

Discussion Paper 2023/05
**Transitioning to Sustainable Production
across the UK Theatre Sector**

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1. Introduction

This discussion paper examines transitional pathways to sustainable theatre production in the UK. By presenting and evaluating the application of circular economy principles within a variety of theatre-making contexts, it provides evidence related to the time, cost, training, support, professional development and resources required to decarbonise theatre production, reduce waste, and eliminate environmentally harmful industry practices. The report concludes by identifying the key issues, challenges and opportunities associated with low carbon/low waste theatre production, and offers observations and recommendations to enable the sector to reduce its environmental impacts and contribute to the meeting of net-zero emission targets.

This research is centred on the case studies of three productions (all of which premiered in July/August 2022) that followed the guidelines in the Sustainable Productions volume of *The Theatre Green Book*. Published as a “beta version for trialling” in March 2021,¹ the *Green Book* was developed with the support of all the leading UK theatre and sustainable culture organisations,² and was based on the input of an unprecedented coalition of UK theatre-makers, including freelancers, venues, companies and producers through surveys, focus groups and interviews. Its purpose was not to “reinvent the wheel” but to synthesise, amplify and find commonality across existing practices and guidelines.³ While there are other (or additional) models and strategies available for reducing the environmental impacts of theatre production,⁴ *The Theatre*

¹ Buro Happold and Renew Theatre, *The Theatre Green Book. Part 1: Sustainable Productions (version beta.2 for trialling)* (2021): <https://theatregreenbook.com/book-one-sustainable-productions/> This remains the version available as of April 2023.

² *The Theatre Green Book* was created by Renew Culture and sustainability engineers, Buro Happold, and led by the Theatres Trust, Association of British Theatre Technicians (ABTT) and UK Theatre/SOLT. Supporting bodies and organisations included Society of British Theatre Designers (SBTD), Sustainability in Production Alliance (SiPA), Association of Lighting Designers (ALD), Independent Theatre Council (ITC), Federation of Scottish Theatre, Theatre and Dance NI, Creu Cymru, Community Leisure UK, Stage Sight, Scene/Change, Ecostage, Julie’s Bicycle, and Creative Carbon Scotland.

³ Nick Clark and Georgia Snow, “How theatre is setting new standards in its fight against climate change,” *The Stage*, 11 November 2021, p. 12.

⁴ For example, the director, Katie Mitchell, who makes work at the intersection of ecology and theatre, has powered several productions onstage using stationary bicycles made of recycled materials, and has created productions for touring where no people or materials move between venues (the productions are recreated in situ using a blueprint). As an example of a business model that combines circular economy and philanthropy, Hispanic theatres in Miami have used non-profit management structures as a tool for sustainability (Lindamaria Ortega and Pablo Alamo, “Cultural and creative entrepreneurs facing pandemic crisis: The case of Hispanic

Green Book can be said to broadly represent a remarkably diverse industry, one that includes commercial and subsidised theatre, small-scale touring companies, SMEs, freelance practitioners, large building-based producing organisations, receiving venues, opera and ballet, site-specific and cross form practices, theatre-in-education, and rural productions.

As a result, this open access document (available to download for free) not only consolidates what is understood to be best practice in sustainable production and sets out collective standards for achieving change across the sector, but also can be considered a statement of shared and negotiated values. Within months of its publication, the National Theatre, National Theatre of Scotland, and National Theatre Wales, as well as many other companies and organisations, committed to making all their shows to *Green Book* standards. *The Theatre Green Book* has been described as “a chance to reset how we work as a sector” and a “one-stop shop the whole industry can use”.⁵

There is no body to enforce *Theatre Green Book* guidelines and standards; its creators and lead partners hoped the industry would implement it as a voluntary code of practice. At the 2021 Theatres Trust Conference, Arts Council England (ACE)'s Director for Theatre and London, Neil Darlison, stated that working to *Green Book* standards, while not mandated, would be expected by its NPOs (National Portfolio Organisations) as part of ACE's next funding process in order to meet its Environmental Responsibility Investment Principle. In Scotland, organisations that receive funding through Creative Scotland are required to report their carbon management plans and carbon emissions. Importantly, the latter cannot be established solely by following *Green Book* guidelines for sustainable production in the vast majority of cases. This is because only productions working to *Green Book* “Advanced” level are required to engage in carbon calculating; no large organisations have committed to working to this standard to date. This report demonstrates that the most significant ambition and achievement of *The Theatre Green Book* is likely to be the socialisation, monitoring and tracking of behavioural and cultural change at both micro (individual production) and macro (the UK theatre industry) levels.

Theatres in Miami Dade County”, *Sustainable Innovations 2023 Proceedings* [The Centre of Sustainable Design, March 2023]).

⁵ Clark and Snow, “How theatre is setting new standards in its fight against climate change,” p. 12.

Scope and Terminology

The word *theatre* may be defined in many different ways: as the building in which performances take place; as a distinct aesthetic form or genre of performance; or, as a way to describe a company or organisation that produces this type of performance. This paper employs it in all of these senses where appropriate – that is, when it is used in this way by an organisation, company or by other invested groups or individuals. Importantly, not all “theatre” takes place in a “theatre”. Mirroring *The Theatre Green Book*, which itself embraces opera, dance, circus and site-specific and outdoor performance, theatre is considered here as a diverse sector within the creative industries that operates in a wide range of scales and across multiple locations.

Production refers to the making of a show, event or performance, with a specific focus (in this report) on the material and operational elements that create and define its representational world and enable its presentation. This includes design, procurement, construction, disposal and storage of materials, including sets and scenery, props and furniture, costumes and technical equipment.

Venues and performance environments, and their operation (including energy use), are largely outside of the scope of this research for a number of reasons. The first of these is that, unlike the materiality of production work, research pathways are established and ongoing in these areas;⁶ and, associated carbon emissions are measured and reportable in a relatively straight-forward manner. The second reason is that the research discussed in this paper has concentrated on the adoption of the first of the three volumes of *The Theatre Green Book* which focuses on Sustainable Production. The second volume, published later in 2021, offers guidelines and recommendations for Sustainable Buildings. This is based on four key hierarchical principles for theatre buildings: BE LEAN (for example, by improving walls and roofs, so as to lose less energy); BE CLEAN (by improving services systems to use less energy); BE GREEN (by drawing energy from renewable sources); and finally, support biodiversity

⁶ See, for instance, Theatres Trust, “More than £1bn needed to make the UK’s theatre buildings sustainable,” 5 November 2021: <http://www.theatrust.org.uk/latest/news/1626-more-than-1bn-needed-to-make-the-uks-theatre-buildings-sustainable>. According to the *Creative Green Strategic Report 2018/19*, the 14 members of the London Theatre Consortium made a carbon and energy commitment that resulted in an average reduction of their carbon footprint by 43% in the previous five years (Giverny Masso, “London producing theatres have reduced carbon footprint by 43% in five years, claims report”, *The Stage*, 22 November 2019).

and reduce waste.⁷ Volume 3 of *The Theatre Green Book*, on Sustainable Operations (published in early 2022), recommends that theatres must re-think both front of house and back of house operations; manage and maintain the building efficiently; manage waste sustainably; enable sustainable travel by staff, audiences and visitors; and, set standards for third parties such as contractors in order to influence Scope 3 carbon emissions.⁸

Carbon emissions related to touring and travel between venues are also not considered in this report, for the same reasons as for venues, buildings and operations above.⁹ Although it offers recommendations related to touring, the Sustainable Productions volume of *The Theatre Green Book* does not include any specific guidelines for emissions attributed to travel. “Extra Guidance and Standards for Touring” were published in a separate document on the *Theatre Green Book* website in May 2022, however its performance indicators are presented in relative terms – that is, to achieve Baseline standard, companies should “reduce average annual travel carbon per show by 10% from the previous year” (rising to 20% per year for Intermediate standard).

This bracketing of “production” aligns with Stephen Heatherington’s identification of processes in his discussion of the flow of finance and decision-modelling of a theatre production lifecycle. He categorises these processes in three ways: 1) those associated with creation and production (dependent on “personal choice and individual aesthetic judgement”); 2) those concerned with presentation (which are “more managerially and operationally rationalised”); and 3) the distribution of financial outcomes realised through performance.¹⁰ This paper focuses on the first category of processes. In practice, however, it is neither possible nor (as will be noted in the conclusion of this paper) especially meaningful to neatly segregate theatre production from the other elements of its infrastructure and ecology.

⁷ Buro Happold and Renew Theatre, *The Theatre Green Book. Part 2: Sustainable Buildings (Beta version for trialling)* (2021), p. 5: <https://theatregreenbook.com/book-two-sustainable-buildings/>

⁸ Buro Happold and Renew Theatre, *The Theatre Green Book. Part 3: Sustainable Operations (version beta.1 for trialling)* (2022): <https://theatregreenbook.com/book-three-sustainable-operations/>

⁹ See, for instance, Julie’s Bicycle, *Moving Arts: Managing the carbon impacts of our touring. Volume 3: Theatre*, June 2010.

¹⁰ Stephen Hetherington, *The Interdependence of Public and Private Finance in British Theatre* (Arts Council England, 2015), pp. 8-9.

2. Context

Production as a Proportion of the Theatre Industry's Carbon Footprint

While the percentage of the theatre industry's carbon emissions associated directly with the materiality of making shows is certainly relatively small, their reduction enables theatre-makers and producers to model behaviour, engender conversations with venues and audiences, and exemplify a values-led approach to their practice. It is difficult, however, to ascertain what proportion of UK theatre's overall carbon emissions is associated with production processes. This is because it is a challenge to fully grasp the scale of theatre as an industry across the UK (and hence the number of productions that are actually made in a given year); it is difficult to neatly separate production from presentation/performance events and broader infrastructural requirements; and, also, because it is rarely attempted to measure the carbon associated with production with any transferrable degree of consistency, accuracy or precision.¹¹

In 2008, the Greater London Authority (GLA) published a report which stated that 5% of the London theatre industry's carbon footprint (then estimated at 50,000 tonnes of CO₂/year) comprised production materials and another 5% "pre-production management"; by comparison, 35% of the total footprint was attributed to theatre front-of-house (including auditorium air conditioning and cooling) and 28% comprised rehearsal space (again, including heating and cooling).¹² The GLA report suggests that sourcing and reusing production materials, minimising deliveries, managing buildings and workshops efficiently, and using a carbon calculator to identify and tackle the biggest contributors, would probably result in CO₂ savings of 5-6% of the 10% of a theatre's carbon which is associated with production and pre-production management – that is, 0.5% of its total carbon footprint.¹³ Of these savings, less than 20% was estimated

¹¹ *The Theatre Green Book* offers the indicative illustration of the Royal Court Theatre in London which uses 30,000 kg of steel, timber and boards per year. While this figure is not presented as a proportion of the theatre's current carbon emissions, it is estimated that it would represent 30% of the theatre's total carbon footprint in 2030, and that (assuming all other carbon emissions remained the same), this proportion would reduce to 10% if low carbon materials were used and to less than 5% if these materials were repurposed and reused (Buro Happold and Renew Theatre, *The Theatre Green Book. Part 1: Sustainable Productions*, p. 20).

¹² *Green Theatre: Taking action on climate change* (Greater London Authority, September 2008), p. 9. These figures did not include audience travel.

¹³ The 2016 *Analysis of Theatre in England* report states that, of the 2,173 organisations that produced and presented theatre, 37% of companies and 43% of venues were located in London (BOP Consulting & Graham Devlin Associates, *Arts Council England: Analysis of Theatre*

to be due to changes in materials and this may explain why the report's indicative carbon calculator for "production planning" seems to account solely for energy use during performances (for example, the number of stage lights, how long they will be on, the size of the auditorium, etc).¹⁴

Even taking account of the age of these estimates (in a pre-austerity, pre-Covid, pre-Brexit financial and political landscape), they are unlikely to be representative of the sector as a whole. For instance, the *British Theatre Repertoire 2014* report notes that, while over half the number of theatre performances took place in London that year, this represents only 20% of productions in England.¹⁵ After removing non-theatre shows (like poetry readings), the report determined that there had been 2,211 different theatre productions in 2014. In the same year, the BBC reported that 62 of the most-subsidised UK theatre companies produced 395 full productions; these had to have a running time of at least an hour and a run of at least a week.¹⁶ In short, given shifting parameters and reporting mechanisms, it is as difficult to know precisely how many productions are under discussion as it is to currently determine the extent to which the materials used to make them contribute to their organisations' overall carbon footprint (especially if we also take into consideration the outsourcing of fabrication, the rental of non-theatre spaces, and so on).

Still, that production materials continue to comprise a relatively low percentage of theatre's carbon footprint (especially when disaggregated from energy use and other building-based emissions), and thus are not usually emphasised (or perhaps even accounted for as data) in reporting, is evidenced in Arts Council England's 2021-22 Environmental Report. Here it is notable that 17% of the total reported CO₂ attributed to its National Portfolio Organisations (NPOs) is associated with the theatre sector (rising to 21% if dance is included); however, production materials and processes are not included in the designated environmental impact areas (i.e. energy, gas, waste, water, business

in England, 13 September 2016); as no distinction was made between producing and presenting venues, it is likely that theatre production by building-based organisations is more likely in London and this is reflected in the breakdown of carbon footprints.

¹⁴ *Green Theatre*, p. 33.

¹⁵ British Theatre Consortium, SOLT/UKTheatre and BON Culture, *British Theatre Repertoire 2014* (May 2016). It isn't clear from the report what percentage of productions in the UK are located in London.

¹⁶ The 20 best funded theatre companies produced 200 of these shows; these include both the RSC and National Theatre of Scotland (two of the case study organisations discussed below). Because the BBC did not count youth, amateur or community productions, some of the latter's productions were not included. See Ian Youngs, "The state of UK theatre: In numbers", 4 February 2015: <https://www.bbc.co.uk/news/entertainment-arts-31055373>

travel), although touring travel is (at 4% of total CO₂).¹⁷ For many organisations in ACE's National Portfolio up to 2022, production was included in its "beyond carbon" reporting.¹⁸

One of the few British theatre companies to publish a breakdown of its carbon emissions is Metta Theatre (described on its website as "a small, under-resourced" touring company). In 2020, 75% of Metta's emissions came from touring travel and transport. Of the remaining quarter, about half is due to office energy use, IT and supplies, and slightly less than half of the remainder (c. 5-6% of the annual carbon footprint) is associated with set, props and costumes.¹⁹ Metta notes that most of its emissions fall under Scope 3 – that is, Value Chain Emissions – in contrast to the data presented in both the 2008 London Theatre report and the 2022 Arts Council England NPO report.

Pigfoot Theatre also publish a breakdown of their carbon emissions, although it is best to consider this an example of what might be possible rather than as typical. Pigfoot Theatre is a company that makes work about climate and ecological crisis with the least carbon impact possible. For the year between May 2020 and May 2021, an estimate of 50 kg CO₂e (out of a total of 846 kg CO₂e) was due to purchases: that is, "items we bought first-hand. We buy most things (e.g. design materials & costume) second-hand, so we don't include the carbon emissions from their production".²⁰ The largest elements of Pigfoot Theatre's carbon footprint that year were attributed to the purchase of "energy-saving technology" and company train travel; they note that because all their shows were streamed during this period, there were no emissions from audience transport, normally their greatest carbon cost.

There are hundreds of theatre companies in the UK that neither tour extensively nor run their own building or workshops,²¹ not to mention those who

¹⁷ Julie's Bicycle and Arts Council England, *Culture, Climate and Environmental Responsibility Annual Report 2021-22*, p. 10.

¹⁸ Described as "a new option on the Creative Green Tools for organisations to report on environmental action and engagement beyond their carbon footprint" (Arts Council England, *Sustaining Great Art and Culture: Environmental Report 2018/2019* [January 2020], p. 4).

¹⁹ Metta Theatre, "Carbon Emissions - Setting a Science Based Target", 17 November 2020: <https://www.mettatheatre.co.uk/blog/2020/11/17/carbon-emissions-setting-a-science-based-target>. There are no figures on the webpage; percentages have been estimated based on the piechart that is included.

²⁰ Pigfoot Theatre, "Our carbon impact": <https://www.pigfoottheatre.com/carbon-impact>. To calculate the cost of purchases, the company used the statistics in *How Bad Are Bananas* by Mike Berners-Lee; for transport, shipping and energy, they used Climate Care's carbon calculator.

²¹ Indicatively, according to the 2016 dataset of English theatre production and presentation, of the 1,759 organisations that are not venues, 985 are companies with more than one staff and 774 are sole traders (BOP Consulting & Graham Devlin Associates, *Arts Council England: Analysis of Theatre in England*, 13 September 2016, p. 16.)

make the thousands of not-for-profit, community, amateur and student productions that take place each year, and which haven't been accounted for above. Those carbon emissions associated with production materials and making processes are what most of these theatre-makers have the agency to control themselves.

Challenges to Sustainable Production

The UK theatre industry was one of the creative industries sub-sectors most severely affected by the Covid-19 pandemic,²² not least because it was already increasingly reliant on earned income from ticket sales.²³ In October 2022, audiences for live theatre were still only at 71% of pre-pandemic levels.²⁴ Moreover, while ticket revenue remains depressed, the costs of materials and energy have rocketed due to high inflation and geopolitical instability.²⁵

In simultaneously working toward recovery and the reduction of its environmental impacts, the theatre sector faces a number of additional challenges, which taken as a whole form the background to this paper:

Historical assumptions

Sustainability requires new ways of working, and theatre tends to be conservative in its professional practices. Aesthetic concepts and assumptions of audience expectation – for example, as expressed by an attendee at the Theatres Trust 2021 conference, that shows should “hit you between the eyes” – are disproportionately prioritised over environmental impact. There are fears that

²² Creative Industries Policy and Evidence Centre (PEC), *Creative Industries and the Climate Emergency: The path to Net Zero* (2022), p. 33.

²³ There was a 4% cash reduction in ACE funding for theatre NPOs between 2010/11 and 2014/15, during which period funding reduced on average from 29% to 22% of the turnover for those organisations. Over the same period, local authority funding reduced by 50%, which was likely to impact most on non-NPO funded theatres (Arts Council England, “Analysis of Theatre in England: A Strategic Overview”, no date). Between 2010-2018, overall arts funding in England fell by more than a third; while largely due to government austerity policies, both business contribution and philanthropic giving also fell (National Campaign for the Arts, *Arts Index England 2007-2018*, p. 4). As Stephen Heatherington has demonstrated, “while direct subsidies make up much the smaller portion of financial turnover, indirectly they support nearly every part of British theatre” (*The Interdependence of Public and Private Finance in British Theatre*, p. 72).

²⁴ Giverny Masso, “Theatre audiences slower to return to pre-pandemic levels than film”, *The Stage*, 25 October 2022: <https://www.thestage.co.uk/news/theatre-audiences-slower-to-return-to-pre-pandemic-levels-than-film>

²⁵ The supply of birch plywood, which has been used extensively in theatre production, has been especially disrupted (Construction News, 21 December 2022: <https://www.constructionnews.co.uk/supply-chain/clc-energy-prices-to-send-material-costs-soaring-in-2023-21-12-2022/>). Electricity prices in the UK rose by 66.7% and gas prices by 129.4% in the 12 months to March 2023 (Office for National Statistics, 24 April 2023: <https://www.ons.gov.uk/economy/inflationandpriceindices/articles/costoflivinginsights/energy>).

sustainable sets “will all look like junk yards” or else “Peter Brook’s empty spaces”.

Practitioner barriers

A 2020 survey conducted by Ecostage, a grassroots initiative for the performing arts sector that embeds ecological thinking at the centre of the creative process, identified the following reasons why practitioners and companies are not choosing sustainable production options. These include: not knowing how to start implementing changes; “a lack of unified thinking across the sector” and “contradictory information” available; the need for “a clear value statement”, “public recognition of values” and “practical knowledge from case studies exchange”; “feeling alone”, “time constraints” and “lack of funding or budget”.²⁶

Pressurised timescales

According to Theatres Trust Director, Jon Morgan, “We work in such a labour-intensive, quick-delivery industry, and some of this means we have quite bad practices around sustainability and production”.²⁷ Theatre tends to operate within under-resourced infrastructures that demand fast, paradoxically costly solutions, often due to pressurised lead times and high event turnover. As the Unicorn Theatre’s *Greening Production Practices 2020* document states (and our research, discussed below, confirm), “Time gives us choices. The more time we have to assess and realise designs, the more sustainable we can be”.²⁸ However, there are widespread expectations across the sector that taking the time to build a more sustainable workflow will not prove cost effective.

Precarious labour & Training

The UK theatre sector is characterised by its use of precarious labour. According to the Freelancers Make Theatre Work website (March 2023), 71% of the theatre workforce is self-employed or freelance. A 2022 survey found that low pay, long

²⁶ Ruth Stringer, Presentation at “Greening Theatre” at Bristol Old Vic, 2 December 2021, an event organized as part of the Arts and Humanities Research Council (AHRC) scoping project, “Sustainable Materials in the Creative Industries” (SMICI). This section draws significantly from the findings of the SMICI project, for which the author was Co-Investigator. See Peter Oakley, Roberta Mock, Jules Findley, Ita Jansen, Siobhan Bauer, Rebecca Lardeur and Emily Macdonald, *Sustainable Materials in the Creative Industries: a scoping report for the AHRC (Redacted Version)* (London: Royal College of Art, 2022).

²⁷ Clark and Snow, “How theatre is setting new standards in its fight against climate change,” p. 13.

²⁸ Unicorn Theatre, *Greening Production Practices 2020 and Our Sustainability Action Plan* (2021): <https://www.unicorntheatre.com/about/sustainability>

hours and poor work-life balance are driving a continued technical skills shortage in the UK theatre sector.²⁹ The 2016 *Analysis of Theatre in England* report noted that staff training across the sector is limited and ad hoc, despite identified skills gaps, due to lack of time and funding; when training is available, it does not tend to support mid-career workers or self-employed independents.³⁰

In December 2021, AAPTLE (The Alliance of Associations & Professionals in Theatre & Live Events) and Bectu (Broadcasting Entertainment Communications and Theatre Union) launched a petition to halt the practice of “forced multi-skilling” (e.g. across costumes, hair, wigs and make-up) in commercial theatres, arguing that a lack of appropriate training will lead to lower standards and health and safety risks. This practice also potentially impacts on the knowledge of and ability to access and use materials sustainably. Moreover, there is little evidence across the creative sector that “environmental issues are being embedded in continuous professional development and ongoing skills provision”.³¹

Touring

The design, construction and choice of materials for sets, rigs and staging for touring has not tended to prioritise issues such as weight or truck/air pallet/container packing or space requirements, which contribute significantly to the carbon emissions arising from transport and freighting. Perform Europe (2020-21), a project that investigated sustainable touring practices across the 40 countries of Creative Europe and the UK, concluded that “current funding and cultural policies do not stimulate and support the growing environmental awareness in the sector to be put in practice”.³² In all 41 countries, “structured incentives for ecologically considerate touring and presentation are insufficient” and many other support programmes are “at odds with greening ambitions: they require producing and presenting new work instead of ‘recycling’ existing productions, overfocus on quantitative indicators, do not stimulate using green transport means, etc.”

²⁹ Bectu, “Theatres skills shortage worsening since pandemic: Bectu survey”, 1 December 2022: <https://bectu.org.uk/news/theatres-skills-shortage-worsening-since-pandemic-bectu-survey>

³⁰ BOP Consulting & Graham Devlin Associates, *Arts Council England: Analysis of Theatre in England*, p. 48.

³¹ Creative Industries Policy and Evidence Centre (PEC), *Creative Industries and the Climate Emergency*, p. 42.

³² Perform Europe, *Perform Europe Insights: Sustainability through Innovation* (2021): <https://performeurope.eu/resources>

Carbon Calculating

While of significant value for calculating emissions for travel and buildings, it is widely agreed by those engaged in production work that carbon calculating does not yet produce meaningful data in relation to set construction or equipment purchase or rental. The accurate data on which calculators rely can be difficult to ascertain for recycled and specialist materials and items; this is because “[n]ot all aspects of sustainability are easily quantifiable, such as care of materials, quality of recycling, renewable or finite sources, effects on biodiversity”.³³ Although there have been successful attempts to calculate the carbon dioxide equivalent of theatre production materials, the results tend to be specific to the organisation (such as the Carbon Calculator created for the National Theatre by Andrea Jago) and/or extremely labour-intensive (such as the one created for 59 Productions by Rebecca Lardeur).³⁴ The report, *Creative Industries and the Climate Emergency*, produced by Creative PEC and Julie’s Bicycle, notes that, “[d]espite their importance in emissions reduction strategies,” carbon calculating tool-kits have been subject to little external scientific scrutiny and “broader analysis of their effectiveness and uptake is lacking”.³⁵

The Theatre Green Book: Sustainable Productions

The purpose of *The Theatre Green Book* “is not to suggest creative solutions, but to define the parameters within which theatre must work” in order to reduce its environmental impacts.³⁶ Developed and researched in 2020-21, the first volume of *The Theatre Green Book* was largely produced while theatres were shut and practitioners were on hiatus, with time for reflection that tends to be unavailable during pressurised production schedules. While based on knowledge and practices established pre-pandemic and prior to Brexit, it was

³³ Oakley et al, *Sustainable Materials in the Creative Industries*, p. 155.

³⁴ See the “How has National Theatre production practice changed over the last year?” panel at Making Theatre Green conference, National Theatre, 6 June 2022 (<https://vimeo.com/727085584/f4669f3889>); and the “Measuring & Evaluating” panel at the Coming Together: Arts & Cultural Networks for Sustainability conference, organised as part of this project at the University of Plymouth, 30 September 2022 (https://www.youtube.com/watch?v=9RDD6zJXSCc&ab_channel=siobhanmckeown).

³⁵ Creative Industries Policy and Evidence Centre (PEC), *Creative Industries and the Climate Emergency*, p. 41.

³⁶ Buro Happold and Renew Theatre, *The Theatre Green Book. Part 1*, p. 15. Unless otherwise noted, references to *The Theatre Green Book* in this paper refer to this volume, *Sustainable Productions*.

largely responding to the same on-going challenges outlined in the section above (many of which it explicitly discusses).

The *Green Book* begins by presenting a cyclical model of sustainable theatre-making; key milestones, responsibilities and processes are associated and align with its various elements throughout the rest of the document. Its driving principles can be summarized in three imperatives: “do more with less”; spend more on people’s time and less on stuff; and “reduce harmful chemicals”³⁷. It advocates a circular economy approach whereby “[p]roducts and materials are kept within productive use for as long as possible, and when they reach end of use, they are effectively cycled (or looped) back into the system”.³⁸

Detailed recommendations and guidelines are provided to meet the three *Green Book* standard levels (Baseline, Intermediate and Advanced). For Baseline productions, at least 50% of the materials used in their making processes should have had a previous life, and 65% should be repurposed when disposing of them. To meet Intermediate standard, 75% of materials should have been used before and 80% likely to be used again. Advanced level productions are expected to ensure that all materials have already been used before, or else are accredited carbon zero; after the production ends, 100% of materials must be reused or recycled. Productions operating at Advanced level should also only use electric vehicles, trains, bikes or public transport, and no toxic production materials, however mitigated.

Only Advanced standard productions are expected to use carbon calculators; this, it states, is because more data is still needed to establish carbon budgets for shows, and few theatre-makers are trained in their use.³⁹ *The Green Book* therefore recommends creating Materials Inventories for each production which document both the provenance and expected after lives of all the materials it has used, recorded by weight if possible. These inventories are intended to generate data that organisations can employ to identify problem areas, prioritise “easy wins”, establish their starting points, and then track improvement over time.

The final section is a compilation of “Toolkits” that effectively act as appendices to the previous pages. These are organised under four headings: “Producing”, “Designing and Making”, “Technical” and “Site Specific and Touring”. Ultimately, this first volume of *The Theatre Green Book* emphasises that

³⁷ Buro Happold and Renew Theatre, *The Theatre Green Book. Part 1*, pp. 10 and 18.

³⁸ Peter Lacy, Jessica Long and Wesley Spindler, *The Circular Economy Handbook: Realizing the Circular Advantage* (London: Palgrave Macmillan, 2020), p. 5.

³⁹ Buro Happold and Renew Theatre, *The Theatre Green Book. Part 1*, p. 18.

sustainability requires new and different ways of working which depend on collegiality and collaboration, demand more time, and promote different kinds of creative relationships. It suggests that there are additional benefits to this form of sustainable practice: “Working collaboratively improves working culture for everybody. Working collectively brings more diverse talent into the industry. Working locally connects theatre to communities”.⁴⁰

⁴⁰ Buro Happold and Renew Theatre, *The Theatre Green Book. Part 1*, p. 16.

3. Methodology

The results, discussion, findings and recommendations presented in this report are based on a portfolio of qualitative research methods that centre on three case studies of productions that followed the guidelines in the Sustainable Productions volume of *The Theatre Green Book*. These productions were chosen from amongst those organisations that had registered to trial the *Green Book* via its website (25 at that time) and are intended to reflect some of the different contexts, priorities and challenges for theatrical production in the UK. The case study productions are:

- *All's Well That Ends Well* by the Royal Shakespeare Company (RSC) – a “large-scale production”;⁴¹
- *River Land* by Theatre Alibi – a “small-scale production”;
- *Exodus* by National Theatre of Scotland (NTS) – a “touring production”.

This broadly aligns with the *Green Book*'s categorisation of guidelines, and is designed to enable the researching of individual representative situations, as well as undertaking an embedded multiple analysis.

In addition to reflecting diversity of location and genre, we also attempted to select productions aiming to achieve each of the three *Green Book* standard levels. RSC and Theatre Alibi were working formally with *The Theatre Green Book* for the first time and both were aiming for Baseline standard. National Theatre Scotland was already using the *Green Book* and aiming to meet its Intermediate standard. We were unable to find a production aiming for Advanced standard targets within the timeframe of our project (that is, a production scheduled to open in the summer of 2022).

Each case study production was tracked from its first production meeting to its closure and disposal of materials. The project team (the author and Research Assistant, Siobhan Bauer) attended key “green milestone” meetings within the production process, each of which aligned with *Green Book* modelling. The majority of these were online. As per *Green Book* guidelines, each case study organisation identified a Sustainability Champion (See Appendix), and they acted as the key liaison with the project investigators. In all three cases, the Sustainability Champions were the shows' Production Managers. As part of this research project, each case study production was also

⁴¹ Our criteria for “large-scale” was that it had a cast of over 15 and a production budget of over £50k.

assigned an “Expert Mentor” from outside the organisation (See Appendix): a practitioner with expertise in sustainable production to support the production team, help them think through problems, point to further advice, and recommend solutions. All of these individuals were uncomfortable with the title of “Expert Mentor”; “Sustainability Sounding Board” was suggested as an alternative. In practice, the Sustainability Champions and Expert Mentors worked together as a collective, meeting online regularly and helping to steer the project, as an unofficial Management Committee, in directions meaningful for the industry.

These meetings led to running two online “Greening Theatre (Bring Your Own) Coffee Mornings” in June and July 2022. These sessions were an opportunity for anybody working with the case study companies, in any capacity, to informally talk about any matter that interested or vexed them about making more sustainable, low carbon/low waste theatre. These sessions – together with “wash up” interviews with key members of the production and creative teams, interviews with practitioners from non-case study organisations working with *The Theatre Green Book* (such as the Royal National Theatre), and meetings with other organisations and networks (for instance, individuals from SOLT/UK Theatre, Equity for a New Green Deal, and the Consortium Advising on Sustainability in Theatre, or CAST) – contributed further data to this project. This was enhanced by the peer-observation of Carbon Literacy Training sessions that were run for the case study organisations as part of this project, as well as through the analysis of participants’ submissions for Carbon Literacy certification.

To triangulate the data emerging from the case studies, as well as from other published *Green Book* case studies,⁴² we ran a qualitative online survey (October-November 2022) for self-identified individuals and companies that had either registered their intent to work with *The Theatre Green Book* or had already started working with it.

⁴² For example (all of which are available from <https://theatregreenbook.com/book-one-case-studies/>): Tinderbox Theatre, *SYLVAN: Evaluation Report on Tinderbox Theatre Company's trial of Theatre Green Book's Sustainable Productions Guidelines* (2021); Will Reynolds, *The Rhythmics: Trialling the Theatre Green Book Advanced Standard* (Metta Theatre, 2022); Told by an Idiot, *A First Encounter with the Theatre Green Book: Sustainable Productions* (2022).

4. Case Study 1: Theatre Alibi

Theatre Alibi's *River Land* (1-10 July 2022),⁴³ designed by Ioana Curelea, was performed in the 1920s church, Emmanuel Hall, that had been the company's base since its founding exactly forty years earlier. Alibi describe themselves as "contemporary storytellers" who make theatre that "moves freely between the intimate and the epic",⁴⁴ for audiences of all ages, mainly in the South West of England. *River Land* began in 2019 when they began working with the local community in St Thomas (an area of Exeter), where Emmanuel Hall is located, to gather their stories of the area. This project was extended, adapted and took several forms (including an audio walk) due to the pandemic, before eventually culminating in a full-scale production as part of the 10-day long St Thomas Festival of Stories, which Alibi organised. *River Land*, which was written by Daniel Jameson, tells the intergenerational story of Walter, who carries with him vivid memories of devastating floods that took place in St Thomas in 1960, and Ellie, who worries about global floods to come. The show was designed as a sensory theatre experience, with live music and projection, performed traverse style with audience members facing each other.

The choice to begin using *The Theatre Green Book* consciously reflected both Alibi's values and the subject matter of this particular production. They shared this with audiences via publicity materials, on their website, in media interviews and in discussion. Importantly, *River Land* was not explicitly about the climate crisis. Its director, Nikki Sved, said that they "wanted to allow people to properly connect to the subject in a fresh way. I never wanted to be preachy and I'm always very dubious about how well theatre and the arts actually do tell those stories and whether it is better to be hearing directly from scientists". For Alibi, *River Land* was a story about the climate crisis set in their local neighbourhood. The place, community and environmental concerns were entirely intertwined, and were intended to provide a more immediate way of relating to the crisis.

River Land far exceeded Green Book Baseline standards. By weight, nearly 100% of its sets and scenery, props and furniture and technical equipment had a previous life. Its Production Manager, Rachael Duthie, noted that this is largely because they were able to focus more on sourcing a "vibe" than finding a specific look or item. Also, due to the aesthetic of the production, the fact

⁴³ *River Land* was funded by Arts Council England, the Garfield Weston Foundation and Exeter City Council.

⁴⁴ Theatre Alibi, "About Us": <https://theatrealibi.co.uk/about-us/>

that it wasn't touring, and the flexibility of a venue that the company managed, furniture and scenic elements didn't need to be exact sizes or shapes. In the case of costumes, which were measured by quantity of items rather than weight, 73% were purchased "second hand" or had a previous life; only underwear and relatively few items that could not be sourced in the correct sizes (such as shoes) were bought new. All of the latter were returned to the company's stock, and some were used in Alibi's next show. The cast were also given the option to purchase their costumes after the run and all of them took up this offer.

Sourcing most of the set and costumes through social media, resale websites and even house clearances, produced some challenges, not least the additional time this process takes (that is, "a staff member walking around town all day on a last-minute charity shop haul rather than spending 3 minutes buying online"). In addition to occasionally creating difficulties in formally accounting for "cash-in-hand" purchases with their finance department, it also meant that actors did not always wear identical versions of the same costume, as is standard practice.



River Land (Theatre Alibi, 2022) by Daniel Jamieson, directed by Nikki Sved, and designed by Ioana Curelea.
Photographer: Steve Tanner.

Almost all of the materials used in *River Land* were likely to be reused or recycled. Most went back into the company's stock. All technical equipment, some furniture, and plastic plants had been hired and were returned. The living plants bought for the show were sold to the audience following the final performance and sheets of live carpet moss were donated to a local collective that makes art in response to the climate emergency. Despite the incredibly full set, *River Land*'s "get out" produced only two bin bags full of rubbish. The only plastic that was not rehomed was PVC tape; however, the company used far less than for past productions by replacing it with Velcro ties and paper-based tapes wherever possible.

Theatre Alibi say that *The Theatre Green Book* "absolutely" helped them to make *River Land* a more sustainable production. They attribute this to clear, easy-to-follow guidelines that take into account the practicalities of theatre-making and enable quantifiable data collection. The company also believes that the cultural impact of embedding sustainability from the earliest Research and Development stage, with effective communication across the entire creative and production team from the outset, made a significant difference.

Theatre Alibi's advice for production teams that want to reduce their environmental impacts:

- *Consider and plan for reuse at the conception of a project;*
- *Ensure that sustainability is the responsibility of and owned by all members of the team;*
- *Prioritise the making of and funding for time above everything else in order to reach sustainability targets.*

5. Case Study 2: Royal Shakespeare Company

Royal Shakespeare Company's *All's Well That Ends Well* (18 August - 8 October 2022) was directed by Blanche McIntyre and designed by Robert Innes Hopkins for the RSC's Royal Shakespeare Theatre in Stratford-Upon-Avon. This was a modern dress production, set in a social-media focused world, of a relatively little performed play by Shakespeare. The main elements of the set were a platform and a large elliptical sculptural dome which was used to delineate scenes and locations, scramble over and project onto. This presented an engineering challenge, and eventually required the production of a bespoke high density machined plastic chain track. Still, the production exceeded its Green Book Baseline target; 62% of sets, scenery and costumes had a previous life, and 89% of props and furniture by weight (or 68% by quantity) were either from reused or recycled sources. One of the major reasons for this positive result was the reuse of the stage floor from a previous production. Although this repurposing had happened infrequently in the past, it had not been considered a first choice option as standard until this production.

In terms of disposal, 87% of sets and scenery, 100% of larger props and furniture by weight (73% of smaller ones by quantity), and an estimate of over 95% of both costumes and technical equipment from the show were likely to be reused or recycled. This technically meets the Intermediate Green Book target, and is largely due to all of the production departments using as many stock items as possible in the first instance, all of which eventually went back into stock. However, the production also featured a deliberate technical design for disassembly, and space and time were made available to dismantle scenery into component materials for reuse when it finished.



All's Well That Ends Well (RSC, 2022), directed by Blanche McIntyre, and designed by Robert Innes Hopkins.
Photographer: Ikin Yum © RSC

Working with the *Green Book* on this production fostered numerous “small sustainability wins” across all of the RSC’s production departments, which have since been implemented long term. In *Running Wardrobe*, this includes the use of an ozone cabinet more often than dry cleaning, thereby reducing the use of cleaning chemicals such as perchloroethylene, eliminating the fuel for the journey to and from the dry cleaners, and reducing the amount of plastic used by costumes returned to the theatre in polythene wrap. When it is necessary to send costumes to the dry cleaners, reusable garment bags and hangers are now provided by the RSC. While these might seem like small actions, they represent cultural and behaviour change within the department, and all add up when multiplied across the organisation.

Three of the RSC's "sustainable production take-aways" from working with *The Theatre Green Book*:

- *"Don't be daunted by the size of the task and don't worry about being perfect. If the mountain seems too high, you don't have to get to the top. Just getting into the foothills means you are working more sustainably than last time. You can always build on small successes."*
- *"Include actors from early on in the process. They have a surprising impact on the last minute purchasing of costume and props during the rehearsal period."*
- *"Use the materials inventory as a planning tool from the start, and not just for recording what you've used and where it has gone after the fact."*

The RSC's environmental policy, published in June 2022, sets out the organisation's ambition to reduce carbon emissions to net zero before 2050, in line with the UK's legally binding target set the previous year.⁴⁵ It states that the RSC "will implement measures to meet the standards within the Theatre Green Book, with a focus on action" that will efficiently manage the consumption and disposal of resources across all their operations, minimise the impact of business travel and touring, and "incorporate environmental sustainability into the creative process; into the stories we tell and how we tell them".⁴⁶ While the RSC has had an environmental policy and action plan since 2015, and has reported on its carbon footprint since 2013, the focus has been on estates and operations (aligning with Volumes 2 and 3 of *The Theatre Green Book*) and did not include data explicitly related to production.

Reflecting on how the company dealt with environmental sustainability in its production work prior to formally working with the *Green Book for All's Well That Ends Well*, one member of the production team said:

⁴⁵ Dominic Carver, "Global net zero commitments", 12 November 2021: <https://commonslibrary.parliament.uk/global-net-zero-commitments/>

⁴⁶ RSC, "Environmental Policy", June 2022: <https://www.rsc.org.uk/about-us/policies/environmental-policy>

The short answer is that we didn't! We were primarily driven by artistic requirements and cost. It has traditionally been cheaper and easier to throw the old thing away and design and build the new thing according to your exact artistic requirements... The artistic culture is slowly shifting toward being more tolerant of making compromise in order to reuse old materials. We spend more on people and labour and less on materials. This has happened faster than it would have done as a result of the massive increases in materials prices we have experienced in the last three years.

In fact, the total cost of production materials for *All's Well that Ends Well* came in far under budget due to its minimalist aesthetic, the designing out of unnecessary materials, and the use of a repurposed show floor.

6. Case Study 3: National Theatre of Scotland

National Theatre of Scotland (NTS)'s production of *Exodus* by the playwright Uma Nada-Rajah (28 July - 21 September 2022) was a colourful satirical farce about political ambition and hypocritical values. Directed by Debbie Hannan, it opened at the Traverse Theatre during the Edinburgh Fringe festival and subsequently toured around Scotland to six different venues. NTS describes itself as an arts organisation “without walls” that brings theatre to audiences all over Scotland. Although its purpose-built facility, Rockvilla in Glasgow, includes rehearsal rooms, a working wardrobe, production workshop and technical store, NTS does not have its own theatre or performance space. Its Green Plan states that they are “acutely aware” of the environmental impact of a “core mission” reliant on touring. NTS is committed to finding an effective way to better understand, monitor and measure their carbon footprint and to working towards a zero waste and zero carbon future in line with Creative Scotland and Scottish Government targets, as well as to fulfilling a responsibility “to learn, inform, communicate and influence”.



Exodus (National Theatre of Scotland, 2022) by Uma Nada-Rajah, directed by Debbie Hannan, and designed by Alisa Kalyanova. Photographer: Tim Morozzo

NTS's 2021-22 Annual Report states that the organisation is an "active partner in the Theatre Green Book", that "Green Book" clauses have been embedded in their contracts with designers, and that they are committed to following its Intermediate standard guidelines for all productions.⁴⁷ *Exodus* met the Intermediate standard related to the previous lives of materials in most categories; over 95% of its sets and scenery (by weight), as well as sound, video and lighting equipment were reused or recycled, and 77% of costumes. This is quite an accomplishment for a set that its designer, Alisa Kalyanova, says was "insanely difficult to make green".⁴⁸ Comprising two revolving floors and a truss-based frame that was both climbed on and projected onto, it needed to represent a moving train among other locations, be weight-bearing, be transported to and erected in venues of different sizes, and be "fringe-able" (that is, capable of being put up safely and taken down within an hour).

One of the key sustainability take-aways of this production is the value of working closely with set builders; Glasgow's Pretty Scenic collaborated with the production team to find solutions to problems as they arose, as well as supplying wood. Although the Production Manager, Elle Taylor, wasn't able to source recycled or pre-used plastic to make the set's integral light boxes, she was able to order sustainable plastic from England. Moreover, at least one of the Scottish companies contacted said they would try to begin sourcing and supplying it in future, now that they established there was interest.

The 30% of props and furniture (by quantity) for *Exodus* that needed to be bought new and that were made of virgin or raw materials included sex toys, a vape, fake blood, hand sanitizer and food eaten during the performance. Additionally, a number of new technical components had to be purchased, some of which were required for health and safety compliance, and the company did not have the resources or contacts to find sustainable versions of these products. For this reason, NTS believes it is currently unlikely that they would consistently be able to stretch to Advanced Green Book standard in the near future. Still, the main advice from Gemma Swallow, Technical Director of NTS, for those working with the *Green Book* for the first time, is "not to panic. Everything is a win compared to the old days."

⁴⁷ National Theatre of Scotland, *Annual Report and Financial Statements for the year ended 31 March 2022*: <https://www.nationaltheatrescotland.com/about/who-we-are/reports-and-documents/annual-reports>

⁴⁸ National Theatre of Scotland, *Exodus* | *Education Portal* | Alisa Kalyanova (video), 2022: https://www.youtube.com/watch?v=D5r46Lbccfc&ab_channel=NationalTheatreofScotland

National Theatre Scotland are most proud of achieving the following in relation to the sustainability goals for *Exodus*:

- *Working collaboratively to overcome challenges*
- *The knock on effects to the wider sector through freelancers doing this work with us and taking it on to their next job*
- *Myth busting (a production can be made for the same money and it can look just as good)*

In addition to creating a Materials Inventory for *Exodus*, NTS recorded touring mileage for freight and captured the travel of the cast and crew through their expenses system. This included a carbon calculation.⁴⁹ However, they are unsure about how to use these data meaningfully, as every tour and its requirements are different, especially when public transport and the hiring of electric vehicles are not available options. So, for instance, “a tiny tour that goes up to the Highlands and all around the islands” can’t be compared to “a massive show going from Glasgow to Edinburgh” or, for instance, to NTS’s *Burn*, a one person show by Alan Cummings that toured Scotland and to New York, and was being performed at the same time as *Exodus*. While trying to organise tours with the least mileage as possible – for the wellbeing of cast and crew and for cost reasons, as much as for climate – this is often reliant on the dates that venues are available. Everyone who drives for NTS also undertakes training in how to drive economically and sustainably.

NTS have a clause in their co-production agreements, stating that they expect partners to work to and with their environmental standards, but did not use a “Green Rider” with receiving venues for *Exodus*. Citing a recent touring venue that did not have recycling facilities, they intend to develop one in future, if only to have a better sense of what to expect in terms of facilities (“If we’d known ahead, we would have taken our own boxes”), in the same way as for technical equipment. The latter, too, is for both cost and environmental reasons. The *Green Book* Intermediate Standard (in its Touring supplement) states that 45% of all material and equipment should be procured locally at receiving venues for shows designed for touring from the outset (although the scale, nature and resourcing of the venues they perform in makes that impossible for

⁴⁹ The Touring “Toolkit” in Volume 1 of *The Theatre Green Book* only recommends “recording mileage” for Intermediate standard productions and making the most sustainable transport choices available to them. It states that Advanced standard shows should use carbon calculators to “help with decision making” (p. 56).

the majority of NTS tours). The *Green Book* also suggests that touring productions should work with receiving venues to monitor audience transport; the company notes that while they try to encourage sustainable transport in their advertising materials (and are starting to sell some tickets directly now themselves), they do not own or hold data about audiences.

At the end of *Exodus's* tour, nearly 100% of all materials were categorised as likely to be reused. According to the company, this was due to their benefitting from two commodities: first, the space to keep items from their shows; and, secondly, *staff time* to record, categorise, archive, and where necessary, locate new homes for things outside of the company.

7. Carbon Literacy Training (CLT)

Research has indicated that Carbon Literate individuals understand how climate change impacts on them sectorally and are able to lower their carbon footprint by 5 to 15%.⁵⁰ The Intermediate standard guidelines of *The Theatre Green Book* state that “All key members of the team [should] have undertaken carbon literacy training before production starts”. Although several theatre organisations run or organise their own training (for example, HOME Manchester, the Unicorn Theatre, SAIL in Leeds, and, our case study, National Theatre of Scotland), during early stages of our project (December 2021 - January 2022), we were unable to find any theatre- or broader arts-specific Carbon Literacy Training that we could make available for our case study participants in line with production schedules.

We therefore ran our own CLT programme, via Zoom, for the purposes of this project. This was led by Sigrun Wagner, Elizabeth Schafer and David Bullen, using the model and materials they employ to train staff and students at Royal Holloway, University of London.⁵¹ Although Schafer and Bullen are theatre academics, the course materials are generic, focusing on the causes of climate change, how climate justice intersects with other social justice movements, how everyday aspects of lives such as travel and diet impact the climate, and facilitating the making of individual and collective climate conscious choices on an everyday basis. Participants were expected to attend four two-hour sessions; we offered each session twice. It was therefore possible to complete the sessions over two full days or four half days. Even so, it proved a challenge to schedule sessions when the majority of a production team was available, let alone three. Many people either had other freelance commitments or were working on other shows within the organisation. For the same reasons, we were unable to schedule CLT prior to the start of production for any of our case studies.

The training was open to anybody participating in our case study productions, or working in or with the wider company in any capacity. At the end of the training programme, participants had the opportunity to be awarded a Carbon Literacy Certificate by completing a short written submission identifying both individual and group actions that they will undertake and why it is significant. We paid for the costs of accreditation. Several months later, one freelancer working in costumes who participated in the training contacted us to

⁵⁰ Carbon Literacy Project, “Organisation”: <https://carbonliteracy.com/organisation/>

⁵¹ This is a Carbon Literacy Project accredited course that they have based on one originally created by Nottingham Trent University’s Green Academy.

say that they used their CL certification when employed by another company for which this was a requirement.

63 individuals from case study companies attended the CLT we ran (five others signed up but attended no sessions). Of these, 53 attended all four sessions and 36 were awarded Carbon Literacy Certification. Nearly 75% of participants worked with Royal Shakespeare Company. The RSC had already started running one-hour voluntary sessions introducing key elements of carbon literacy to its employees and was looking to extend and develop this across the organisation. The majority of individuals working with NTS had already completed CLT. Although all members of the *Exodus* team were freelance and only employed for this one show, many had worked regularly with NTS on other projects. NTS was not offering CLT in the run up to this production, and those attending our training included both the designer and Production Manager, who was also its Sustainability Champion. Almost all members of Theatre Alibi's creative and leadership team, as well as one of its Board members, attended our CLT.

I work for the Royal Shakespeare Company who design and build sets for the theatre industry. As a leading company in the world of theatre, we as a group want to strive to be as sustainable as possible and help pave the way for other theatres to do the same. The carbon literacy training is part of that as we want to have a better-informed work force who can understand the environmental impact we have and why it's so significant.

Just in my department alone we throw away at least ten skips of steel a year which amounts to at least 4 tonnes of steel. 4 tonnes of steel produces at least 7.8 tonnes of CO₂. So, by reusing at least half of that, we can save 3.9 tonnes of CO₂ right there. If all 4 departments were able to do the same, we could be saving over ten tonnes of CO₂ as a workshop just by designing more sustainably.

(from a Carbon Literacy Certification submission)

Feedback about the CLT was overwhelming positive in terms of, as one respondent described it, "gaining a more complex understanding of how our aims fitted into a larger narrative". It was unanimously expressed, however, that theatre-specific training that was slightly less "science heavy" would have been preferable. While some participants felt energised by doing the training with people from other organisations (and with a slightly different mix at every session), most found particular value in doing the course with others within their

organisation and/or production team. This was linked specifically with building a community with “critical mass” and a shared sense of purpose.

The “breakout room” discussions that formed approximately a quarter of the course were largely treated as “safe spaces” in which to discuss specific organisational challenges (for example, how RSC production teams felt unable to “say no” to directors or designers who demanded last minute changes or unsustainable solutions). They also delved deeply into exploring infrastructural changes – for instance, setting defined sustainability objectives based on on-going benchmarking; adding carbon budgets into design briefs and contracts; making CLT mandatory as part of staff on-boarding processes; and the creation of databases and catalogues for sets and costumes that can be used within and beyond an individual organisation.

While all three production managers felt that the CLT hadn't necessarily impacted on the decision-making for their case study productions (possibly due to its timing, after initial concept and design meetings), 20% of participants accredited explicitly referenced *The Theatre Green Book* in their pledged actions and over 75% described activities that are recommended in it. There was a pledge to initiate a longer and earlier theatre design process, one to create a “green supplier list” to make it easier to procure alternative products, one to reduce car use between RSC sites, and another to start a South West Hub to share resources and sustainability knowledge (which, as discussed elsewhere in this paper, was subsequently initiated).

On 18 July 2022, we co-organised and facilitated an online event with CAST (Consortium Advising on Sustainability in Theatre, which is a Working Group of Society of London Theatre & UK Theatre, and represents organisations & freelance practitioners from all around the UK). This focused on the development of CLT for the theatre sector. It featured presentations by Jennifer Taillefer, who developed CLT at the Unicorn Theatre, and Alison Neighbour, who is part of a team from the Society of British Theatre Designers (SBTD) that was in the final stages of accrediting CLT for theatre designers. Attended by 24 people (plus facilitators and presenters), predominantly from beyond our case study organisations, discussion points raised by participants included:

- Lack of engagement with CLT from the commercial theatre sector, although it was noted that many creative and production freelancers move frequently between funded and commercial organisations and productions;
- Whether CL accreditation was necessary and whether it should be voluntary or mandatory (similar questions were raised in parallel about working to or meeting *Green Book* standards);

- Whether CLT is more effective in person or online;
- Patterns of delivery (for example, all day events or a series of shorter sessions, perhaps supplemented by self-directed study).

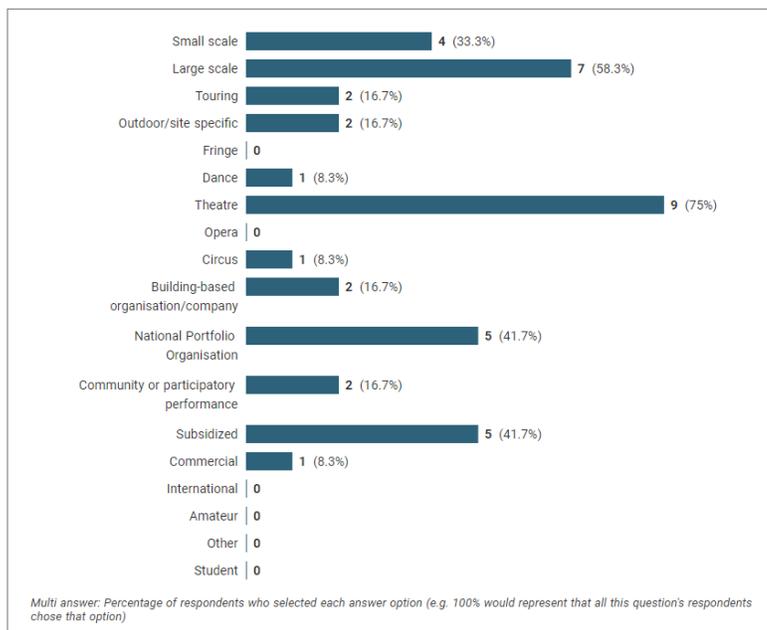
There was general agreement that industry-specific CLT was more desirable than training that was generic or more widely cultural or arts-based; however, there was also discussion about whether this should be broken down further within the sector (for instance, training specifically for designers, actors, front of house staff, etc).

The conversation during the CAST event occasionally moved beyond CLT to reflect on barriers to sustainable practice – for instance, the presumed “lack of glitz” of sustainable productions or the higher costs of sustainable paint products. In this context, it was agreed by participants that ACE’s requirement that National Portfolio Organisations demonstrate how they meet its Environmental Responsibility Investment Principle is positive and beginning to lead to structural changes within organisations. It was suggested, in particular, that ACE’s intervention has put sustainability on the radar of senior leaders and decision-makers within cultural organisations and that a productive starting point for those individuals would be to attend CLT themselves.

8. “Working with *The Theatre Green Book*” Survey

Our qualitative online survey was open from 26 October to 30 November 2022. It was promoted primarily through social media (Facebook, Twitter) and JISC lists, and stated that it was for “companies and theatre-makers that have started to make productions using the *Theatre Green Book Volume 1 (Sustainable Productions)* – regardless of whether they have seen through a production to completion – AND 2) Companies and individuals that registered for the 'beta trial' of the *Theatre Green Book Volume 1 (Sustainable Productions)* on the *Theatre Green Book* website – even if they have not made a production using the *Theatre Green Book* as of yet.” While the number of respondents (n=12) may lead to lack of statistical confidence, it might also point to the possibility that, while industry awareness of *The Theatre Green Book* seems to be extremely high, it may not have been used much in practice.

Respondents chose the following descriptions of their production work, or intended production work, with *The Theatre Green Book* (they could choose as many as they liked):



The majority of these productions were made in London, with one respondent in Scotland, and another based in Germany who was working worldwide. Ten out of 12 respondents had started making a production using the *Green Book*. Of the two that hadn't, one was using its standards as a marker for a year to set their targets; the other used the survey as an opportunity to describe the *Green Book* as “woke, Marxist, Climate cult, nonsense” and answered no further questions. Of the ten that had used it, 80% were aiming for Baseline and 20% for

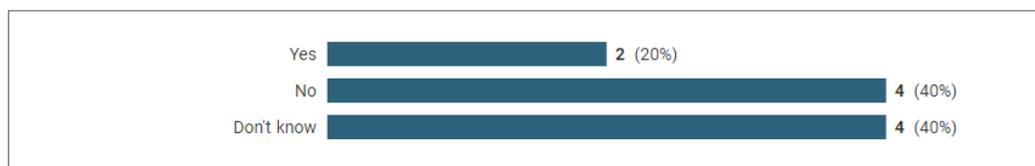
Intermediate standard. Six met their target, one did not, and three of these were unable to follow *Green Book* guidelines fully to the completion of their projects. The reasons given for the latter were: limited time and resources; difficulties in “aligning all parties” and “finding extra time with their partners to make them aware of the TGB issues”; and “post pandemic short staffing”.

Reasons given for not meeting *Green Book* targets related to the previous life of materials in each category (set, props, costumes, technical) centred on timescales, design work that could not be made sustainably and “an unwillingness to compromise from the creative teams”. Those productions that were able to meet their target attributed this to: being able to access large amounts of materials in storage; the flexibility of the creative team; a strong commitment from the designer and director; and the use of “time efficient tools” recommended by *The Theatre Green Book* (in particular, the making of Materials Inventories).

All of the respondents stated that they met their targets related to the disposal of materials. This was attributed to the increasing use of modular scenery, future touring of the production, and the maintenance of their store. With regard to the latter, however, one individual asked “does it really count as a future life if you are just putting materials into a storage unit that you are going to heat, cool, insure, etc in order to skip them five years later?”

When asked whether attempting to make a production to *Green Book* standard cost more money, 2 respondents said yes:

16 Did attempting to make a production to *Green Book* standard cost more money?



In explaining their responses, individuals identified the cost of “time” (to plan, repurpose scenery and props, to fill out inventories, find alternatives). While this was sometimes balanced by reduced consumption and materials use, one respondent stated that “our industry is consistently understaffed and under resourced. I am already hearing from producers in my freelance career that it is one more parameter they cannot afford to support”.

Asked whether they felt that Brexit has made it more difficult to make more sustainable productions, five people answered yes and four “don’t know”. Explanations for these responses can be summarised in the comment that

“labour and materials are harder to source, more expensive, and lead times for deliveries have increased”; however, another person observed that these have, “if anything, incentivised looking at reclaimed materials”. The same distribution of respondents (five yes, three no, and four don’t know) felt that the Covid-19 pandemic has made it more difficult to make more sustainable productions. The reasons for these responses include: “labour and skills shortage”; “budgets tighter due to the risk of cancellation, making it harder to make good choices”; and “People are happy to work again. With the increasing cost of living crisis, many people take this as an excuse to not adhere to sustainability developments”.

Nine out of ten respondents said that using the *Theatre Green Book* helped the company to make a more sustainable production and that this will lead to the company making increasingly sustainable productions in future. They attribute this to being “comprehensive” with “clear steps” that “showed how possible it was”; that the *Green Book* made it “feel good to be part of something”; and, in one case, because it was “a contractual obligation for the whole team”. Finally, only four of ten respondents said that they had promoted or publicised the fact that the production was using *The Theatre Green Book*. Those that had, generally did so via social media: “We were trying to reach audiences and other stakeholders to let them know we were doing our bit regarding the climate crisis but also to raise awareness of the scheme among our peers”.

9. Discussion

The research reported in this paper demonstrates that the sustainability of the production stages of theatre-making is the result of dozens, if not hundreds, of inter-related decisions by numerous individuals and teams, working with different degrees of agency and with a variety of drivers. As Heatherington observed, unlike processes of performance and presentation (which are “more managerially and operationally rationalised”), theatre creation and production tends to revolve around “personal choice and individual aesthetic judgement” (See Section 1 above). This significantly impacts on the ability to decarbonise, reduce waste and eliminate environmentally harmful industry practice within this sphere of influence. Nevertheless, and despite the fact that it is identified still as a “beta version” for trialling, Volume 1 of *The Theatre Green Book* has already changed the discourses and expectations of theatre-making in the UK, especially in the subsidised sector. Although not without its critics (for instance, for focusing entirely on how a production is made and not what it is about), it provides models, frameworks and rationales for change that are largely considered authoritative within a diverse community of practice.

Researching through the lens of *The Theatre Green Book* also enables the identification of key barriers and opportunities associated with low carbon/low waste production. The discussion below draws from the results presented in the previous five sections of this paper (arising from our three case studies, peer observation of carbon-literacy training, and survey), alongside other qualitative and quantitative data, to explore these issues. They are organised into seven overarching themes: the efficacy of *The Theatre Green Book*; measurement; budgets and labour; training; storage and sharing; cross-sector connectivity; and, engaging audiences. While open to interpretation (and with important overlaps), these themes have been classified according to the typology of “what progress looks like” in Arts Council England’s 2018/19 Environmental Report – that is, by whether they primarily relate to taking action; collaboration; a new creative ecology; understanding and skills; or creative opportunities.⁵²

Signs of a New Creative Ecology: The Efficacy of *The Theatre Green Book*

Our research evidences that consciously following even some of the guidelines in *The Theatre Green Book* (for the first time or more systemically) is likely to facilitate the making of more sustainable productions, primarily by

⁵² Arts Council England, *Sustaining Great Art and Culture: Environmental Report 2018/2019*, p. 17.

applying circular economy principles to production processes and in decision-making.⁵³ All three of the case study teams told us that *The Theatre Green Book* was invaluable in helping them to make their productions more sustainable; this was compellingly corroborated by the other qualitative data gathered through this project. For companies that attempt to follow the *Green Book*'s production guidelines, it enables the embedding of standards, goals and communication channels within and across teams, and provides guidelines and practical advice to monitor and audit progress.

What also appears to have been particularly enabling is the supportive, open and honest forum created through the Sustainability Champions and Expert Mentors from each of the case studies meeting together online regularly and working through *Green Book* and broader sustainability issues and challenges as a collective. This experience leads to one of this project's overarching findings: that engaging with a wider network (comprising individuals with a range of experiences working with the *Green Book* and with different levels of expertise), throughout all stages of the production process, can significantly impact upon the ability to make lower carbon/lower waste theatre.

There is an extremely high level of awareness of *The Theatre Green Book* across the UK theatre sector. Although this has not yet translated to its widespread systemic use (that is, productions following all of its procedures and recommendations from start to finish), the principles emphasised in Volume 1 – in particular, to do more with less, to reuse and repurpose as many materials as possible, and to reduce harmful chemicals – are accepted as aspirations and frequently referenced by companies and individuals. Announcing a commitment to *The Theatre Green Book* may be used as a proxy for the expression of organisational values, as well as a mechanism for public accountability; however, there are also some fears that it might lead to greater scrutiny and, potentially, accusations of "green washing" if productions are unable to fulfil their promise. Many theatre companies now include explicit

⁵³ As part of this research project, a report was prepared for *The Theatre Green Book* editorial committee in order to share insights about the use of Volume 1, and to suggest amendments and additions to future versions. These recommendations broadly concern the terminologies of milestones and roles; setting realistic expectations within a predominantly freelance workforce; performer and audience involvement; and the enhancing of templates to create materials inventories. The editorial report also note that production teams working with Volume 1 do not tend to reference or use the other volumes and this lack of cross-referencing could unintentionally reinforce a sense of "silo-ism" across areas of an organisation.

mention of *The Theatre Green Book* in their Environmental Policies and Green Plans.⁵⁴

As our case studies demonstrate, it is certainly possible to reach Green Book Baseline and Intermediate target standards, and the setting of a defined collective challenge is considered productive in itself.⁵⁵ However, “success” might best be understood in terms of whether working with *The Theatre Green Book* leads to short and long term changes in behaviour, operational activities and processes. The ability to enact such change is directly linked to the extent with which it is embraced at all levels and in all areas of an organisation. This, most importantly, includes its senior leadership team, which needs to send strong signals about expectations and values, especially to creative teams (including performers).

David Tanqueray, the production manager of the RSC’s *All’s Well That Ends Well*, has even suggested that “green book” is now being used interchangeably with the word “sustainability”, as in a statement like “That’s not very Green Book”. This, he says, is effective because the concept of “sustainability lacks tangibility whereas the *Green Book* is measurable. It knows what it stands for and so does everybody else”. Related to this, Meg Magill, the producer for Belfast-based Tinderbox Theatre Company, has described the publication of the *Green Book* as “the first time that we’ve ever had tangible guidelines in Northern Ireland” to enable them to “start to gather and measure and put data to our working”.⁵⁶

Developing Understanding and Skills: Measurement

“Measurability” (including how, what, when and by whom), however, has proven to be the primary dilemma exposed by this project. As Feimatta Conteh, Environmental Sustainability Manager for Factory International, has suggested,

⁵⁴ In a study of the environmental policies of British and Dutch theatres, Marjet Groen demonstrates that although they found no clear cases of greenwashing, many British theatres emphasise the urgency of the situation and express high ambitions with little evidence that they act upon these ambitions to the extent required. This is described as “a value-action gap” (Marjet Groen, *Transparency in Environmental Policy of Theatres: A comparison of British and Dutch Theatres*, Masters Thesis [Radboud University, 2020], p. 55).

⁵⁵ We have yet to find an example of a company that has reported consistently meeting Green Book Advanced standard, although the few that have aimed for it have said that it was a valuable challenge.

⁵⁶ Arts Council of Northern Ireland, *Tinderbox on the Theatre Green Book* (video), 28 January 2022: https://www.youtube.com/watch?v=Po1z-Ew_E6M&ab_channel=ArtsCouncilofNorthernIreland

“You can’t control what you can’t measure”.⁵⁷ However, there is still a lack of accessible, free, context-appropriate, reliable tools to measure, report and evaluate the environmental impacts associated with all elements of live theatre production (separately and together). Even once such data is collected, it isn’t always clear what *to do* with this information to make it meaningful since this tends to be based on comparative analysis of similar, if not the same, scenarios over time. This is the case even when considering the carbon emissions of travel due to touring, which is both relatively easy to calculate and universally accepted of being of value. As Gemma Swallow, Technical Director of National Theatre of Scotland, reflected when discussing the travel data for the touring production case study, *Exodus*: “We’ll just keep recording it until we find a use for it... eventually we may be able to come up with an average budget for a large scale tour, for a medium scale tour, and a small scale tour”.

Although there have been attempts to calculate the carbon dioxide equivalent of production materials, they have been time-consuming, reliant on background research, and the results have tended to be specific to the organisation. For these reasons, *The Theatre Green Book* recommends that only productions aiming for its “Advanced” standard of sustainability use carbon calculators. Instead it advocates the use of a Materials Inventory that documents and measures the provenance and afterlife of all materials used in a production. The creation of Materials Inventories is widely considered the most important and helpful of *Green Book* recommended activities, leading to both a more sustainable production and a systematic approach to making increasingly sustainable productions over time. It is also the element of the working with the *Green Book* that seems to cause the greatest anxiety and uncertainty, and was the subject of the most discussion by our research participants.

Although it was largely recognised that, as it says in the *Green Book* Toolkit, “A Materials Inventory is not an accurate tool”, those compiling them found it difficult to characterise and compare vastly different materials and items, at vastly different scales (from a handful of buttons to a stage floor), from vastly different sources. Materials Inventories were also considered labour-intensive, requiring “a significant amount of time and people power”,⁵⁸ as well as methodological and careful record keeping in the midst of often chaotic,

⁵⁷ Feimatta Conteh, Presentation on *The Theatre Green Book. Part 3: Sustainable Operations* at Greening Theatre event at Bristol Old Vic, 2 December 2021 (as part of the Sustainable Materials in the Creative Industries project).

⁵⁸ Told by an Idiot, [A First Encounter with the Theatre Green Book: Sustainable Productions | Told by an Idiot](#) (2022)

understaffed production schedules. Many concerns related to categorisation: deciding whether a chair is a prop or piece of furniture; or whether an off-cut of wood is brand new material; or whether steelwork is part of the theatre building or the show. Those responsible for making Materials Inventories expressed a desire to “get things right”, to be fair, transparent and accurate, but felt they lacked the expertise, information, data (and time) to do so.

Nonetheless, by the end of the research project, all of our case studies felt more comfortable with the “inability to capture everything” in their Materials Inventories. Together, they decided that the process of conscientiously thinking about materials and their categorisation in itself fosters, and is an example of, positive organisational and behavioural change. They also saw their potential as part of the design and costing process, in order to serve as a planning and discussion tool for decision-making, rather than simply retrospectively track what was used in a production. Overall, due to subjectivities and variabilities in approach to categorisation, the *Green Book*’s system is best used by organisations to establish and track their own sustainability goals and achievements (including behavioural change) against their own benchmarks over an extended period time, rather than to compare them with others (or even their own, very different productions).

Following *Green Book* recommendations by making Materials Inventories should enable National Portfolio Organisations (NPOs) in England, for instance, to demonstrate that they meet ACE’s Environmental Responsibility Investment Principle by “collect[ing] and us[ing] good quality data to inform your environmental strategies and initiatives, including your action plan and policy”,⁵⁹ as long as they use a clearly defined, consistent, and transparent system of measurement. In Scotland, however, where funded organisations are required to report and plan for carbon reduction, these data need to be translated into savings (kg CO₂e). This is indicative, more broadly, of an increasing expectation of and emphasis placed on carbon reporting and accountability. While our research confirmed a consensus that carbon calculators are appropriate for determining emissions related to touring, transport and buildings, very few individuals working in theatre production advocated their use for scenic materials.

Given current lack of confidence and experience in carbon calculating by theatre-makers, as well as the lack of context-specific sensitivity in the tools available to produce the data, the creation of Materials Inventories as per the

⁵⁹ Arts Council England, *Essential Read: Environmental Responsibility* (2021): <https://www.artscouncil.org.uk/essential-read-environmental-responsibility>

Green Book is of value in two ways: they prepare theatre practitioners to begin collecting data in the first instance; and probably, at this time, reveal as much as a carbon footprint calculation about the impact of a set build. While it is possible to argue that only materials and items bought new need to be included in carbon reporting, in practice, these might include dozens of different units requiring complex calculations and “guesstimates” by non-specialists (especially if considering Scope 3 emissions due to, for instance, the outsourcing of fabrication). This also wouldn't necessarily include the transport and procurement routes of materials and items which have had previous lives (for instance, a repurposed item that may have travelled from North America to the UK).

While this seems to point to the need to exclude production and set materials from an organisation's overall carbon calculations – or, perhaps to separate them out and use different performance indicators – this is likely to give the impression that they are insignificant or “don't matter”. Moreover, some companies have found the combination of working with *The Theatre Green Book's* circular economy methods of data collection and the carbon calculation of Julie's Bicycle Creative Green Tools (the latter required by ACE's NPO reporting) to be “challenging” and “overwhelming”.⁶⁰

It also fails to account for an integrated system. On one hand, carbon calculating may disincentivise change in an area like scenic materials that, when isolated, seems to represent a small proportion of its overall footprint; nor does it tend to take into consideration their disposal. On the other, a Materials Inventory approach tends not to factor buildings- and operations-related impacts into the monitoring of sustainable production processes and targets (for instance, those associated with energy and water use, waste, cleaning products, machinery maintenance and disposal, data management, and the travel of staff and contractors between sites). Neither system currently seems to adequately account for sets that are in use for a long period of time (e.g. for a West End show with a ten year run) or materials and items that fall between production, operations and other activities – such as those that are used for digital and hybrid elements of production work, marketing (photo calls, publicity materials), video documentation of performances, educational workshops, and so on.

In summary, there is currently a need to reconcile the use of circular economy strategies with demands to measure and record carbon. This is not only to ensure that a holistic approach is being taken to an organisation's

⁶⁰ Josie Dale-Jones and Eleanor Warr, *Thisegg's Me & My Bee Sustainability Report (2023)*, p. 3.

environmental impacts and that there are no “gaps” in visibility and responsibility, but also to enhance the confidence and efficacy (and to lessen the anxiety and administrative burden) of theatre organisations attempting to make increasingly sustainable productions in a challenging financial climate, whatever their motivations.

Taking Action: Budgets and Labour

Although new sustainable materials, such as paints, tend to cost more than non-sustainable ones (if they are even available or accessible), making more environmentally responsible theatre productions does not necessarily lead to increased materials budgets or spending overall. All three of our case study productions met their Green Book standard overall target and none cost more in materials than their budgets allowed or for previous similar shows. However, while working at different scales and with significantly different infrastructures, Theatre Alibi, the RSC and National Theatre of Scotland are all located within the subsidised sector and have their own storage facilities. Both impact significantly on their experiences and outcomes working with the *Green Book*, and ability to make more sustainable theatre more broadly.

As Tinderbox Theatre’s Meg Magill has acknowledged:

*We’re not all on an equal playing field when it comes to this journey. Being sustainable requires money, time, the ability to store and accumulate resources, so some companies will just naturally find this a bit more difficult than other companies.*⁶¹

Related to this, even if the materials costs for production are lower or static, then (often hidden) labour costs are undeniably higher. In the case of the RSC, where the production workforce is largely contractually employed on an ongoing basis, these costs and workload implications can be largely absorbed. However, across the sector, it is unlikely that the fee levels of freelance practitioners will increase in line with the additional time required for training, researching more sustainable materials, procuring and documenting them. The Equity for a Green New Green Deal network has suggested that processes are needed “for workers to hold theatres accountable and for theatres to hold themselves accountable when workers are being tasked to do more work in similar time frames to help make productions more sustainable”.⁶²

At the National Theatre’s “Making Theatre Green” conference in June 2022, celebrating and reflecting on a year of working with *The Theatre Green*

⁶¹ Arts Council of Northern Ireland, *Tinderbox on the Theatre Green Book* (video).

⁶² Equity for a Green New Deal, *Feedback on the Theatre Green Book* (November 2022), p. 7.

Book, its Director, Rufus Norris, announced that additional payment would be made to (freelance) designers and directors to meet the challenges of sustainability (for example, to fund the additional time required to do so). In line with this, the National Theatre intends that meeting the Green Book Baseline standard will become a contractual obligation, rather than an aspiration, from 2024. For many theatre organisations, even when the increased costs of production materials are mitigated through the application of circular economy principles, the labour costs that enable these savings might stretch further out of reach. It should also be noted that all three of our case studies relied on freelance workers, to a greater or lesser extent, and none felt they were able to hire or engage all members of their production and creative teams early enough for them to be fully involved in sustainability discussions from start to finish.

It is broadly acknowledged that Arts Council England's and Creative Scotland's environmental reporting requirements are leading to increasingly climate conscious expectations and structural change within those organisations they fund, as well as those that aspire to funding. Concerns are being expressed, however, about what happens when this funding is withdrawn or reduced,⁶³ as well as fears that meeting such reporting requirements, in itself, might divert budgets from core elements of an organisational mission, as well as the ability to fund more sustainable choices. This includes the perceived potential need to employ sustainability managers or consultants who are solely or primarily responsible for producing and presenting scientific data to meet compliance requirements, often at an arms-length from the practitioners who are making creative and technical decisions.

Commercial theatre, currently with little external imperative (except, significantly, steeply rising costs for materials like plywood), has engaged far less in sustainable production processes. However, this is not a straight-forward binary ecology. Many subsidised organisations, like the RSC and National Theatre of Scotland, create "commercial" shows (or else have had successful commercial transfers) and many commercial theatres receive public funding to

⁶³ Indeed, in November 2022, the National Theatre lost 5% of its funding, and Theatre Alibi lost 100% of its funding as National Portfolio Organisations of Arts Council England. In the Introduction to its report on *Sylvan*, Tinderbox notes that Theatre and Dance Northern Ireland (TDNI) had already lost 38% of its project funding in 2018, significantly impacting on their ability to support environmental change within the sector (p. 2). In April 2023, the Arts Council of Northern Ireland wrote to the 95 organisations in its Annual Funding Programme (AFP), to warn them to "assume a 10% reduction on 2022-23 resource funding levels", after 18 successive years of funding cuts (Michael Quinn, "Arts in Northern Ireland braced for 10% cuts to funding," *The Stage*, 14 April 2023).

upgrade their buildings to improve their environmental sustainability. Importantly, freelance practitioners extend knowledge and expertise as they move between the commercial and subsidised sectors, which additionally share procurement channels and material supply chains.⁶⁴

Developing Understanding and Skills: Training

Our research unambiguously suggests that Carbon Literacy Training (CLT) enables companies to make more sustainable productions and that the provision of theatre-specific CLT packages should be encouraged. Most found particular value in doing the course with others within their organisation and/or production team as this facilitated the building a community with “critical mass” and a shared sense of purpose. One of the freelance design assistants working with Theatre Alibi later told them that it was the CLT that made them realise that the company was serious and committed to the ethical change.

However, CLT is time-consuming and this is particularly problematic for freelancers and within a limited and busy production schedule.⁶⁵ Some individuals working on our case study productions had already participated in or completed CLT, and as such it wouldn’t have been either desirable or necessary for production teams to do the full training (i.e. able to be accredited) together at the start of each process, despite the benefits of a shared experience and opportunity for discussion. Some companies (such as National Theatre of Scotland and Metta Theatre) support freelancers in key roles to complete full CLT as early in the production process as possible, and intend to hold short CLT training sessions on the first day of production meetings or rehearsals, depending on the make up of the team.

CLT is only one type of training that production teams working with the *Green Book* have suggested is necessary. Most also identified a need for training in identifying both sustainable and harmful materials and products used in theatre-making, carbon calculating, and theatre-specific working practices that might reduce environmental impact. The use of *The Theatre Green Book* is increasingly being taught within higher education courses (for instance, at Guildford School of Acting, University of Surrey; Royal Holloway, University of London; and Wimbledon College of Arts, University of the Arts London); however, this training will need to be updated as new processes, products and

⁶⁴ This further demonstrates Heatherington’s conclusion that “subsidy largely supports the various free market operating models with which theatre has traditionally been produced and presented. Any notion of there being simply a ‘commercial’ and a ‘subsidised’ theatre is misleading” (*The Interdependence of Public and Private Finance in British Theatre*, p. 72).

⁶⁵ The CLT we ran as part of this project, which was accredited by the Carbon Literacy Project, required an 8 hour commitment plus additional self-directed time to prepare a submission for certification if needed or desired.

techniques emerge. Moreover, freelance practitioners tend to be responsible for their own upskilling and Continuing Professional Development. While companies may provide training, they are rarely paid for their time to attend and may not therefore be in a position to participate in it. This may further exacerbate an existing skills shortage in the theatre.

Training is essential to sustainable theatre production because it helps to raise awareness and build capacity in areas such as resource management, energy efficiency, and waste reduction, and can be tailored to specific roles within the industry. In the absence of such training, many theatre practitioners may be unfamiliar with the most effective methods for reducing their environmental impact, and may be hesitant to embrace sustainable practices. Training can help to overcome these barriers, empowering practitioners to make informed decisions and take a more proactive approach to sustainability. Ideally, there would be a sector-wide approach to how theatre-specific Carbon Literacy Training and Continuing Professional Development might be offered, by whom, whether it should be accredited, and how to enable freelance and precarious practitioners to participate without financial burden that precludes them.

Increasing Collaboration: Sharing and Storage

As noted above, the ability to accumulate, store and easily access construction materials, props and furniture, textiles and costumes greatly impacts upon a company's ability to make sustainable and affordable productions. However, such storage needs to be efficiently and carefully managed with well-catalogued, up-to-date recorded systems. Although essential to make reuse and repurposing of materials achievable and flexible for designers and production teams, storage generates its own power needs for heat and light, in addition to the labour required for its operation and maintenance. Moreover, there are fears that stores might be or become expensive and inefficiently managed "dumping" grounds, simply masking the deferral of disposal in environmentally harmful ways at a later date. Ideally, all materials would be reused or repurposed as soon as possible when a production ends, rather than sent to stores to expensively languish and potentially be buried and forgotten. As Will Reynolds writes in his account of Metta Theatre's trialling of *The Theatre Green Book Advanced Standard*, "the only way to ensure the most

sustainable outcome is to plan for disposal from the beginning – or to Design for Reuse”.⁶⁶

Although shared storage and reuse facilities are available in some regions in the UK, these are few and far between and most are not supported by online browsing capabilities and easy booking systems.⁶⁷ Given the scarcity of both shared storage facilities as well as organisations that operate their own stores (not to mention their costs in maintaining them), it is vital to create and maintain local or regional networks that are able to facilitate the sharing of materials and resources in a timely manner.

One initiative that arose directly from working with the *Green Book* is a nascent “Sustainability Hub” for theatre companies and other cultural organisations in South West England. Its creation was the subject of a pledge made by Theatre Alibi’s Rachael Duthie as part of the Climate Literacy Training run for this research project, and she launched it as a proposal at our cross-sector summative event held in Plymouth in September 2022.⁶⁸ For Duthie, such a network would aim to be accessible, non-hierarchical and self-sustaining, avoiding labour-intensive activities such as the creation of databases, inventories and the maintenance of mailing lists. One of its purposes would be to enable production teams to find homes for materials and objects during their design stage rather than at the end of a show’s run, ensuring that they moved quickly into reuse.

For the RSC’s production of *The Tempest* (January 2023), “inspired by the climate emergency”, its designer, Tom Piper, used numerous recycled elements from previous sets. These included the show floor from his RSC production of *The Winter’s Tale*, which had just been repurposed for our case study, *All’s Well That Ends Well*; wooden flats and gold mirror panels from his production of *Girl on an Altar* at the Kiln Theatre (2022), which were transported to the RSC as soon as the show finished; and tree branches and reeds from Piper’s production of *Wind in the Wilton’s* at Wilton’s Music Hall (2022). According to Piper, sustainable working requires both storage (“the biggest problem within the industry”) and borrowing networks for costumes and sets like the “theatre sharing ecology”

⁶⁶ Will Reynolds, *The Rhythmics: Trialling the Theatre Green Book Advanced Standard* (Metta Theatre, 2022), p. 8.

⁶⁷ In early 2021, a survey was commissioned by Greater London Authority about the development of a Reuse & Recycling facility for London theatres, asking whether productions were likely to use recycled materials in general, components (doors, windows, stairs), flats, floors, costumes, props, stage equipment, lighting practicals, drapes/curtains, and if so, using what criteria (e.g. location/travel distance, assets and material on offer, their condition, etc).

⁶⁸ The first steps toward this goal were taken in March 2023, when Theatre Alibi and Quirk Theatre co-hosted a “Sustainability Arts Gathering” in Exeter, attended by representatives from 16 different organisations.

that exists in Scotland: “Budget constraints have always worked to spark creativity and imaginative solutions, the Green Book will do the same”.⁶⁹

Increasing Collaboration: Cross-sector Connectivity

Across the UK, there are organisations and networks that bring together cultural and creative communities to take action that addresses the climate crisis, often on a local or regional level; these include GMAST in Greater Manchester, SAIL in Leeds, and the Green Arts Initiative in Scotland. However, our project has revealed that there is little cross over in terms of knowledge-sharing between theatre and other creative industries sectors. For instance, many theatre companies rely on the overbuying of “fast fashion” online to costume modern dress productions, with little awareness that the unsuitable clothing they return (in various colours and/or sizes) is destined for landfill. Nor has our research evidenced any significant use by theatre-makers of the tools, guidelines or resources provided by albert for the film and television sector, even in relation to the digital or intermedial content of productions (or entirely digital or hybrid productions).⁷⁰

Beyond the creative industries, effective partnerships and collaborations should almost certainly be built with the construction industry to ensure economies of scale (for instance, for timber procurement). For their 2023 production of *The Tempest*, for example, the RSC sourced trees from a managed local forest. In the past, these stage trees would have comprised a composite of steel frame, chicken wire, expanding foam and polystyrene, which couldn't be separated (and so recycled).

Theatre does not operate in a national or global vacuum. Legislative and infrastructural barriers to sustainable production include the need for: the strengthening of vulnerable supply chains and development of alternative materials as mitigation; systems and policies that allow for maximum recovery and reuse of raw materials; electronic equipment standardisation; further clarity and understanding of Extended Producer Responsibility (EPR); better understanding and control of hazardous bi-products and chemical usage in textiles; more informative labelling and transparent identification of the provenance of materials; and the valuing, via healthy working conditions and fair wages, of creative and cultural practitioners, as well as all involved in the

⁶⁹ Tom Piper, “Designing a Sustainable Tempest” (2023): <https://www.rsc.org.uk/blogs/whispers-from-the-wings/designing-a-sustainable-tempest>.

⁷⁰ albert is a BAFTA-owned organisation, founded in 2011, that supports the global film and television industry to reduce the environmental impacts of production.

chain of production. All need to be addressed by cross-sector coalitions, in which the theatre industry needs to participate.

Creative Opportunities: Engaging Audiences

Our research has indicated that theatre production teams would like to learn more about how to engage with audiences, and also that audiences would like to engage more with production processes. This goes beyond simply knowing that a production is using the *Green Book* or gaining insight into specific materials, items and processes (although this seems to be welcomed when offered); there are at least some audience members (or potential audience members) who are interested, for instance, in contributing to sourcing, procurement and disposal. For this, theatre companies and organisations need to be firmly embedded in the fabric of their local communities.

The 2022 Act Green Survey of over 11,000 audience members found that 86% are worried about climate crisis and that 90% expect theatre organisations to use materials from reused or recycled sources for sets.⁷¹ Although there are currently few opportunities for audiences to engage with and learn about the materiality and construction of scenic elements, National Theatre of Scotland has offered a rare example. On the webpage for NTS's production of *The Enemy* by Kieran Hurley (2021), visitors can click on parts of a photograph of the set (which was made from 100% reusable or recycled materials) and discover where some of the elements originally came from.⁷²

While *The Theatre Green Book* discusses issues such as audience travel to venues in its Operations volume,⁷³ as well as in its Touring supplement, audiences are absent from the guidelines related to sustainable production. As noted in the National Theatre of Scotland Case Study section, unless a producing organisation also runs the venue and is responsible for ticket sales, they are unlikely to own the data that would enable them to track and monitor audience travel. This points, again, to the necessity of enabling production, venues and operations to be considered as an integrated system (whether or not these processes are run by different companies).

For all three of our case study companies, publicly committing to *The Theatre Green Book* pointed to tangible actions and outcomes that ensured

⁷¹ Katy Raines and Flo Carr, *Act Green: Understanding audience attitudes towards the role of cultural organisations in tackling the climate emergency* (Indigo and Point One, 2022):

<https://pointone-epos.co.uk/act-green/>

⁷² National Theatre of Scotland, *The Enemy* (2021):

<https://www.nationaltheatrescotland.com/past-performances/the-enemy>

⁷³ Buro Happold and Renew Theatre. *The Theatre Green Book. Part 3*, p. 23.

they would be accountable to themselves as organisations, to their funders, to those who work for and with them, and, of course, to their audiences. Theatre Alibi, in particular, expressed the company's values by aligning the making of theatre with its themes, content and social purpose, and then creating space for community conversations. Because assumptions of audience expectation are at least partly fuelling a reluctance to make changes that reduce ecological damage,⁷⁴ then audiences need to be part of theatre's sustainability journey and have a voice in it. These audiences are neither homogenous nor may they yet be engaging with theatre. The various networks advocated above to catalyse and sustain environmentally responsible theatre practice should not only be intra- and cross-sector but, crucially, must involve those for and with whom the experience of theatre is (and must be) made.

⁷⁴ See "Historical Assumptions" under "Challenges to Sustainable Production" in Section 2 of this paper.

10. Conclusion & Recommendations

This Discussion Paper has presented the findings of a project that explored the implementation of a model to decarbonise production processes in the UK theatre sector. It is based on a portfolio of qualitative research methods that included three case studies of productions that followed *Theatre Green Book* guidelines as well as interviews, observations, grey literature reviews, and an online survey.⁷⁵ The project investigated the feasibility and practicality of these guidelines; the roles and responsibilities of key participants, such as production team members, mentors, and senior organisational leaders; the relevance and effectiveness of the *Green Book* as a tool for driving change towards a more environmentally conscious and socially responsible theatre industry; and, more broadly, the challenges, opportunities and outcomes of sustainable production practices, which must also maintain (and, preferably, enhance) economically viable organisations, artistic quality, and audience reach.

Our research has demonstrated that *The Theatre Green Book* is a useful resource for sustainable theatre production, and that its guidelines can be applied in different contexts and at different scales to reduce the use of high carbon materials and waste. It has found that the *Green Book* is already widely valued and trusted, and is empowering theatre-makers to become increasingly aware of their environmental impacts and systematically more sustainable in their practices. This highlights that sustainability initiatives are likely to be more successful when implemented collaboratively and with support from industry experts, and also when practitioners, such as those in our case study organisations, are able to learn from each other's experiences and work through problems together. It also aligns with Alison Tickell and Eliza Easton's suggestion that "If governments are to support the creative industries in their decarbonisation efforts," what is needed is "not only a cross-sectoral roadmap

⁷⁵ There are some limitations to this study. While the three case studies were chosen to reflect diversity in terms of context, priorities and challenges, as funded organisations making what might be called "straight theatre", they are not representative of all elements of the broader UK theatre industry or theatre practice. Moreover, the *Green Book* is a voluntary initiative and the companies who participated in this project were already more committed to sustainability than many others. While the online survey, as well as our organisation and attendance at a range of practitioner events, mitigates these limitations to some extent, the survey sample is relatively small. Finally, by focusing on the implementation of *Green Book* guidelines, a full range of sustainable practices and innovations in the industry (such as the cross-sector co-development of new materials and technologies by organisations like the National Theatre) are not reflected here.

but sub-sector strategies that recognise the idiosyncrasies of different parts of the sector".⁷⁶

In the theatre sub-sector of the creative industries, these idiosyncrasies include hesitations related to the measurement and evaluation of data, especially as it relates to production, which gave rise to the greatest anxieties for the companies in this study. This includes the tensions arising from expectations of, demands for and an emphasis on carbon calculating, on one hand, and the embedding of circular economy principles, such as those advocated by the *Green Book*, on the other. By implementing circular economy principles which encourage resource efficiency, waste reduction, and reuse of materials, organisations can reduce their carbon footprint (even if not precisely measured) while also promoting sustainable practices. Currently, the measurement and evaluation of reuse (both as source and disposal) is preferred by the majority of companies due to the lack of accurate data for scenic materials used in various and irregular, often composite, quantities, and also because it is easier to manage by adapting existing systems of record-keeping.

While in practice, the compilation of Materials Inventories based on circular economy principles is the first step toward carbon calculating, the latter is perceived as something additional that requires more time, skills and knowledge and which doesn't align neatly with existing theatre role profiles. Because the two approaches are reported and evaluated in different ways, it is necessary to build in supplementary moments of collaboration across various departments and participants in the production process. Many theatre companies lack the confidence, time, resources and expertise to implement the changes to communication and decision-making structures this necessitates, especially if it is not considered to be related to core business. Our research suggests that a carbon calculator for theatre productions – the equivalent, for instance, of the one created by albert for film and television production – is still some time in the future.⁷⁷

Confirming industry knowledge and expectation, the commodities consistently identified in this research as enabling sustainable theatre production are well-managed and well-stocked storage facilities, and the time to research and source materials, products, techniques, and to prepare items for reuse. The storage and sharing of resources (such as costumes, props, and scenery) reduces the need for the production, transport, and disposal of new materials and items, thereby also reducing the carbon footprint, waste, and costs of

⁷⁶ Alison Tickell and Eliza Easton, "Climate", in Creative Industries Policy and Evidence Centre, *The State of Creativity: Policy, Research, Industry* (2023), p. 59.

⁷⁷ albert's production tools are available at: <https://wearealbert.org/carbon-calculator-and-production-certification/>.

production work. However, while the use of environmentally responsible materials may not necessarily increase material budgets overall (even when using sustainable materials and products that are more expensive), sustainable production almost always requires more labour, training, and mechanisms to network. Although the case studies demonstrate that sustainable theatre production is not only feasible but also can be economically viable, it is undoubtedly a challenge for theatre companies to balance budgets and labour costs while ensuring that production teams are not overworked and that freelance practitioners are adequately paid for the additional time required.

In conclusion, the findings from this research suggest that the implementation of the following twelve inter-related measures would facilitate and lead to more sustainable theatre production:

1. Offer meaningful incentives to any theatre company or organisation (including commercial) that is able to demonstrate the reduction of their environmental impacts in *all* elements of their work, including production, through targeted and monitored actions.
2. Encourage theatre companies to commit publicly to sustainable practices, such as those outlined in *The Theatre Green Book*, in order to hold themselves accountable and inspire greater action.
3. Invest in the creation and maintenance of well-managed shared storage and borrowing facilities that facilitate the repurposing of construction materials, props, furniture, textiles and costumes, and that enable these items to move as quickly as possible into reuse. These do not need to be theatre-specific. Offer additional funding to theatre organisations with their own storage facilities to operate them as regional hubs.
4. Develop tools and mechanisms to enable theatre companies to holistically measure and track their environmental impact (including production materials, audience travel, energy usage, and digital technologies) with limited scientific expertise, and to measure carbon in ways that also account for circular economy principles.
5. When measuring and monitoring the carbon associated with production materials and processes, factor in energy and water use, waste, cleaning products, machinery maintenance and disposal, data management, and the travel of staff and contractors between sites, for both building-based organisations with their own workshops and companies that hire rehearsal and making spaces.

6. Establish local and regional networks to support low carbon/low waste theatre-making through the facilitation of shared procurement and energy purchasing, collective fundraising, knowledge exchange, and community-building.
7. Ensure that fees and remuneration for freelance theatre practitioners increase to reflect the additional time required to engage in sustainable production practices.
8. Support Continuing Professional Development (CPD) and Carbon Literacy Training (CLT) that is specific to the theatre sector, accessible, and available without undue financial burden. Agree a sector-wide approach to accreditation.
9. Encourage the input of current and potential audience members in theatre's sustainability journey to foster a sense of shared responsibility, increase demand for sustainable theatre, and influence industry behaviour and expectations.
10. Invest in the refurbishment and resourcing of small to medium scale receiving venues in order to reduce the need to freight technical equipment when touring, and to enable them to actively collaborate with visiting companies to establish and maintain sustainable practices.
11. Subsidise the costs of developing and using eco-friendly materials and technologies for the theatre sector.
12. Foster cross-sector coalitions to address legislative and infrastructural barriers to sustainable production, such as strengthening vulnerable supply chains, developing alternative materials, and valuing healthy working conditions and fair wages for all involved in the chain of production.

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Appendix: Case Study “Sustainability Champions” and “Expert Mentors”

Sustainability Champions:

Rachael Duthie – Production Manager, *River Land* (Theatre Alibi)

David Tanqueray – Production Manager, *All’s Well That Ends Well* (Royal Shakespeare Company)

Elle Taylor - Production Manager, *Exodus* (National Theatre of Scotland)

Expert Mentors:

Feimatta Conteh – Environmental Sustainability Manager, Factory International

William Reynolds – Artistic Director and Designer, Metta Theatre

Gemma Swallow – Technical Director, National Theatre of Scotland