4. Model of carbon calculator for cultural sector-gallery based on the Gallery Climate Coalition.

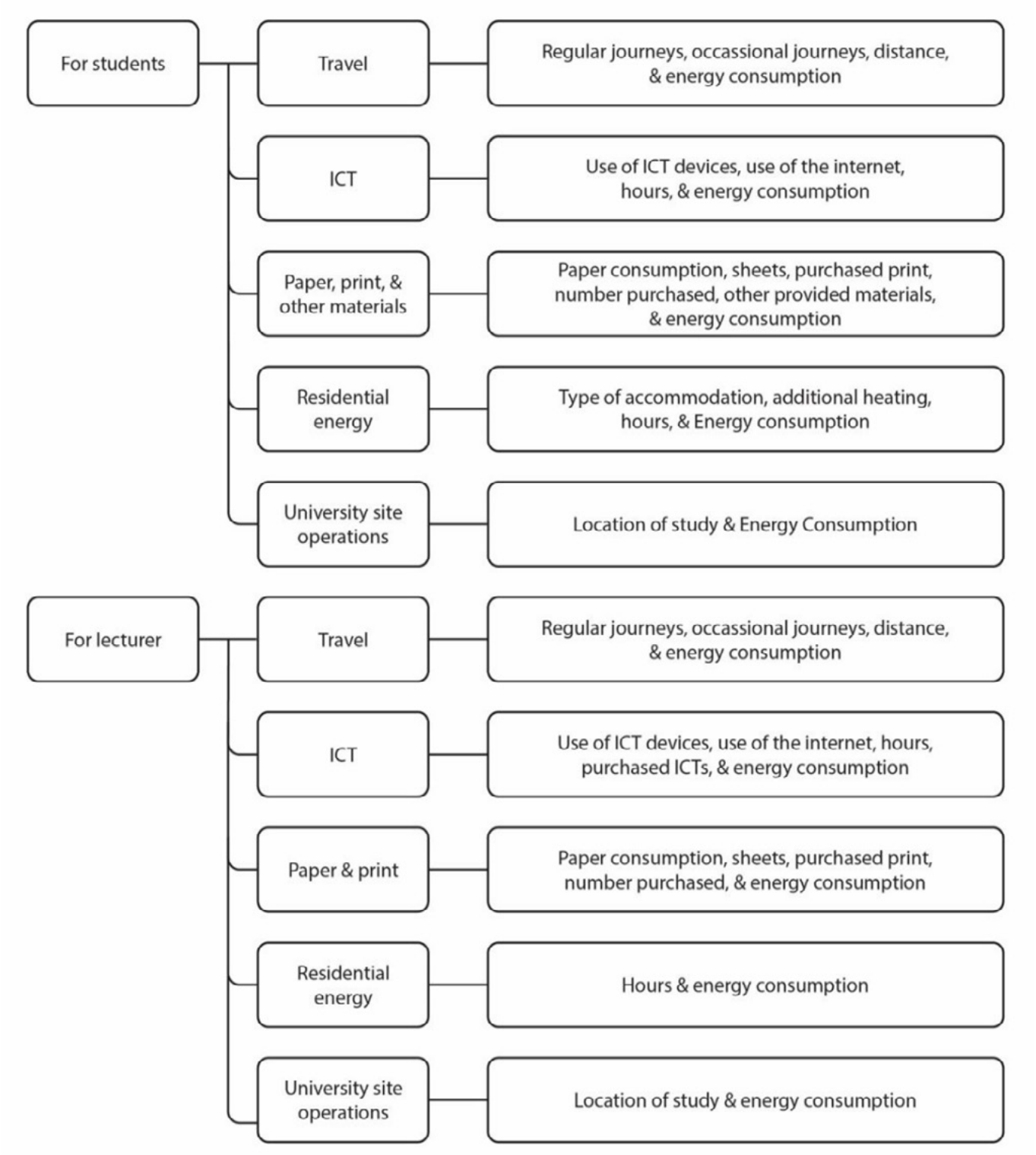


Figure 5. Model of carbon calculator for education sector based on the Sus TEACH- Open University.

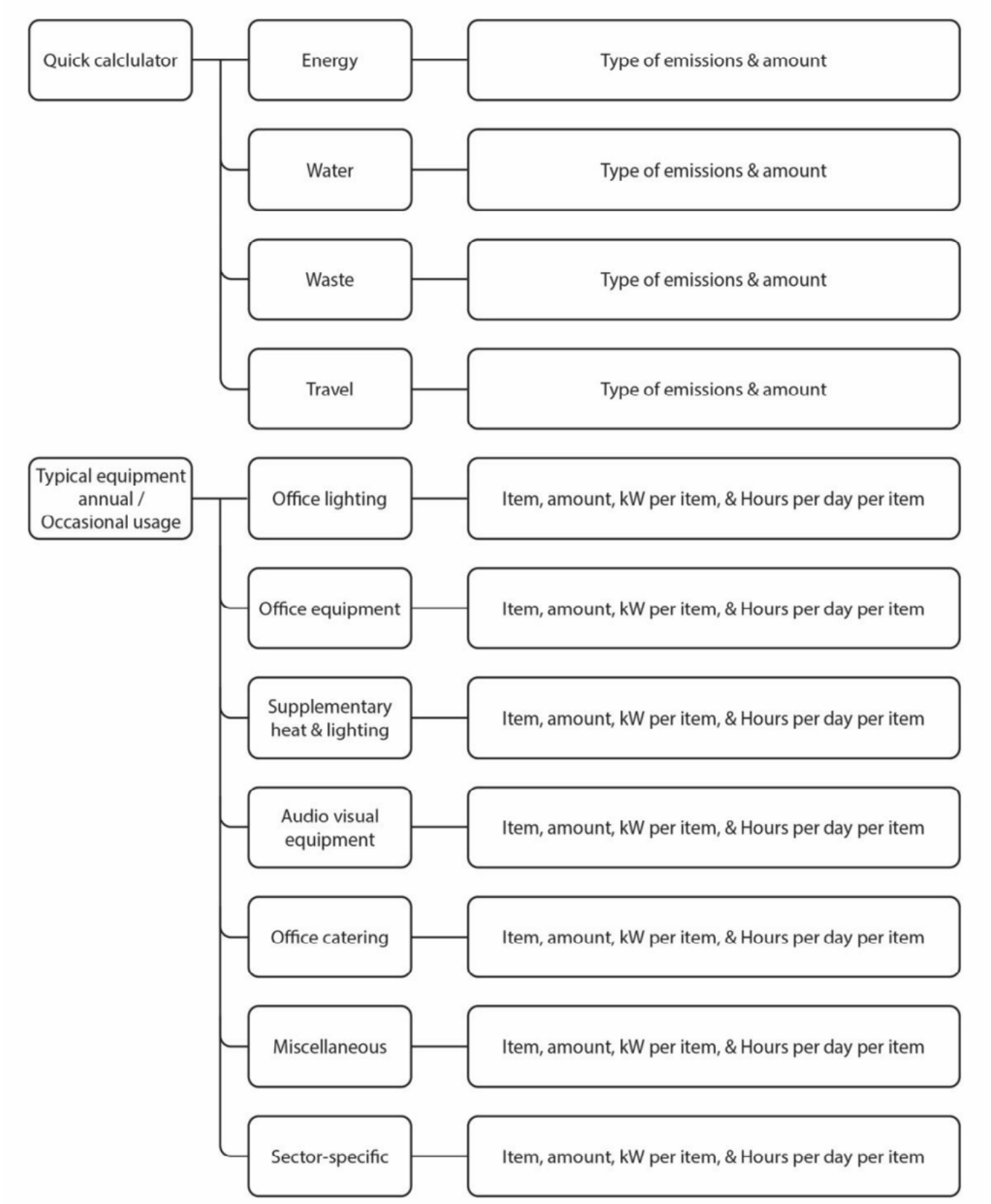


Figure 6. Model of carbon calculator for public sector based on the Creative Carbon Scotland.

2.2 Carbon calculator for exploring the environmental impact of cultural and creative sector authentic assessment activities

From the analysis of existing carbon calculators (section 2,1), seven re-occurring general themes were identified as most relevant and engaged with to develop the WSA Carbon Calculator (WSA-CC).

The following (Figure 7.) shows the seven themes and their key elements data that are required to measure carbon emissions in various learning processes involving creative practices.

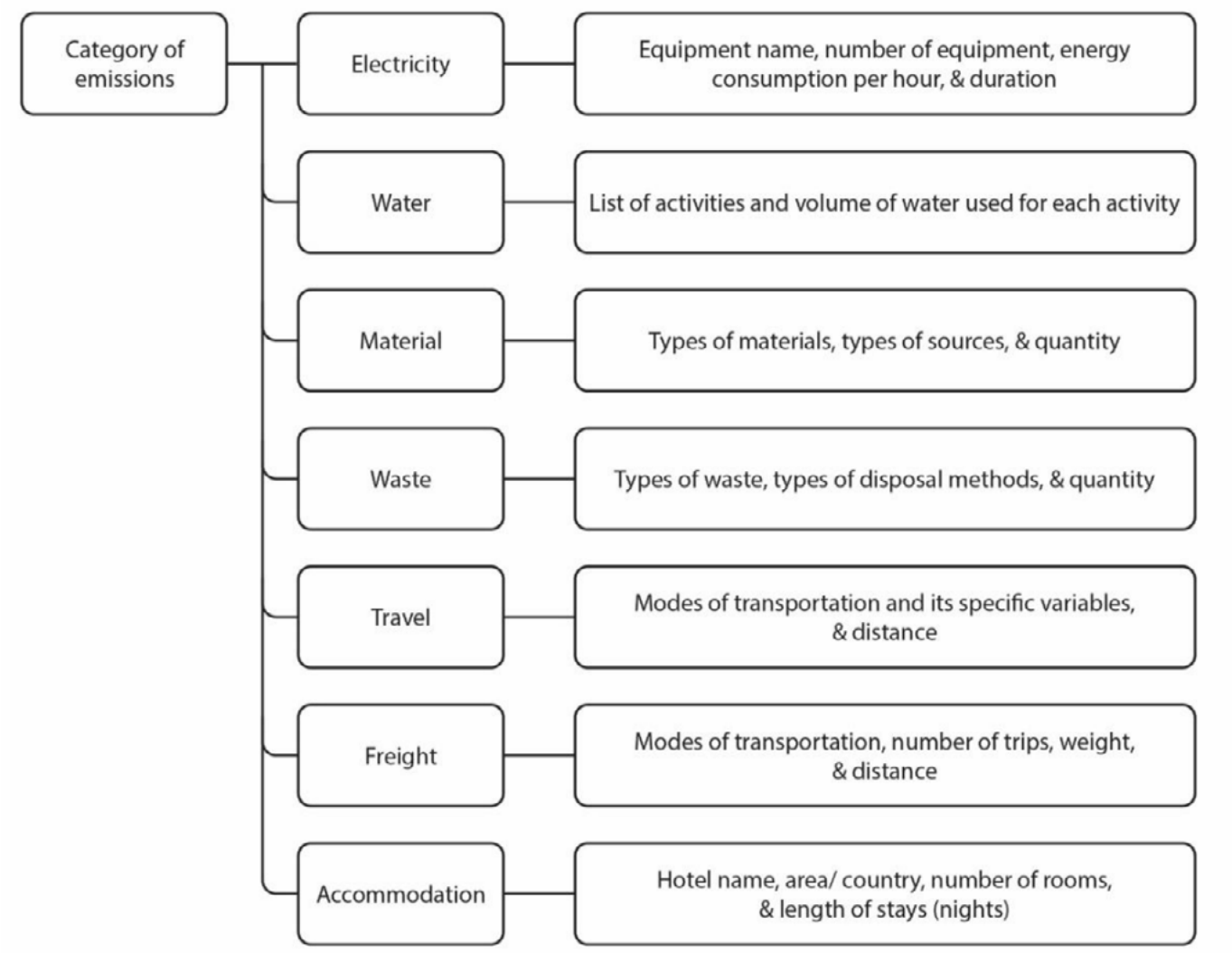


Figure 7. WSA-CC's general themes and their key elements.

In measuring carbon footprint / emissions in the UK, the WSA-CC refers to the UK Government Conversion Factors for greenhouse gas (GHG) and its basic formulas that are published annually by the Department for Energy Security & Net Zero and the Department for Environment Food & Rural Affairs.

The development of the WSA-CC had two main versions.

Version 1

Version 1 (shown in Table 2) was designed to:

1. help users understand the various elements that are interrelated and need to be accounted for to measure the carbon footprint or emissions of a single activity.
2. help users understand the formula or logic behind the process of measuring carbon emissions that is usually undisclosed.

Activity	Category of emission	Types of source / Modes of transportation / Location	Number of equipment / Types of source / Waste treatment/ Types of vehicles / fuels	Intensity (per Quantity / N
	Energy			
	Water			
	Material			
	Waste			
	Travel			
	Freight			
	Accomodation			

Table 2. 1st version of the WSA-CC.

The drawback of version 1 is that the table gets very long and very detailed and is potentially overwhelming for users. Further insights were generated through conversations with University of Southampton colleagues in requesting participation in the pilot (stage 3).

- → How are we going measure the carbon footprint?
- → How to differentiate between measuring carbon footprint from practice and regular routine activities, such as commuting to campus?
- → Some equipment and their wattage, materials, vehicles, etc. are not listed on the calculator.
- → Reaffirm to users that we are not gathering data on the carbon, rather testing the prototype of the carbon calculator.
- → The ability to measure carbon footprint as an additional and interesting skill to be put in the portfolio (for assessment).

The following adjustments were also made through the insights and suggestions of WSA technicians:

- → Color coded the sheets.
- → Made an extra table on the Energy Sheet as a reference for various equipment and their energy consumption.
- → Extra table on the Material sheet & Waste sheet to identify types of materials students are using and their waste that are not on the list.

hours per item) / Number of trip	Unit 1	Duration / Distance	Total usage	Unit 2	GHG Conversion factor	Carbon footprint (kgCO2e)

Version 2

Following the above, version 2 of the WSA-CC was developed. This is the current WSA-CC version that is accessible from the University of Southampton via **https://doi.org/10.5258/SOTON/P1177**

The following summarises the processes and features:

1. The WSA-CC is an online Excel document that can be easily shared, downloaded, uses, and submitted as part of a learning process.
2. Even though the basic formula to measure carbon emissions for each key themes refer to the formula suggested by the **GHG Conversion factors 2024**, the WSA-CC is different by employing/visualising the formula in the form of an Excel document. The current WSA-CC version is using the latest **GHG Conversion factors 2024**, but steps for updating are required – see 3.2.
3. The WSA-CC is intended for use across subjects and sectors, but was developed with reference to the specific WSA context and the programmes there.
4. The WSA-CC consists of seven bespoke worksheets that can be used individually or as a whole.
5. The breaking down of the seven key themes into separate worksheet or calculators can help users to understand the logic of measuring carbon emissions without being too overwhelming.

The following figures (8-15) are screen capture images of the worksheets which comprise the WSA-CC and are provided here to give some indication of structure and content:

1. The use of electrical energy from the UK grid (See Figure 8.)
2. The use of water (See Figure 9.)
3. The use of materials (See Figure 10.)
4. The disposal of waste (See Figure 11.)
5. Travel (See Figure 12.)
6. Freight (See Figure 13.)
7. Accommodation (See Figure 14.)
8. The 8th worksheet summarises the carbon emissions from all gathered data and visualises it into a pie chart that helps users to easily understand their carbon footprints from seven key themes (energy, water, materials, waste, travel, freight, and accommodation) (See Figure 15.).

Winchester School of Art Carbon Calculator-2024

University of Southampton

Module: Click here to type once to automatically fill the rest
Type here if you prefer to provide a name
Type here if you prefer to provide student ID

Date: Click here to Type

Energy

Sheet: 1 of 8

This carbon calculator measures the carbon footprint emitted through the use of energy derived from the UK electrical grid. The use of electrical equipment that provides direct support to the student's learning and making process, such as personal computers (PCs), laptops, monitors, printers, 3D printers, washing & drying machines, sewing & embroidery machines, studio & photographic lightings, etc., are to be considered.

CLEAR DATA

Instructions:

1. Input the name of the equipment used.
2. Input the number of the equipment used.
3. Input the energy consumption used by each equipment.
4. Input the hours of usage for each equipment

Equipment Name	Number of equipment	Energy Consumption (Watt/ hour)	Hours	Carbon footprint ($kgCO_2e$)
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
			Total carbon footprint :	0.00

You may refer to a list of equipments that are commonly used in WSA and their Wattage at the bottom of this sheet.

Figure 1. Energy consumption and its carbon footprint

Figure 8. Screen capture of WSA-CC - Energy.

Winchester School of Art Carbon Calculator-2024 University of Southampton

Module: Click here to type once to automatically fill the rest Date: Click here to Type

Water

Sheet: 2 of 8

This carbon calculator measures the carbon footprint emitted through the use of water delivered through the mains supply network. The use of water in every activities that is in direct support to the student's learning and making process, such as washing fabrics, ..., etc., are to be considered.

CLEAR DATA

Instructions:

1. Input the name of the water-consuming activity.
2. Input the amount of water consumed for each activity in

Note:

Water usage of less than 50 litres is likely to be considered insignificant, resulting in near 0 carbon footprint.

Activity	Quantity (Litre)	Carbon footprint (kgCO2e)
		0.00
		0.00
		0.00
		0.00
		0.00
		0.00
		0.00
		0.00
		0.00
		0.00
	Total carbon footprint :	0.00

Figure 2. Water consumption and its carbon footprint

Figure 9. Screen capture of WSA-CC - Water.

Winchester School of Art Carbon Calculator-2024

University of Southampton

Module: Click here to type once to automatically fill the rest Date: Click here to Type

Material

Sheet: 3 of 8

This carbon calculator measures the carbon footprint produced through the use of various materials. The use of any materials in every activity that is in direct support of the student's learning and making process are to be considered. The assessment of carbon footprints will vary depending on the source of each material.

CLEAR DATA

Instructions:

1. Choose the relevant source for the materials used. Otherwise, leave it blank.
2. Provide the quantity of materials used.

Notes:

Primary material production : Materials made from virgin stock.
Re-used: Materials that are re-used instead of being disposed of.
Closed-loop source: Materials made from recycled content where the previous product was the same as the new product.

Please note that the list of specific fabrics are measured in m2 of usage, NOT in kg.

If you can't find the materials on this list, please add them on the table at the bottom of this sheet. However, we won't be able to measure the carbon foot print of those materials at this point.

Type of material	Source	Quantity	Carbon footprint (kgCO2e)
Common Metal (kg)			0.00
Aluminium cans & foil (kg)			0.00
Scrap Metal (kg)			0.00
Soil/ clay (kg)	N/A		0.00
Plasterboard (kg)			0.00
Rubber/ Tyres (kg)			0.00
Wood (kg)			0.00
Glass (kg)			0.00
Raw Fabric (kg-unspecified)	Primary material production		0.00
Recycled Fabric (kg-unspecified)	Re-used		0.00
Food & Drink (kg)	N/A		0.00
Average Plastic (kg)			0.00
Plastic Film (kg)			0.00
Card Board (kg)			0.00
Paper (kg)			0.00
Fabric: Wool (m2)	N/A		0.00
Fabric: Acrylic (m2)	N/A		0.00
Fabric: Cotton (m2)	N/A		0.00
Fabric: Silk (m2)	N/A		0.00
Fabric: Nylon (m2)	N/A		0.00
Fabric: Polyester (m2)	N/A		0.00
Fabric: Linen (m2)	N/A		0.00
		Total carbon footprint :	0.00

Figure 3. Material consumption and its carbon footprint

- Aluminium cans & foil (kg)
- Scrap Metal (kg)
- Soil/ clay (kg)
- Plasterboard (kg)
- Rubber/ Tyres (kg)
- Wood (kg)
- Glass (kg)
- Raw Fabric (kg-unspecified)
- Recycled Fabric (kg-unspecified)
- Food & Drink (kg)
- Average Plastic (kg)
- Plastic Film (kg)
- Card Board (kg)
- Paper (kg)
- Fabric: Wool (m2)
- Fabric: Acrylic (m2)
- Fabric: Cotton (m2)
- Fabric: Silk (m2)

Figure 10. Screen capture of WSA-CC - Material.

Winchester School of Art Carbon Calculator-2024 University of Southampton

Module: Click here to type once to automatically fill the rest Date: Click here to Type

Waste Disposal

Sheet: 4 of 8

Almost all learning processes create waste. This carbon calculator measures the carbon emissions produced in the disposal of various types of waste. The assessment of carbon footprints will vary depending on the disposal method for each waste.

CLEAR DATA

Instructions:

1. Choose the relevant disposal method for each waste.
2. Provide the quantity of waste in kg, except for water waste that is in litres.

Notes:

Landfill include collection, transportation and landfill emissions ('gate to grave').
Open-loop recycling is the process of recycling material into other products.
Closed-loop recycling is the process of recycling material back into the same product.
Combustion: Energy is recovered from the waste through incineration and subsequent generation of electricity.
Composting: CO_2e emitted as a result of composting a waste.

Type of waste	Disposal method	Quantity (Kg)	Carbon footprint (kgCO2e)
Water* in litres			0.00
Soil			0.00
Plasterboard			0.00
Rubber/ Tyres			0.00
Wood			0.00
Book			0.00
Glass			0.00
Fabric/ Clothing			0.00
Household Refuse			0.00
Food & Drink			0.00
Commercial & Industrial Refuse			0.00
All Metal			0.00
All Plastic			0.00
Paper & Card Board			0.00
		Total carbon footprint :	0.00

Figure 4. Waste production, disposal, and its carbon footprint

Figure 11. Screen capture of WSA-CC - Waste Disposal.

Winchester School of Art Carbon Calculator-2024 University of Southampton

Module: Click here to type once to automatically fill the rest Date: Click here to Type

Travel

Sheet: 5 of 8

This carbon calculator measures the carbon footprint produced by a student in their travel related to learning and making processes. The assessment of carbon footprints will vary depending on the various modes of transportation, the type of vehicle used, and the travelling distance.

CLEAR DATA

Instructions:

1. Choose the relevant modes of transportation & its variables
2. Provide the length of journey in km.

Notes:

The business travel by air or sea are for use for passenger and not for freighting goods. Freight calculator is available in the next worksheet.
'For air travel:
'Average passenger' does not account the difference in flight type (economy, business, first class, etc.).
Domestic flights are those between UK airports.
Short-haul is air travel to outside of UK with a distance up to 3,700 km.
Long-haul is air travel with a distance of > 3,700 km.

Modes of transportation	Specific variables	Distance (km)	Carbon footprint (kgCO2e)
Air travel for an average passenger			0.00
Sea travel			0.00
Diesel car			0.00
Petrol car			0.00
Hybrid car			0.00
Plug-in hybrid electric vehicle			0.00
Battery electric vehicle			0.00
Motorbike			0.00
Taxi per passenger			0.00
Bus per passenger			0.00
Rail per passenger			0.00
		Total carbon footprint :	0.00

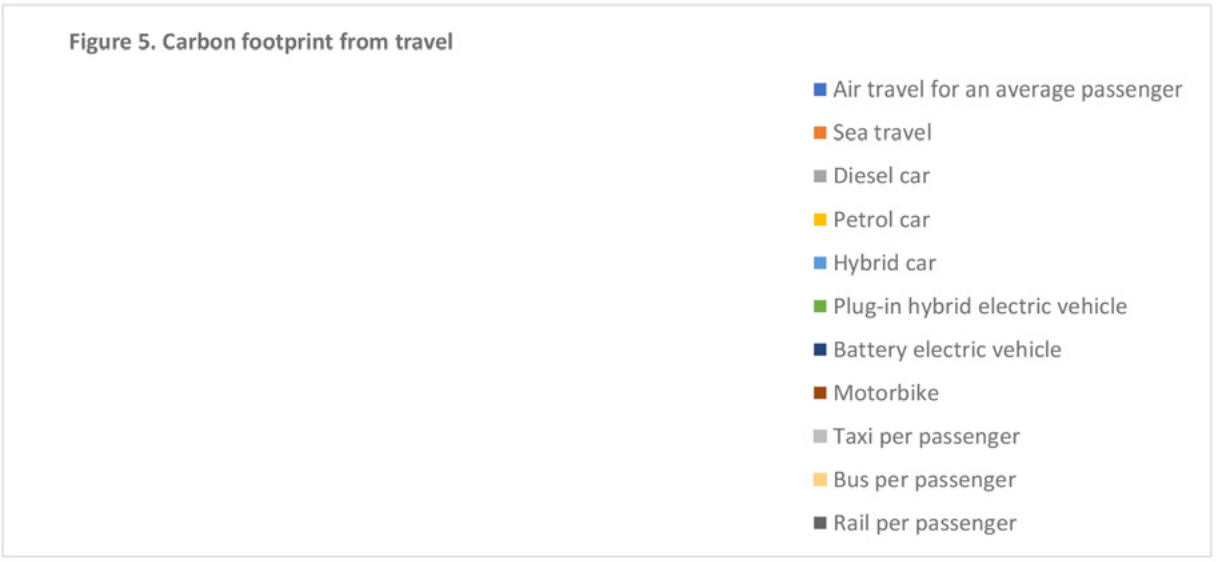


Figure 12. Screen capture of WSA-CC - Travel.

Winchester School of Art Carbon Calculator-2024 University of Southampton

Module: Click here to type once to automatically fill the rest Date: Click here to Type

Freight

Sheet: 6 of 8

This carbon calculator measures the carbon footprint produced from the shipment of goods over land, air, and sea. The assessment of carbon footprints will vary depending on the various modes of transportation, the cargo weight, and the distance.

CLEAR DATA

Instructions:

1. Choose the relevant modes of transportation.
2. Provide the number of trip, cargo weight, and distance.

Notes:

Domestic flights are between UK airports.
Short-haul International flights to/from the UK, typically to Europe (up to 3,700 km distance).
Long-haul international flights to/from the UK, typically to non-European destinations (over 3,700 km distance).
International flights to/from non-UK countries.

Modes of transportation	Number of trip	Weight (kg)	Distance (km)	Carbon footprint (kgCO2e)
Land-average diesel van				0.00
Land-average petrol van				0.00
Land-average plug-in hybrid e.van				0.00
Land-average electric van				0.00
Land-train				0.00
Air-Domestic, to/from UK				0.00
Air-Short-haul, to/from UK				0.00
Air-Long-haul, to/from UK				0.00
Air-International, to/from non-UK				0.00
Sea-General cargo-Average				0.00
Sea-Container ship-Average				0.00
			Total carbon footprint :	0.00

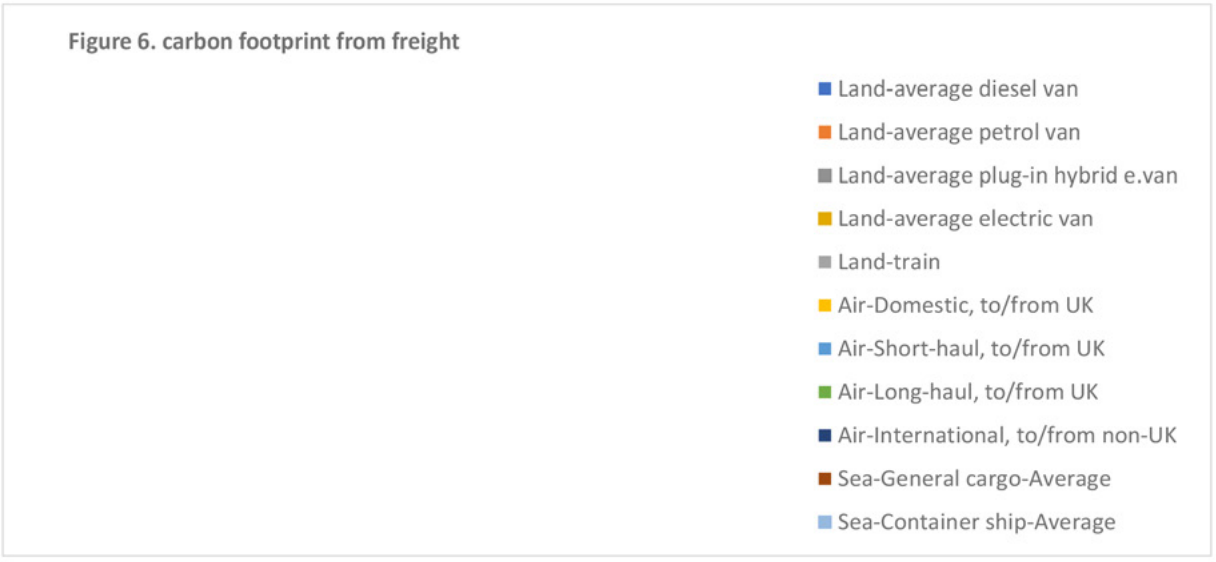


Figure 13. Screen capture of WSA-CC - Freight.

Winchester School of Art Carbon Calculator-2024

University of Southampton

Module: Click here to type once to automatically fill the rest Date: Click here to Type

Accommodation

Sheet: 7 of 8

This carbon calculator measures the carbon footprint produced from the hotel stays that occurs as part of the learning and making processes, for example, going on exhibition. The assessment of carbon footprints will vary depending on the place of stay.

CLEAR DATA

Instructions:

1. Type in the hotel or accomodation's name.
2. Choose the location or country.
3. Provide the number of rooms and the length of stays.

Notes:

You can list up to 10 hotels in various places.
To choose from the drop-down list, use the "Up" or "down" keys.

Hotel name	Area/ Country	Number of rooms	Length of stays (nights)	Carbon footprint (kgCO2e)
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
			Total carbon footprint :	0.00

Figure 7. Carbon footprint from hotel stays

Figure 14. Screen capture of WSA-CC - Accommodation.

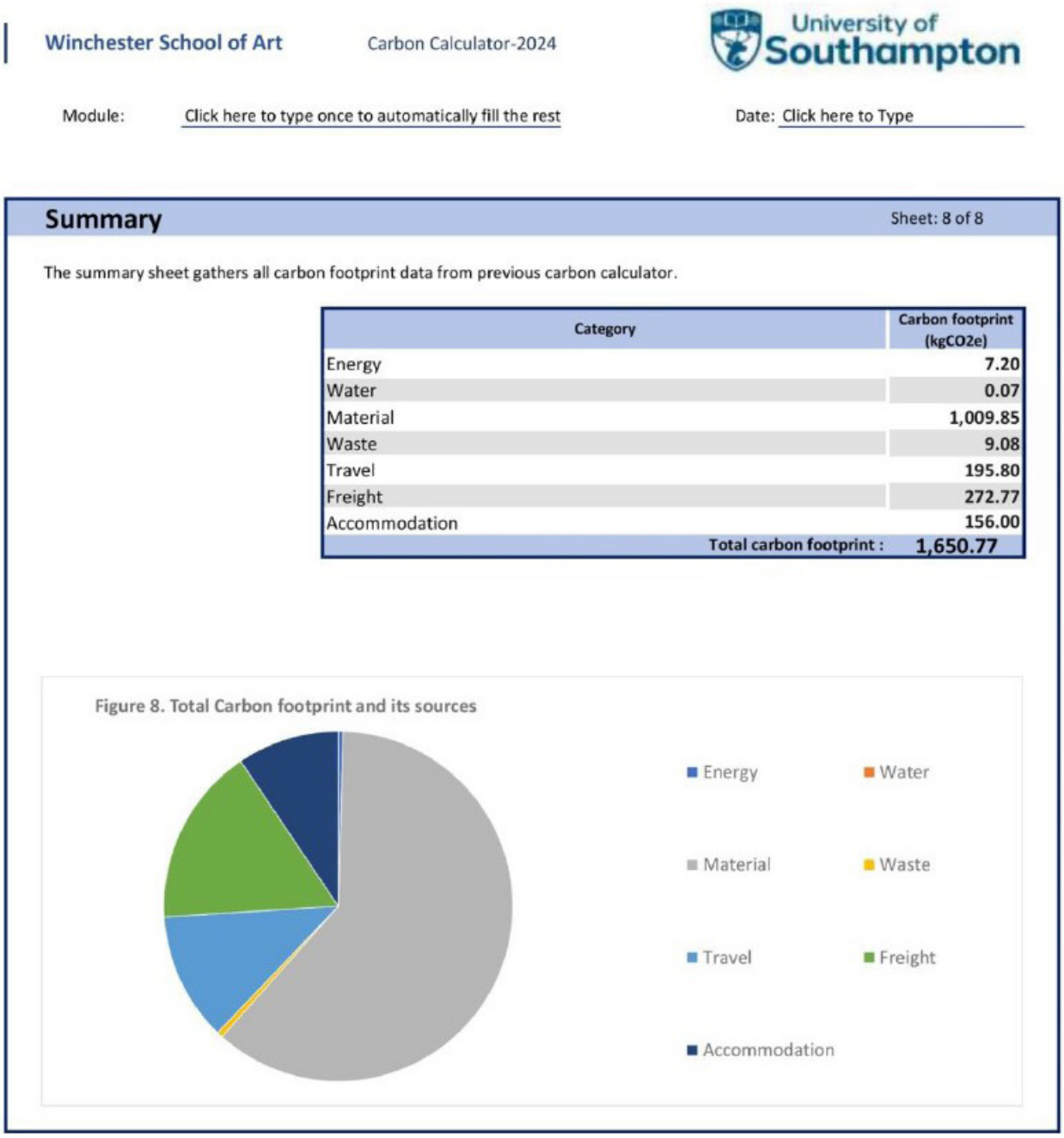


Figure 15. Screen capture of WSA-CC - Summary (example when filled in).

2.3 Creating a toolkit

The project aim was to support higher education staff and student to measure and reflect on the environmental impact of authentic assessment activities associated with cultural and creative sectors/subjects. A fully developed and standalone toolkit to do this is still under exploration. Steps towards this aim and a toolkit are available with:

- → Current WSA-CC version.
  Accessible from the University of Southampton via DOI:**10.5258/SOTON/P1177**
- → Guidance video for the WSA-CC.
  Accessible from the University of Southampton via DOI:**10.5258/SOTON/P1189**
- → Recording of the CHEP festival presentation.
  Accessible from the University of Southampton via DOI:**10.5258/SOTON/P1191**
- → Report which offers critical reflections and prompts for next steps.
  Accessible from the University of Southampton via DOI:**10.5258/SOTON/P1190**

The further development of a toolkit is also discussed in part 3.3.

PART 3: FEEDBACK

The project included three evaluation methods:

3.1 Questionnaire with students

A questionnaire for students participating in piloting the carbon calculator. The questionnaire was of limited value due to a low response rate. Insights from students were instead explored by programme teaching teams during their scheduled contact time and, where possible, included in the focus group.

3.2 Focus group with programme teaching teams

A 60-minute focus group with University of Southampton colleagues teaching on undergraduate and postgraduate programmes in the Department of Fashion and Textiles that participated in the pilot.

The focus group generated the following insights into changes in practice and curriculum development ideas:

1. Where and how to position sustainability at different levels of an undergraduate programme and across semesters on a postgraduate taught programme.
2. Embedding sustainability within formative and summative assessments.
3. How sustainability and professional practice interweave. For example, increasing technical competence and professional development can lead to the reduction of waste. Similarly, how effective time management can help avoid undue urgency and associated waste.
4. Collaborations across programmes to share sustainability priorities and practices.
5. Connecting sustainability to student employability and career opportunities. For example, discussion points in job interviews and presentations and in the development of business plans.
6. Critical reflections on how industry talks about and make changes and that these do not always fully align.
7. Taking steps to identify and then share data relevant for the carbon calculator (e.g., energy usage of equipment; water run off).

There were also **feedback and suggestion**s on developing the carbon calculator.

1. Challenges and inefficiencies with lots of staff and students trying to gather the same data for their carbon calculator and the need for a central and **shared database** at different levels (e.g., campus; school; department; programme; lab) to identify and keep up-to-date information.
2. The accessibility and complexity of the calculator. In emphasizing sustainability literacy and reflection, comprehensiveness (and associated complexity) may be reduced and the calculator could instead focus on a more **visually orientated interface with less features** for which data is more accessible.

3.3 CHEP festival workshop

Approximately 15 colleagues from across the University of Southampton engaged with the project through a CHEP festival workshop (10.09.24). Whole group and breakout group discussions generated feedback and suggestions. Within this workshop Professor Simon Kemp described the project as "gold standard" and said 'I love this project because it is enabling students to understand what's actually happening from the activities that they're involved in.'

From this workshop, the project team identified the following points:

- → How does the **University's use of renewable electricity** factor into the calculator?
- → The scientific integrity of the robustness of the Department for Energy Security and Net Zero and Department for Environment, Food & Rural Affairs greenhouse gas conversion factors was highlighted. However, there will be an ongoing issue with the **upkeep of the data.** This connects with a point identified during the stage 1 desk study that, 'inconsistent data and differing ways of calculating and reporting carbon emissions pose a serious threat to climate targets' (Trillos cited in International Organisation for Standardisation, 2021). This suggests the need for a coordinated resource at a University, Faculty or School level to ensure data consistency and enable programme teams to focus on the embedding of the carbon calculator within learning and teaching.

PART 4: REFLECTIONS AND FURTHER ENQUIRY

4.1 Reflections

Drawing on the focus group and the workshop and a project debrief exercise, the project team offer the following reflections.

The following **benefits and areas of potential** were noted:

- → Increased visibility of the carbon impact of assessment in practice/creative programmes.
- → Improvement in foregrounding the concept of sustainable practices in studio/creative sessions.
- → Employability attributes are highlighted through authentic assessment and connected to sustainability through the calculator and related materials.
- → Ability to introduce practical measures for students to assess the use of materials.
- → Ability for students to engage with critically evaluating alternatives that mitigate the amount of waste and the carbon impact of their assessment and learning activities.
- → Strategic development of assessment to reduce reliance on multiple physical outputs that measure similar learning outcomes.
- → Teaching teams (academic staff and technicians) collaborating and sharing practices around shared sustainability priorities.

The following barriers and challenges were noted:

- → When the project and calculator was introduced to students within the academic year (January) and how efforts to engage with feedback clashed with the end of year assessment period (June).
- → Difficulty for students to begin to quantify costs. For example, for: energy; production process/; material consumption; waste; exhibition shipping.
- → Engagement with the project was an additional opportunity/ask. As the pilot was not embedded within the programme/module, the engagement was partial (only some students) and inconsistent (not for the full duration of the pilot/module).

3.4 Further enquiry

The project team identified four further areas of enquiry.

Decolonialisation

Our review of various standards, frameworks, toolkits, carbon calculators, guides and resources on sustainability and carbon emissions (see Table 1) came from a relatively homogenous set of contexts and there is potential to diversify the points of reference engaged with. Following Akel (2020), critical enquiry is more than diversifying and needs to address and challenge the dominance of frameworks and knowledge systems. A similar intervention comes from Alacovska and Gill (2019) on the importance of not merely multiplying non-western case studies and examining the destabilizing of entrenched notions.

In terms of decolonising education, the distinction between diversity and decolonialisation is examined by Akel (2020):

Decolonising education is often understood as the process in which we rethink, reframe and reconstruct the curricula and research that preserve the Europe-centred, colonial lens. It should not be mistaken for 'diversification,' as diversity can still exist within this western bias. Decolonisation goes further and deeper in challenging the institutional hierarchy and monopoly on knowledge, moving out of a western framework

The alignment of decarbonisation and decolonialisation has received attention from the Council for Higher Education Art and Design (CHEAD) with the 2022 event on **Climate Justice: Decolonising Decarbonisation**. In terms of carbon calculators, there is urgent work to do in 'going further and deeper' to question and challenge assumptions around frameworks and knowledge systems. Suggestions for this include questioning the knowledge practices at work in creating carbon calculators and exploring with staff and students their positionalities in using carbon calculators to reflect on the environmental impact of their creative practices.

Neurodiversity

In discussing neurodiversity within art and design practice and education, Damiani (2018) sets out how 'neurodiversity arises due to the different ways that our brains are networked, how neurons connect to each other and how those connections form and change.' As Tan (2024) outlines in a *Society for Research into Higher Education* blog piece on love, neurodiversity and higher education art and design, 'it is well-established that neurocognitive variants like dyslexia, ADHD and autism are **over-represented** in the arts and culture (above 30%, eg **RCA 2001**; **Bacon and Bennett (2013)**; **Universal Music (2020)**.'

Damiani (2018) points out that 'educational dialogues around neurodiversity focus on it according to abilities and not "disabilities"' and that 'art and design encourages different ways of looking at or interpreting the world, and thinking differently, shaping diverse voices and opinions.' Following this, there is a scope to further consider both the accessibility of the WSA-CC and how a diversity of approaches from art and design might contribute to the development of different ways of conceiving the WSA-CC. This project offers a solid starting point in researching existing carbon calculators and ways to

'remix' this for a specific context focusing on creative subjects. The research team were attentive to issues of accessibility and explicitly addressed this in the evaluation. The next step is to build on our understanding of *what* could be in a carbon calculator and explore (with more time, resources and contributions) the *how*.

Sector specifics and international perspectives

The Creative Industries Policy and Evidence Centre report on *The State of Creativity* (2023) addresses "climate" as one of the Centre's 10 key areas. This project and report have already referenced the *Creative Industries and the Climate Emergency* (Creative Industries Policy and Evidence Centre, 2022) report which was commissioned by the Centre and there are some shared points of reference, including Julie's Bicycle **Creative Climate Tool** and the **Theatre Green Book**. *The State of Creativity* also makes an important point, which resonates with this project, on the need to 'recognise the idiosyncrasies of different parts of the sector' (Creative Industries Policy and Evidence Centre, 2023: 59). This point on the distinctive features of different sectors has been explicitly addressed in relation to creative industries pedagogies by Ashton, Thomas and Ayisi (2022), who also draw the connection to definitional complexities and global specificities.

One of the challenges this project faced was the participation of different subject areas/sectors. Even full engagement from the local WSA setting for this project would not ensure connections with the wider number of sectors covered in creative industries groups or segments (see Ashton, Thomas and Ayisi, 2022). A further line of inquiry then is to encounter and understand the experiences of a wider range of subject areas/sectors. This would help for considering the different elements which should feature within a carbon calculator aimed at engaging students who have diverse creative practices. Likewise, a range of technical elements would emerge in considering the applicability and resonance of the calculator within different national contexts. In expanding into these two areas of enquiry on different sectors and national contexts, another priority follows on exploring the different learning and teaching approaches employed across subjects/sectors and in different national learning and teaching settings.

Embedding within learning and teaching

Closely related to the above is the question of how to facilitate meaningful engagement for students. Section 3.1 addressed how programme teaching teams identified the relevance of the carbon calculator and how it might be embedded within their programmes, for example in relation to learning outcomes on "sustainability".

A further line of enquiry is to develop and share ideas on embedding a carbon calculator within different learning and teaching activities, interactions, assessments and so on. This might then extend to exploring how to shape future development, for example through a 'students as researchers' methodology (Thompson and Gunter, 2007). Over time, examples and experiences might be shared as a collective resource.

PART 5: RELATED OUTPUTS

Presentation at CHEP Festival of Learning and Teaching

Ashton, D., Kurniawan, M. and Padovani, C. (2024) Measuring the environmental impact of cultural and creative sector authentic assessment. CHEP Festival of Learning and Teaching. University of Southampton. DOI: **10.5258/SOTON/P1191**

Carbon Calculator

Kurniawan, M., Ashton, D. and Padovani, C. (2024) Carbon calculator for exploring the environmental impact of cultural and creative sector authentic assessment activities. Centre for Higher Education Practice. University of Southampton. DOI: **10.5258/SOTON/P1177**

Guidance Videos for Carbon Calculator

Kurniawan, M., Ashton, D. and Padovani, C. (2024) Guidance videos for carbon calculator for exploring the environmental impact of cultural and creative sector authentic assessment activities. Centre for Higher Education Practice. University of Southampton. DOI: **10.5258/SOTON/P1189**

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Ashton, D., Thomas, B. and Ayisi, A. (2022) *Creative Futures Exchange – Approaches to Creative Industries Pedagogies.* University of Southampton. DOI: **10.5258/SOTON/P1076**

Creative Industries Policy and Evidence Centre (2022) *Creative Industries and the Climate Emergency.* Available from: **https://www.culturehive.co.uk/wp-content/uploads/2022/10/Creative-Industries-and-the-Climate-Emergency-The-Path-to-Net-Zero-PEC-Research-Report.pdf**

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Damiani, L.M. (2018) On the spectrum within art and design academic practice. *Spark: UAL Creative Teaching and Learning Journal* 3(1). **https://sparkjournal.arts.ac.uk/index.php/spark/article/view/88/146**

Fawns, T. et al. (2024) Authentic assessment: from panacea to criticality. *Assessment & Evaluation in Higher Education*: 1–13. DOI: **10.1080/02602938.2024.2404634**

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