JULIE'S BICYCLE

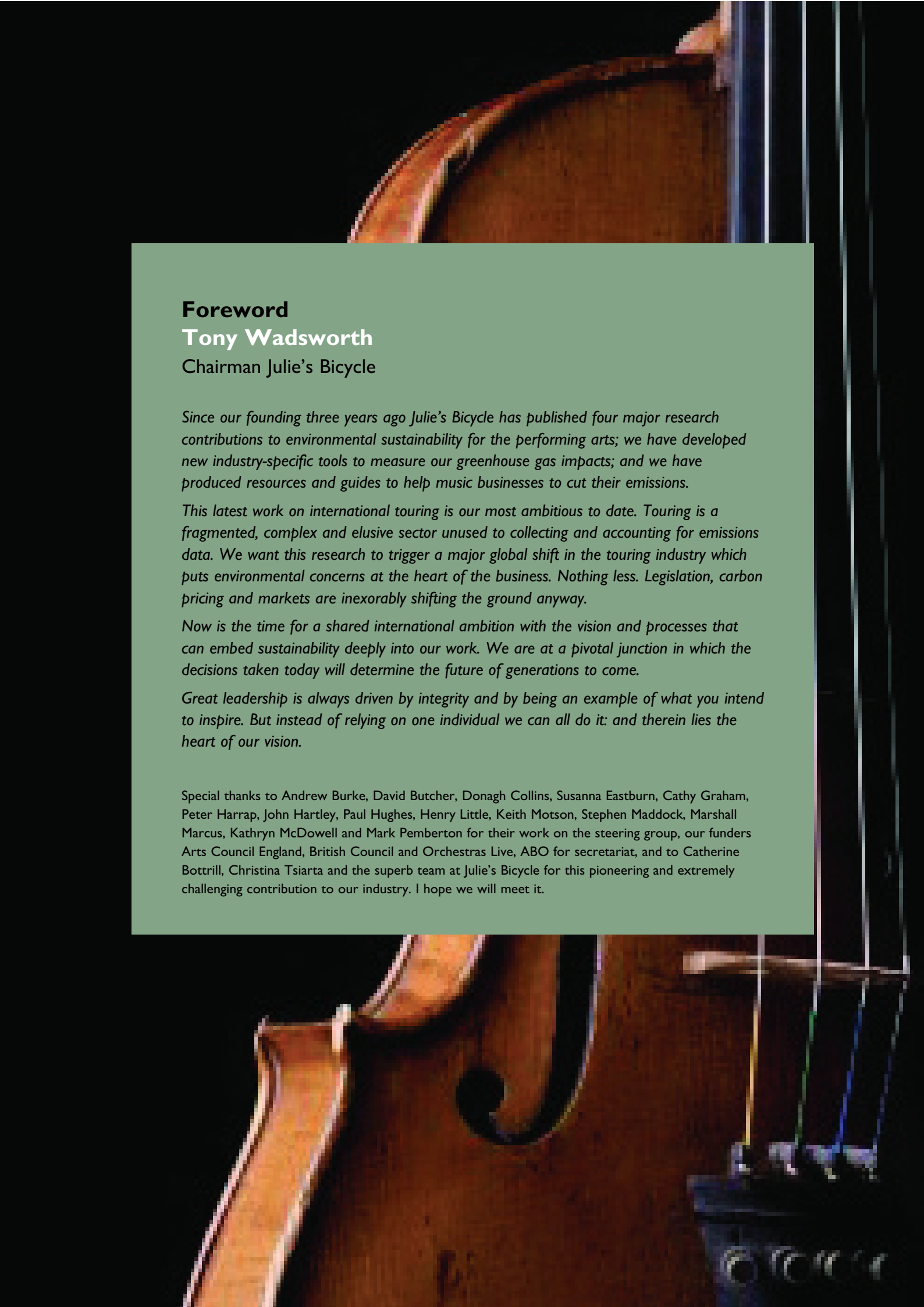
Moving arts

REPORT

Managing the carbon impacts of our touring

Volume 2:
ORCHESTRAS

June 2010



Foreword

Tony Wadsworth

Chairman Julie's Bicycle

Since our founding three years ago Julie's Bicycle has published four major research contributions to environmental sustainability for the performing arts; we have developed new industry-specific tools to measure our greenhouse gas impacts; and we have produced resources and guides to help music businesses to cut their emissions.

This latest work on international touring is our most ambitious to date. Touring is a fragmented, complex and elusive sector unused to collecting and accounting for emissions data. We want this research to trigger a major global shift in the touring industry which puts environmental concerns at the heart of the business. Nothing less. Legislation, carbon pricing and markets are inexorably shifting the ground anyway.

Now is the time for a shared international ambition with the vision and processes that can embed sustainability deeply into our work. We are at a pivotal junction in which the decisions taken today will determine the future of generations to come.

Great leadership is always driven by integrity and by being an example of what you intend to inspire. But instead of relying on one individual we can all do it: and therein lies the heart of our vision.

Special thanks to Andrew Burke, David Butcher, Donagh Collins, Susanna Eastburn, Cathy Graham, Peter Harrap, John Hartley, Paul Hughes, Henry Little, Keith Motson, Stephen Maddock, Marshall Marcus, Kathryn McDowell and Mark Pemberton for their work on the steering group, our funders Arts Council England, British Council and Orchestras Live, ABO for secretariat, and to Catherine Bottrill, Christina Tsiarta and the superb team at Julie's Bicycle for this pioneering and extremely challenging contribution to our industry. I hope we will meet it.

Moving arts – Managing the carbon impacts of our touring
Volume 2: ORCHESTRAS

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Lead researcher: Catherine Bottrill

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In the UK we can be justly proud of our orchestras. We have some of the best ensembles in the world, we regularly attract the most talented performers and conductors to our shores and our music reaches audiences all over the world. Protecting and nourishing our sector to ensure it continues to thrive is the first principle of sustainability. Thus far, then, sustainability has been framed for us largely in economic and social terms.

However, environmental impacts are moving rapidly up the list of priorities as government, funders, performers and, most importantly, ourselves and our audiences are waking up to the possible consequences of inaction. The emphasis on environmental sustainability at the 2009 ABO conference signalled this shift, and resulted in commissioning Julie's Bicycle to research sustainable orchestral touring, with funding from Arts Council England, British Council and Orchestras Live and support from the ABO. Our first step was to publish, in February 2010, the Green Orchestras Guide, a simple handbook for more sustainable practices in our organisations. The best orchestras thrive by seeking out new repertoire, artists, audiences and partnerships. The principles of self-determination and pre-emptive action are best served if we actively anticipate changes in the regulatory environment, and develop strategies for adapting our current business models. This does not mean, for example, that we should expect UK orchestras will no longer tour domestically and internationally – this is a vital activity for the orchestral sector economy. But we should expect touring to change and begin planning for this. We must ensure that we are responsive to contemporary concerns – which will inevitably support the business case for action. Audience members – particularly younger ones – are showing an increasing tendency to make choices influenced by an organisation's approach to the environment. There is a new generation of staff, musicians and young people for whom this is a very compelling and serious issue. These people are making choices about their lifestyles, values, tastes and professions – choices in which our activities may be invoked.

The research contained in this report enables us to work towards change in orchestral touring practice. The first step is understanding and measuring the level of greenhouse gas emissions generated by orchestras now. The second is refining our tour planning processes in order to reduce emissions, whilst at the same time, seeking to reconcile the implications of such change against our business plan imperatives, and ensuring that audiences continue to access our live performances locally, nationally and internationally.

Undertaking this research has been a collaborative effort. Not only orchestras, but artist managers, tour agents, concert halls, trade associations and the funders of the research – the Arts Council, The British Council and Orchestras Live – have worked tirelessly to support the research. We hope that the findings will be a prelude to more sustainable practices being introduced to our touring patterns within the UK and abroad in the next decade and to that end, the Board of the Association of British Orchestras has made a commitment to ensuring that every orchestra signs up to an environmental touring charter by 2015. We look forward to continuing the dialogue with our partners to embed this commitment across our industry.

Preface
Alison Tickell

When we began researching the environmental impacts of British based touring bands, theatres and orchestras last September we had no idea that the scientific and political framework within which we were working would change so dramatically. The month between mid- November and mid-December seeded sudden doubt in the integrity of science and witnessed political disarray in Copenhagen. Now we have become hesitant and it is clear that for the vast majority the resumption of economic growth ranks far higher than action on human- induced climate change.

However, trajectories for greenhouse gas emissions combined with our knowledge of related environmental concerns such as species extinction and ocean acidification remain the stuff of high tragedy. After hopes were so dramatically dashed in the last moments of 2009 we are now experiencing the onset of uncertainty which makes it harder to gauge appropriate responses and, crucially, take decisive action. Already I see this in the cultural sector – it shimmies between stances that could easily tip over to schisms: either to deal with carbon dioxide, or to promote overall sustainability. This is a false opposition; it polarises identity and paralyses action; above all it unveils how deeply uncomfortable we are with uncertainty. If ever the arts could intervene and bridge the 'eithers' and the 'ors' it is now.

Before embarking on the report it is worth anticipating and heading off likely apprehensions. We do not suggest that we stop touring or that international touring is worse than domestic, that large-scale touring is excessive, or that bands are worse than orchestras. There are no goodies and baddies; in reality comparisons of this kind are rarely useful and tend instead to splinter arts communities and reinforce stereotypes. What is much more interesting is that this broad collection of people have come together and given freely of their time and painstakingly gathered data because everyone has committed to understanding their part in this crisis.

Every day we use – and waste – huge quantities of energy. The degradation of the planet – including human-induced climate change – boils down to inequitable over-consumption largely perpetrated in developed countries. Sadly it is not within our direct capacity to prevent wholesale species from extinction but it is possible to reduce our energy consumption by planning routing, or flying less. Reducing consumption and decarbonising our touring will return a direct positive net profit to the environment, including species preservation – not to mention ethical, reputational and financial benefits.

The research has highlighted environmental costs and existing fiscal mechanisms intended to account for them. To date our market system has not begun to reflect the true costs of environmental impacts; so if we are anxious about financial stability we must surely factor in cost considerations that give us the long view. A resilient international performing arts industry that flourishes for generations will be one that anticipates its financing to operate within ecological limits. This is simple good sense.

We set out to probe the business of touring, harvesting the abundant creative raw materials from which to craft a touring industry that puts environmental concerns at its heart. Our goal? To thrust the issue of environmental impacts, starting with decarbonisation, into the heart of the touring industry so that it becomes important enough to provoke an industrial shift.

We have produced a three-volume research study, each volume with a voice of its own but there is much common content. Each sector – bands, theatres and orchestras – considers itself unique, quite distinct from all others. Whether this is the case or not, what matters is accounting for this common perception. What is certainly true is that the cultures and behaviours of the people in these industries, the professional relationships and dynamic interplays, are very different. Within the industries decisions are prescribed by subtle dynamics which operate alongside the obvious financial and logistic transactions. If we are to stimulate change it is important to understand how we can best deploy the human element: it uniquely informs each touring realm and our ambition to alter a complex supply chain means pulling the right levers of influence; to maximise power relationships we need to be aware of where they are. For example, in commercial band touring successful artists are the definitive force, in theatre it is shared between the work itself and the creative interpreters; with orchestras it is the forces of repertoire and management.

Our research legacy will be contingent on whether we manage to draw out common ambitions, issues, and activities, while maintaining the capacity for each industry to tailor and champion environmental priorities internally.

Failure to understand how these ultimately powerful dynamics flow is perhaps why responses from government, science and media are often ineffective and enervating. The assumption that if we focus hard enough on celebrity, regulation or science we will effect a behavioural revolution has proved distinctly shaky. By understanding the science and deploying our creativity in the manner in which we consider best we are much more likely to shape regulation as it will affect us.

A word on expectations: this piece is only a start. It looks at core touring activities: the movement of people and product and how that translates into the generation of greenhouse gases. Touring doesn't have the advantage of fixed or stable data gathering points, such as gas or electricity meters, repetitive work patterns, a predictable or permanent work force, or easy access to information about audience travel. All three industries share a common deficit: available data. Too much of our time was spent doing basic detective work.

We want to track environmental performance and use it in policy, planning and industry intelligence, so where there is relevant data that is in our mutual best interests it makes sense to share it.

We have avoided comparisons across sectors because the scale of activity and audience generally corresponds to the emissions profiles: international touring generates the most emissions because distances are vast and people tend to fly. Similarly, the emissions produced by bands far exceed orchestras and theatres, but so do their audiences.

While there are some pioneering examples of leadership we are, as a community, short on vision and long on doubt. We need to take a few priorities and commit to them. Only large-scale will do, action at the margins is simply not enough. We are suggesting that we begin with the actions that can command the broadest assent and achieve the quickest results. So we propose beginning with four core, principled, priorities:

1. Get to know the issue, engage with energy and environmental issues.

2. Measure your impacts: understanding what the carbon profile of touring is the first step towards managing it.

3. Identify what you can do to reduce your impacts, support 'green' products and activities to help shift markets.

4. Talk about it, disclose your impacts, invigorate the issue, talk to your artists and audiences, be accountable. We all want to avoid suspicions of greenwash.

Finally we would be missing a trick if we failed to bring into the narrative the art itself: the song, the play, the piece. Whatever other factors are at work – including taste – the art is what brings us together and what shapes the industries. We cannot ask artists to 'do' climate change but we can help those artists who choose to make climate change and the environment a part of their work.

Good outcomes ultimately require trust, transparency, accountability and cooperation on a grand scale – in other words, good governance. We have to stop being parochial as it relates to the comfort of art forms and national boundaries, and scale up our ambition.

This research is a heartfelt appeal to the touring industries to be sure-footed and assertive in your environmental responses. With good will and determination our recommendations will become standard practice and the research itself can be archived. Until then I hope that it is, above all, useful, and helps free that palpable but paralysed energy that has characterised our research encounters over the last nine months. Over 300 people have contributed to this research: we all need to look back and know that it has been worth it.

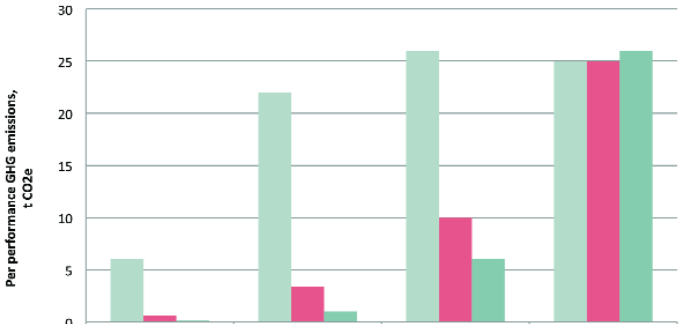
Alison Tickell
Director, Julie's Bicycle

Overall Summary Findings for Bands, Orchestras and Theatre

Touring greenhouse gas (GHG) emissions:

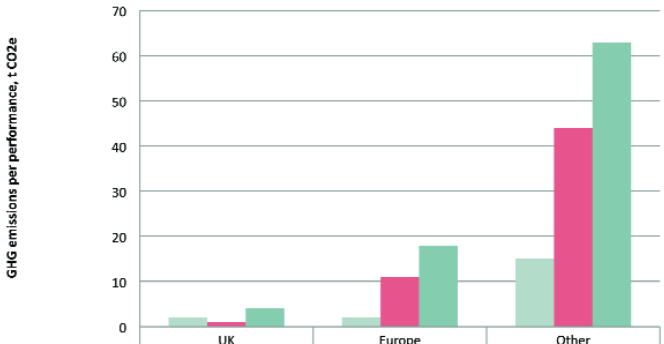
- Bands = c 85,000 t CO_2e
- Orchestras = c 8,600 t CO_2e
- Theatre = c 13,400 t CO_2e

*Figure 1 Initial values of the GHG emissions **per band performance** by each size by region, in tonnes CO_2e*



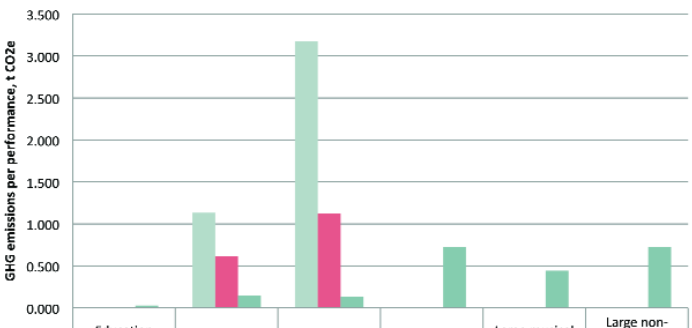
	Club	Theatre	Arena	Stadium
Other	6	22	26	25
Europe	0.565	3	10	25
UK	0	1	6	26

*Figure 2 Initial values of the GHG emissions **per orchestra performance** by each size by region, in tonnes CO_2e*



	UK	Europe	Other
Small orchestras	2	2	15
Medium orchestras	1	11	44
Large orchestras	4	18	63

*Figure 3 Initial values of the GHG emissions produced **per theatre performance** by production scale by region, in tonnes CO2e*



	Education (subs)	Small (subs)	Middle (subs)	Large (subs)	Large musical (comm)	Large non-musical (comm)
Other	0	1.131	3.177	0	0	0
Europe	0	0.619	1.129	0	0	0
UK	0.028	0.144	0.129	0.729	0.442	0.729

Concluding observations

This study has found that touring bands, orchestras and theatres have not systematically embedded environmental considerations into touring practices, and indeed they could not have done so because of the lack of the necessary tools and guidance in this remit. They are at the start of the process of engaging, measuring, reducing and communicating their efforts to improve the environmental performance of touring. We found professionals across the sector are willing and committed to take action, but need guidance on the priorities and support in taking actions.

General recommendations

Touring productions

- Embed environmental sustainability into tour planning.
- Create demand for goods with strong environmental credentials.
- Scope the GHG emissions when planning a tour.
- Measure the GHG emissions post-tour.
- Report the GHG emissions produced from touring.
- Calculate the environmental damage of a tour by pricing environmental impacts.

The business supply chain

- Concert halls embed environmental sustainability into operations and investment plans.
- Suppliers invest in and offer customers goods with strong environmental credentials.
- Funders require as condition of funding measurement of GHG emissions.
- Membership organisations disseminate information on environmental action to members and communicate the concerns of members to relevant stakeholders.

Collective action

- Collection and analysis of environmental statistics on live performance sector.
- Provision of environmental training to develop knowledge, expertise and skills.
- Commit to small number of joint priority actions across the sector.
- Fast-track environmental innovation for the performing arts sector.

1.0 Introduction

Sustainability is the art of living well, within the ecological limits of a finite planet. Art is more than an instrument in this process. It's the nature of it.

Professor Tim Jackson, 2010[1]

If any experience captures the art of living well it must be the experience of live music. Live music connects us to one another, creating a vital bond between the performers and the audience. When it's good, the imprint stays with us forever.

But Professor Jackson is mainly referring to sustainability in terms of how we in the developed world manage – or mismanage – the environmental consequences of our current lifestyles.

And while the experience of music is sustaining is this also true of the business? This research was undertaken to address that question as it relates to touring, and to identify how to reduce the environmental impacts. The results provide fascinating insights, but more crucially, the evidence for the practical actions we propose to reduce those impacts.

Therefore the work is addressed to touring orchestras and their management as well as to promoters, agents, and concert halls.

This study is the first systematic attempt to link the evidence of environmental impacts with practical solutions for cutting carbon emissions. It presents an in-depth understanding of the GHG emissions generated across all scales of touring activity. We have focused on the movement of people and of the production – in other words the primary business of touring – because these decisions have ramifications for all associated GHG emissions. The findings are the result of extensive data gathered from a wide variety of tours undertaken in the 2008/2009 season and from conversations with a broad cross-section of touring professionals.

With this information we have been able to:

1) Quantify the total annual and per performance GHG emissions from all scales of touring activity undertaken in the UK and by UK based orchestras touring overseas.

2) Identify practical actions through the business supply chains, which if taken now, will pave the way for a touring sector with a minimal environmental impact.

The urgency of climate change is not the only motivation for orchestras which tour. The increasing volatility of the price of oil will, in the coming years, inevitably affect a sector dependent on transport. Actions taken to reduce GHG emissions now will have the benefit of buffering the sector from any oil price spikes in the future as well as having a net impact on our stifled biosphere.

These issues are driving both mandatory government regulation and voluntary action. In the UK, the Climate Change Act, which requires an 80% reduction in GHG emissions by 2050, is directly affecting larger concert halls, logistics companies, and lighting and sound manufacturers and suppliers. And while direct regulation of a tour itself is not likely in the short term, regulation will be experienced via increases in the cost of oil, and carbon costs passed on by concert halls, transport or equipment suppliers.

The market aided by regulation is already beginning to put a true price on the environmental impacts of business and consumer choices. This price will become clearer in coming years as regulation develops and oil becomes a scarcer commodity.

Whether we like it or not, paying the real cost of goods and services, including the environmental costs, will profoundly influence businesses, organisations and consumer choices. The live performance sector can only benefit from pre-empting and championing a shift towards practices that minimise environmental impacts, and adapting to changing circumstances.

This is the first time most of the participants have been asked to provide data for the purposes of calculating the GHG emissions and many found this challenging. We need more orchestras to measure GHG emissions in their planning. Passing on this information to Julie's Bicycle will support the development of robust environmental performance benchmarks and overall tracking of the touring industry's progress. We have developed a free online Industry Green "IG" tool to facilitate this process.

To support further development of thinking and practice, this study includes a number of specialist pieces focused on "hot topic" issues (i.e. aviation, biofuels, carbon offsets and leisure travel) that are of immediate relevance to the sector. We also champion the emerging community of organisations and practitioners at hand to help orchestras navigate safely through these issues.

Environmental leadership will take commitment, time and resources but there is a clear opportunity for musicians and music professionals to embrace this issue with confidence. Wisely done, the cultural influence of music can inspire wider systemic shifts towards a society that embeds environmental sustainability as a guiding principle.

So it is timely to be taking stock of orchestral touring practices. Dealing with these issues now will give the orchestral sector a greater ability to respond to future challenges posed by environmental issues, and help to determine its own future.

This study of orchestral touring is part of a series conducted by Julie's Bicycle into the GHG emissions produced by a number of performance forms. The other two areas under analysis are band and theatre touring, with the scope for additional performing arts forms to be undertaken with the same methodology.

[1] Julie's Bicycle and British Council (2010). *Long Horizons: An exploration of art and climate change*. British Council, London

2.0 Conclusions

- Touring is a fundamental activity of the orchestral sector for reaching audiences and for the financial viability of orchestras.

- The majority of touring is undertaken by large and medium orchestras.

- Overseas touring comprises a significant proportion of the orchestral sector's touring related GHG emissions. This touring activity is valued as important for exposing international audiences to British orchestral work and culture. Furthermore, for some orchestras it is critical for their financial viability.

- Non-UK based orchestra touring is not a significant proportion of orchestral activity. However, more understanding of the patterns are needed especially in relationship to UK based orchestras touring overseas. Development of partnerships between venues is needed to reduce the environmental impact of hosting non-UK based orchestras.

- Orchestras have not considered the environmental impact of their touring activities, as to date it has not been a business priority, and for those receiving funding relating to touring, it has not been a requirement of receipt of funds.

- There are strong established professional networks in the orchestral sector that offer opportunities for addressing the environmental impacts of touring, however, business relationships and practices need to prioritise environmental considerations. Key relationships where engagement on environmental issues is critical are between: orchestras and their musicians; orchestras and concert halls; and orchestras and funders.

- Funders for the orchestral sector have a role in monitoring environmental commitment and in signposting the orchestral sector to guidance and resources to reduce their environmental impact.

- Reducing the environmental impacts from orchestra touring will require development of new touring models, which for example might involve possibly more performances per tour (at a single or multiple venues) and assessment of logistics (performer travel and instrument freighting). This will require tools, guidance and training for the sector. Furthermore, investment is needed to pilot and demonstrate new touring models that reduce environmental impacts as well as extend audience reach, maintain economically viable orchestras and ensure artistic quality is retained.

3.0 Recommendations

Environmental action is an ongoing process requiring a commitment to four principles: company or personal engagement with the issues; measurement of impacts; development of a strategy to reduce damages; and communication of what you are doing.[2] To fulfil these principles Julie's Bicycle recommends that the steering group and the orchestral sector adopt the following actions. These recommendations should be read in conjunction with the Green Orchestras Guide.

The recommendations are addressed to those responsible for organising the tour and suppliers of products and services. The list below identifies 12 priorities for action. In addition, we have prepared detailed tables of immediate actions for each participant in the touring business supply change with practical guidance of 'how to do it' in Section 3.4. The tables also outline the scale of ambition for environmental improvement.

3.1 Headline recommendations

Planning:

1. Embed environmental sustainability into tour planning alongside artistic and financial considerations. The main areas for orchestras to consider during the planning stages are; the routing; the venue selection; the travel logistics; and also goods and service procurement. This requires senior management and board engagement at the strategic and operational levels so the business risks and benefits of taking environmental improvements can be understood and action can be taken.

2. Scope the GHG emissions when planning a tour. This is vital for being able to assess early on in the planning process opportunities for reducing GHG emissions. Use the free Industry Green tour tool to predict GHG emissions from the tour.

Measurement:

3. Measure the GHG emissions after the tour. Measurement should take place upon completion of the tour to evaluate environmental performance against comparable sector benchmarks. Use the free Industry Green measurement tool to calculate the actual GHG emissions.

Action:

4. Share the GHG emissions produced from touring and any steps taken to reduce environmental impacts. Sharing this information with staff, suppliers and Julie's Bicycle would enable the development of robust sector environmental performance benchmarks and disseminate emerging and best practice on improving environmental performance.

5. Concert halls embed environmental sustainability into day-to-day operational practices and in future building investments. Concert halls should seek a standard accreditation for their environmental performance and communicate this to all incoming orchestras (including resident orchestras if applicable). Orchestras should request information about concert halls' environmental performance, for example by using a green rider. A template green rider and resources for concert halls including the Green Orchestras Guide are available from the Julie's Bicycle website. In the mid-term Julie's Bicycle will also be preparing a database of venues with strong environmental credentials so orchestras and agents can consider this information when making venue selection.

6. Suppliers invest in, offer and signpost orchestras to the products and services with strong environmental credentials. This is relevant for a whole number of suppliers such as trucking, hotels and consumables. Orchestras should request information about suppliers' environmental performance and policy.

7. Membership organisations should increase member awareness of the importance of embedding environmental sustainability in operational practice, and communicate the concerns of members to relevant stakeholders. Membership organisations should work with Julie's Bicycle to collect, collate and report sector intelligence on touring that is relevant for monitoring environmental impacts.

8. Environmental training is provided to develop knowledge, expertise and skills for taking actions. Environmental training should be incorporated as part of the curriculum in sector relevant degree courses and certification programmes and also in professional development training offered by employers and membership organisations.

9. Fast-track environmental innovation that is grounded in the business realities of the orchestra sector. Identify the most appropriate sources and vehicles for investment to support innovation pilots. The purpose would be to identify low carbon future technologies, formats and business models specific to the performing arts sector, and to take the best innovations to scale.

10. Collect statistics on the orchestral sector. Important statistical information about the sector is fragmented, opaque, un-collated or simply not collected at all. This creates a significant barrier to taking environmental action forward. There are well placed organisations for collecting data and for monitoring the sector's environmental performance. The sector would benefit from this information being shared regularly (e.g. through annual intelligence reports) to communicate to stakeholders, to inform strategic thinking and to take action to reduce its environmental impact.

[2] These principles form the foundations of the Industry Green framework developed by Julie's Bicycle specifically to support the creative industries in reducing their environmental impact.

Finance:

11. **Calculate the environmental damage of a tour by pricing these impacts**. This is an increasingly mainstream practice and is done by measuring environmental damage (i.e. GHG emissions of the tour) and then multiplying this by a price per unit of environmental damage. Knowing the environmental damage of a tour will help inform decision-making to ensure environmental considerations are taken into account and reduced to the extent possible. Furthermore, if wanting to invest in sector specific climate mitigation and adaptation the calculated environmental damage cost can be applied to determine the amount to invest. See "Hot topic 2 – Putting a price on what we can't always see".

12. **Funders require orchestras to measure their GHG emissions as condition of funding**. Funding bodies are in a pivotal position to encourage orchestras to embed environmental considerations into touring practices, at the same time, reconising the potential business plan implications of change and working with the sector to find ways to mitigate the impact. Furthermore, funding bodies should signpost orchestras to tools and guidance for improving environmental performance and financially support organisations providing resources and training.

3.2 Tools and resources needed

A series of web-based information and tools is needed to support the touring sector. Some of these tools are already in prototype development and others need to be created. The benefits of these tools will grow as organisations and companies contribute information and the sector uses them:

- Industry Green (IG) tool for touring emission measurement and tracking (prototype)
- A database of venues with environmental accreditation(s) (prototype)
- A database of suppliers offering goods and services with environmental credentials
- A database of venue equipment in-house and local suppliers
- A database of set materials for rental, sale and recycling
- Sharing of emerging practice to improve environmental performance
- Standard template green rider for concert halls
- Standard template for concert halls to report environmental performance

3.3 Further research needed

The performing arts sector will benefit from further environmental research in the following areas to be able to strategically address its environmental impacts:

- A study of audience travel and public transport services to venue-based performances
- Assessment of the GHG emissions from the concert hall-residency performance models
- Assessment of the proportion of resident touring performances as compared to touring orchestras incoming from overseas

3.4 Detailed recommendation for each key participant

For: Orchestras and Agents

Your actions	Where we want to be	How you do it
Tour Planning		
Ensure environmental issues are taken into account when planning a tour.	Environmental considerations are embedded into all tour planning decision-making.	Include responsibility for environmental actions in the job requirements of all those planning a tour.
Emissions Measurement		
Commit to pre- and post GHG emissions measurement of each tour.	All tours are measured for GHG emissions at the planning stage and upon completion stage of each leg.	Use the free web-based Industry Green (IG) touring tool to measure and track the emissions of tours by leg.
Tour Routing		
Assess the environmental impacts of your routing options.	All tours use a routing schedule that will minimise the GHG emissions produced from travel.	Calculate travel distances between performance dates and use the free web-based IG touring tool to work out the GHG emissions of route options. Develop opportunities for residencies and multiple performances in one locale to showcase the orchestra while reducing the travel impacts and duplicate visits.
Concert Hall Engagement		
Use a green rider to ask venues for information about their environmental performance.	Venues with strong environmental credentials become market leaders.	Use Julie's Bicycle venue environmental reporting template (or equivalent) in your green rider.
Travel Logistics		
Use low emission transport options where commercially competitive and convenient.	All tours make transport choices specifically to minimise the GHG emissions from moving musicians and instruments on tour.	Use rail rather than flying where possible. Choose public transport or coaches in place of individual cars. Promote car sharing where car use is unavoidable. Use logistics companies with fuel efficient vehicles and drivers with eco-driving training. If using biofuels use sustainably sourced. For overseas touring sea freight when possible rather than air freight.
Emission Reporting		
Report tour GHG emission results to staff, suppliers and audiences as well as for industry analysis.	All tours report their GHG emissions to assist with benchmarking and tracking of the orchestral sector.	Use the free web-based IG touring tool to report emissions for confidential annonymised sector analysis.

Continued - For: Orchestras and Agents

Your actions	Where we want to be	How you do it
Costing the Environment		
Make the environment a budgetary consideration.	All tours make the environment a budgetary consideration.	Allocate time and resources for staff and contractors to assess environmental options.
Apply a price of carbon to tour emission results to help inform decision-making.	A total price of carbon is applied to all tour emission results. This amount is invested into schemes supporting climate mitigation and adaptation.	Use the free web-based IG touring tool to calculate carbon costs. Costs could be compensated for by contributing funds to reduce environmental impacts and support adaptation of the live performance sector or by funding carbon offset projects.
Accommodation and Consumable Suppliers		
Adopt an environmental sustainability procurement policy to use environmentally responsible suppliers where possible.	The mainstream use of goods and services with strong environmental credentials.	Learn about the environmental impacts of goods and services - gather intelligence on best suppliers. Ask suppliers to provide you with information about their environmental credentials. Use suppliers with recognised environmental accreditation(s).

For: Concert Halls and Promoters

Your actions	Where we want to be	How you do it
Orchestra Engagement		
Communicate what steps you are taking to incoming orchestras.	There is strong communication between venues and incoming orchestras on environmental considerations.	Use Julie's Bicycle environmental reporting template for venues (or equivalent). The same template should be used to respond to the green rider requirements of orchestras.
Provide incoming orchestras with information about instruments and equipment available on-site or locally available.	The amount of equipment needing to be moved venue to venue is reduced.	Make available information about local suppliers on venue website.
Ask incoming orchestras what steps they are taking to reduce their environmental impact.	There is strong communication between venues and incoming orchestras on environmental considerations.	Ask for this information directly from the orchestra or via the agent.
Emissions Measurement		
Measure the GHG emissions of your venue(s).	All venues measure their GHG emissions.	Use venue auditing and management tools such as Industry Green (IG) venue tool, SMEasure, and Best Foot Forward Footprinter.
Emissions Reporting		
Report venue GHG emission results to staff, suppliers and audiences and used for industry tracking.	All venues report their GHG emissions to assist with benchmarking and tracking of the live performance sector.	Use the free web-based IG venues tool to report emissions for confidential anonymised sector analysis.
Seek a standard environmental performance accreditation for venues.	All venues have standard environmental performance accreditation(s).	Apply for Industry Green status for Venues, Carbon Trust Standard, British Standard 8901 and/or ISO 14001. Submit information on venue accreditation(s) to Julie's Bicycle database of venues with environmental credentials.
Costing the Environment		
Invest in building staff capacity to address environmental issues, energy efficiency and renewable energy.	All venues are investing in reducing building energy use and support renewable energy development.	Ring-fence money from energy saving efforts to further improve your venue's environmental performance.
Apply a price of carbon to venue emission results to help inform decision-making.	A total price of carbon is applied to all tour emission results. This amount is invested into schemes supporting climate mitigation and adaptation.	Use the free web-based IG venue tool to calculate the carbon costs. Costs could be compensated for by contributing funds to reduce environmental impacts and support adaptation of the live performance sector or by funding carbon offset projects.

For: Membership Organisations

Immediate actions

• Make environmental sustainability a standing agenda item.

• Keep abreast of legislation, financial/economic implications and audience concern.

• Signpost orchestras and musicians to resources for how to reduce the environmental impacts of touring.

• Develop a charter for members, which sets out environmental principles, and includes a commitment to monitor and reduce emissions.

• Recognise and award members that are environmental leaders.

• Collect, collate and report statistics on performances, touring and concert hall programming relevant for monitoring environmental impacts of sector.

• Develop partnerships within member organisation and where applicable other bodies to support creation of touring models with reduced environmental impacts.

For: Funders

Immediate actions

• Ensure environmental sustainability is a core issue on the agenda for strategy development.

• Signpost to information on emerging practice for greening touring within the performing arts.

• Support organisations providing resources and training to help orchestras embed environmental decision-making within all activity areas.

• Support organisations working to co-ordinate efforts to reduce the environmental impacts of orchestra performances and tours.

• Set GHG emission guidelines and reporting requirements for grant recipients to measure and report GHG emissions.

• Assess the funding support given to grant recipients on environmental criteria in addition to the artistic and financial criteria.

• Make environmental sustainability a budget provision for RFO and project funding applications.

These barriers have been identified to help each participant understand where they could focus to make their actions more effective.

4.0 Barriers to taking environmental action within the touring orchestra sector

Participant	Creative	Financial	Operational
Orchestra management	• Primacy of artistic vision will supersede environmental considerations. • The shape of a tour – its order, length and stop-off points – needs to address the relative status of inviting venues, exclusion zones and the requirements of funding and co-producing partners. • Desire to present work in artistically stimulating environments. • Ensuring tour schedule is sensitive to well-being of musicians to maintain performance quality.	• Priority to ensure financial stability and, in many instances, maximise income from touring. • Slim profit margins on touring mean orchestra management will not take environmental actions that have a higher cost.	• Tour date bookings influenced by concert hall availability and key markets. • Time constraints and the difficulties of cold selling lead to repeatedly working with supportive promoters rather than developing new relationships that would lead to more environmentally efficient touring. • Limited interest and lack of accessible information on the relatively few concert halls with good environmental credentials. Limited availability of personnel trained with the skills for addressing environmental considerations when planning tours. • Need to balance schedules as often managing more than one tour at any one time. • Concerned about maintaining quality control if using locally sourced equipment and instruments. • No power to require significant alterations to be made to venues unless they are hiring for extended runs.

Participant	Creative	Financial	Operational
Artistic Directors / Conductors	• Responsible for choice of repertoire, which partly dictates type of touring production and concert hall location. • Choice of orchestra and/or players dependent on conductor's affiliations and preferences. • Concerned with impact of concert based on players and repertoire. • Low levels of awareness about the environmental impacts of repertoire choices on tour emissions. • Energy waste can be highest during rehearsals when equipment and instruments are running and/or being tested all day.	• Budget constraints will determine travel and hotel accommodation of conductor, much more than environmental considerations. • Not likely to choose environmental options if notably more expensive.	• Restricted by the dimensions of the concert hall and ability to move and/or to source equipment and instruments.

Participant	Creative	Financial	Operational
Players / Soloists	• Artistic aesthetic not necessarily environmentally compatible. • Want a consistent quality between performances. • Meeting their audience expectations.	• Typically will choose the environmental solution if it costs the same or less than the conventional option. • Not likely to invest in emissions saving measures (e.g. car pooling) if reduce income. • Limited work available so there is a commercial imperative of doing work of artistic integrity wherever that may be located	• Time constraints because of other commitments. • Timing and type of tour depend on career stage. • Trade body regulations only allow for players/soloists/conductors to be away from home base for a certain amount of time, requiring the tour schedule to adapt accordingly. • Availability of venues in key markets. • Low awareness of environmental impacts of touring and what can be done to reduce them. • Confusing information creating inaction: need help to know what to do. • Personnel travel depends on the scale of the production, the tour itinerary and other individual commitments. • Public transport difficult to use because the transport network is not conveniently accessible or operational at the times needed.

Participant	Creative	Financial	Operational
Agents	• Not applicable.	• Priority to maximise artists' and orchestra's income.	• Tour date bookings influenced by concert hall availability and key markets. • Limited interest and lack of accessible information on the relatively few concert halls with good environmental credentials. • Handling multiple artists and orchestras so limited time to explore measures to reduce the environmental impact of touring.

Participant	Creative	Financial	Operational
Promoters	• Not applicable.	• Competition for tour contracts reduces capacity to require more challenging environmental measures. • Profit margins on touring are very tight so promoter will not take environmental actions that have a higher cost. • Limited ability to alter concert hall as usually only leasing or renting space.	• Limited control over personnel and instrument transportation or other tour logistics.

Participant	Creative	Financial	Operational
Funders	• The importance of artistic freedom and the quality of work seen by audiences currently outweigh environmental considerations.	• Limited funding available to facilitate orchestras in making touring more sustainable. • Requirements of public funding mean that audience numbers and diversity currently outweigh environmental considerations.	• Established funding priorities and processes have not yet created the infrastructure and support for improving environmental sustainability of tours. • Lack of tools, guidance or signposting for orchestras on such issues. • No environmental criteria in funding stipulations for touring orchestras as yet. • Lack of national regulatory framework which will mandate funders to act.

Participant	Creative	Financial	Operational
Trade and Membership Organisations	• Priority for trade organisations to demonstrate their value to their members means they are protective of their position in relation to a given issue.	• Priority to deliver financial benefits to membership supersedes considerations of environmental sustainability.	• Representing the best interests of the membership is not always compatible with the best interests of the environment. • Membership organisations can be slower and less flexible in responding to emerging issues. • Membership organisations are always interpreting what is best for their membership, which can act as a brake on issues of emerging concern.

Participant	Creative	Financial	Operational
Concert Hall Managers/ Programmers	• Priority is to deliver on creative requirements of visiting companies before those of environmental sustainability. • The need for a balanced programme and competing requests can make it difficult to respond to a company's environmentally-driven date requirements. • When hired by an external promoter, concert halls have little control over origin or repertoire and thus scale of orchestra.	• A perception of competition for audiences from other concert halls leads to the imposition of exclusion zones. • Budget constraints preclude additional costs of 'green rider' or 'green' audience concessions. • Cannot undertake major changes in building operations for single productions. • Often old buildings requiring major refurbishment, with onus of responsibility dependent on landlord-tenant terms. • Investment in energy saving improvements depends on incentives and regulations. • Concert halls often are locked into energy contracts and can only ask for a renewable energy tariff at the re-negotiation stage. Unlikely to purchase a renewable energy tariff unless it is cost competitive.	• Concert hall staff may be too busy or unwilling to adopt environmental measures that increase their workload. • Concert halls may not have information on local suppliers of environmentally sustainable equipment and instruments. • Concessions in concert halls typically have long-term contracts so the venue can only negotiate for environmental sustainability procurement when these are up for renewal.

Participant	Creative	Financial	Operational
Technical Suppliers	• Equipment manufacturers and suppliers are primarily concerned with the effects that can be created with their equipment, rather than environmental considerations.	• Can only offer equipment that is available in market place and in-stock. • Directors and designers are not yet creating the demand for environmentally sustainable technology and equipment.	• Not applicable.

Participant	Creative	Financial	Operational
Logistic Suppliers	• Not applicable.	• Touring companies are not yet creating sufficient demand for environmentally sustainable vehicles. • The purchase of efficient vehicles for freight company fleet constrained by purchase price and running costs.	• Number of vehicles depends on amount of equipment, properties and sets being used, and driver regulations (i.e. Health and Safety). • Freight companies rarely use public transport because of unreliability or inaccessibility of services. • Environmentally sustainable fuels are not readily available on the road, making use of vehicles running on these fuels difficult.

5.0 Research findings

This section presents our findings of the scale of GHG emissions resutling per annum from UK orchestras touring within the UK and globally.

5.1 Summary findings

- The total GHG emissions from touring orchestras for the 2008/09 season, based on available data, are estimated to be approximately 8,600 t CO_2e (see Figure 7).

- Large orchestras do the greatest number of performances. Consequently these orchestras in total contribute the largest proportion of the sector's touring related GHG emissions. Furthermore, small orchestras do not appear to tour much overseas.

- It is estimated that although only 6% of performances are to 'other' geographic territories (such as North and South America and Asia), touring to these territories contributes 23% of the orchestral sector's touring GHG emissions. This is because of the distances travelled and the requirement to use air travel.

- In the UK, concert hall programming of orchestras is predominantly of UK based orchestras with an average of 10% of orchestral performances by non-UK based orchestras.

- Convenience and financial incentives are the key motivators for musicians to drive themselves or carpool to performances, rather than use public transport or a provided coach, especially when needing to transport their instruments.

- A number of creative, financial and operational barriers to taking environmental action were identified in current orchestra touring practices. Many of these barriers are related to organisation priorities, awareness of the environmental issues as they pertain to touring activities and resources and capacity to act.

5.2 Sector trends

Interviewees for this study identified a number of sector trends. These will have a bearing on the GHG emission profile of the sector in the future and therefore strategies to reduce the environmental impacts should be anticipated to develop informed responses.

- Touring schedules are becoming less coherent, with increasing pressure to find sufficient work, exacerbated by the anticipated reductions in public funding to subsidise orchestral activity.

- One-night stands remain a dominant tour format in the UK even though many orchestras would like to extend the number of performances within a tour. This is partly because the regional symphony orchestras are performing repeat concerts as part of their regional remit.

- There is the potential for more international residency models, although this is generally (but not exclusively) limited to large orchestras with international profiles and conductors which can attract audiences for multiple consecutive performances.

- Orchestras want to tour internationally as it can help build their reputation and profile.

- The market for conductors and soloists is a global one.

- Increasing travel costs after a couple of decades of relatively cheap travel, especially air travel means the economics of where, how and when to tour are changing.

5.3 Orchestra status

An orchestra's success and therefore its touring ambition is measured in terms of the number of performances, its audience size, and the location of touring.

5.3.1 Total number of performances

In our sample year 2008-09, we estimate there were a total of 724 tour performances within the UK and overseas by the 40 UK orchestras identified as touring orchestras.

By tour territory: 39% of these performances are in the UK, 55% are in Europe and only 6% are in 'other' geographic territories, such as the United States, Mexico and Japan (see Figure 4). The proportion of touring performances overseas is higher than in the UK because many orchestras that tour will also be performing a significant number of concerts in their 'home base' which are outside the scope of this research.

By orchestra size: 55% of touring performances are estimated to be by large orchestras, 42% of touring performances are by medium orchestras and only 3% are by small orchestras (see Figure 5).

We found (based on our survey of orchestras' touring activities per season) that the average length of a UK tour is usually just one performance; a European tour is three performances; and a tour in 'other' geographic territories is four performances. Performances will not necessary all be done in one concert hall and in fact are more likely to involve multiple concert halls.

Figure 4 Proportion of touring performances by geographic region. Total = 724 orchestra performances were estimated for 2008/09 season

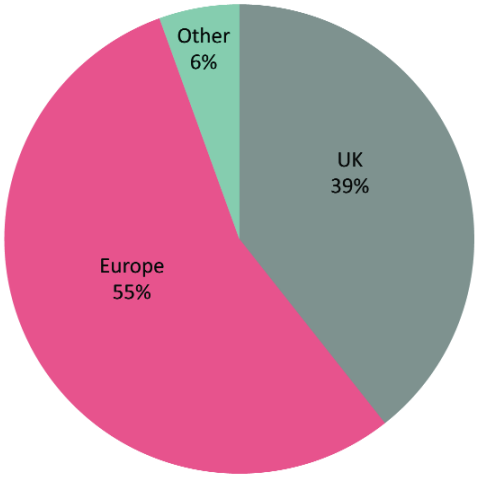
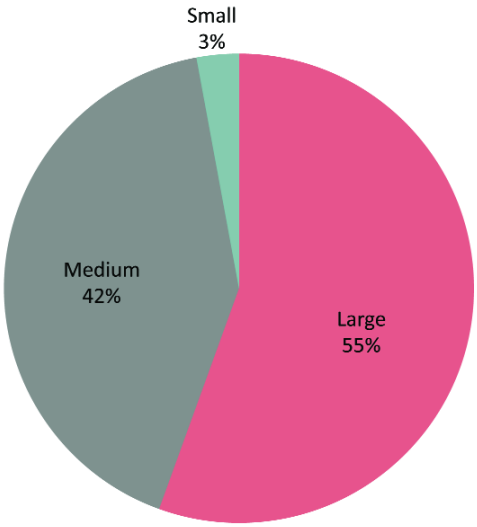


Figure 5 Proportion of touring performances by orchestra size Total = 724 orchestra performances were estimated for 2008/09 season



5.3.2 Total audience size

The total audience size for concert performances by touring orchestras is estimated to be over 1 million people. 41% of this audience (~459,000 people) is in the UK, 54% (~606,000 people) is in Europe, and 5% (~56,000 people) is in 'other' geographic territories.

It is estimated (based on our survey of orchestras' touring activities per season and on consultation with the steering group) that 72% of this orchestral audience (~804,000 people) attend concert performances by large orchestras (see Figure 6). Of this 72%, approximately 45% attend concert performances by large orchestras in the UK, and 51% attend concert performances by large orchestras in Europe.

Figure 6 Estimate audience size for UK orchestras from touring performances. Total = 1.1 million people

5.4 Total GHG emissions from touring orchestras

The total GHG emissions from touring orchestras for the 2008/09 season, based on available data, is estimated to be approximately 8,600 t CO_2e (see Figure 7).

Of these total emissions: 63% of emissions (~5,432 t CO_2e) are attributable to the 15 large orchestras; 36% (~3,046 t CO_2e) to the 14 medium orchestras; and only 1% (~88 t CO_2e) to the 11 small orchestras.

Apportioning the total emissions by regions: only 10% (~871 t CO_2e) are from touring activities within the UK; 67% (~5,760 t CO_2e) are from European touring activities; and 23% (~1,934 t CO_2e) are from touring to 'other' geographic territories, such as the United States, South America and Asia (see Figure 7).

Although orchestras touring to 'other' geographic territories produce more than a fifth of the sector's emissions, this activity represents only a very small proportion of performances, estimated to be 40 of 724 performances (6%).

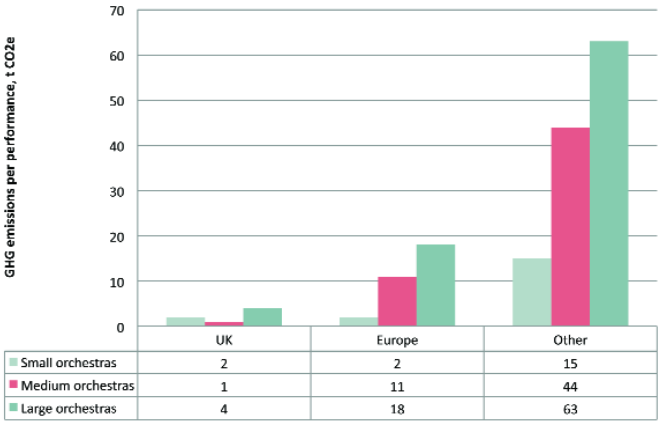
Figure 7 Estimated GHG emissions of the touring orchestra sector for the 2008/09 season by geographic region (in tonnes CO_2e)

5.4.1 Initial values and ranges per orchestra performance

This study is the first attempt to systematically analyse and classify touring according to the orchestra size (i.e. touring party) and territory (i.e. geographic region). Based on our 32 tour samples from 14 orchestras we have calculated initial values of the GHG emissions produced per orchestra performance for each territory (see Figure 8). The initial values are the average per performance results for each territory calculated from the tour sample findings. The data we collected constitutes a rich set of tour samples but it is still too small to determine robust average GHG emissions per performance. However, these initial values serve as a useful starting point from which the orchestral sector can build up a robust set of average GHG emissions per performance benchmarks for each orchestra type by geographic territory.

As more orchestras measure and report the GHG emissions produced from their touring activities these initial values will become increasingly robust. When the sample size is sufficiently large it will then be possible to benchmark tours (freighting, air travel, accommodation etc) so that orchestras can usefully interrogate and compare their touring activities with other similar tours. This will enable them to manage their tours 'down' in terms of GHG emissions, as well as prepare the industry for compliancy and support artists and audiences in their 'green' ambitions.

Figure 8 Initial values of GHG emissions per orchestra performance for each size of orchestra by region (in tonnes CO_2e)



For each size of orchestra, the emissions per performance for tours in the United States, South America and Asia (i.e. 'other' geographic territories) are at least triple that of the emissions per performance in Europe.

We estimate a large orchestra emits 63 t CO_2e per performance when touring to 'other' geographic territories, which is approximately a third higher than a medium orchestra touring to the same geographic territory (see Figure 8). This level of emissions corresponds to the number of musicians and instruments required to perform a repertoire.

The per performance GHG emission results of the tour samples varied in each orchestra size category for each region because of the following varying factors: size of tour party; number of performances; tour routing; and modes of travel used. Table 1 indicates the minimum and maximum per performance GHG emission results we had in our tour samples in each orchestra size category for each region. These ranges are illustrations of the varying GHG emissions per performance an orchestra tour can produce.

5.4.2 Total GHG emissions per orchestra size by extent of touring in each region

Each orchestra can have a light or heavy touring schedule in a region. An orchestra might have a heavy touring schedule in one territory but not another (e.g. City of Birmingham Symphony Orchestra, a large orchestra, has a heavy touring schedule within the UK but not overseas). Figure 9 presents the total emissions for an orchestra in a territory depending on size and type of touring schedule.

A heavy touring schedule to Europe by a large orchestra results in more than 500 t CO_2e per season. This is almost a ten-fold increase in emissions compared to a large orchestra with a light touring schedule to Europe, which will be approximately 50 t CO_2e per season.

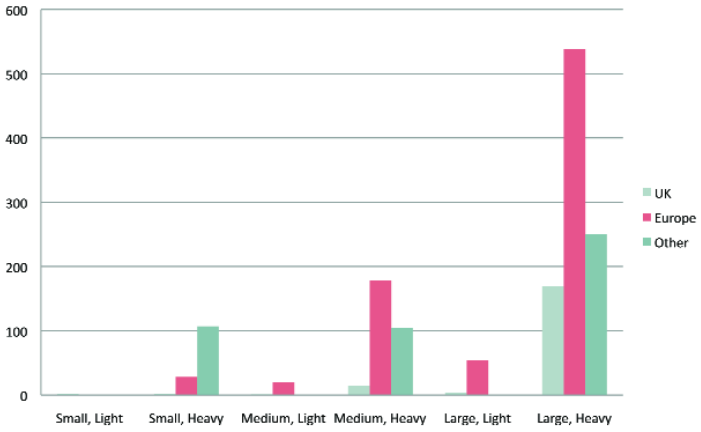
Table 1 Ranges of GHG emissions per performance (in tonnes CO_2e)

	UK		Europe		Other	
	Min	Max	Min	Max	Min	Max
Small	0.29	3.5	1.8*		7.7	21
Medium	0.36	2.5	4.4	17.3	20.6	56.7
Large	1.4	9.4	5.5	39.8	29	83.3

Note: 0.29 t CO_2e = 290 kg CO_2e

* No range is available as only one tour leg sample was submitted.

Figure 9 Total emissions for an orchestra in a region depending on its size and type of touring schedule (in tonnes CO_2e)



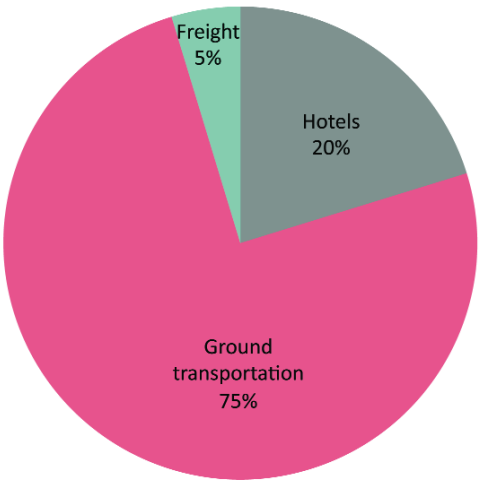
5.5 Examples of tour GHG emissions

The study focused on collecting information about the movement of people and instruments to put on the performance. The examples below illustrate GHG emission results for different sized orchestras to different territories, accepting that some of these examples fall outside the typical touring patterns for the sector. For each tour example we present the proportion of emissions by activity source and also the per performance result compared to the initial value we have calculated for that sized orchestra to that territory (see Figure 8).

5.5.1 A small orchestra UK tour

This one performance date tour with a touring party of 27 people resulted in 4 t CO_2e (4 t CO_2e / performance is double the initial value result of 2 t CO_2e). 75% emissions were the result of ground transportation, with hotel accommodation accounting for another 20% of the emissions. Freight produced 5% of the emissions (see Figure 10).

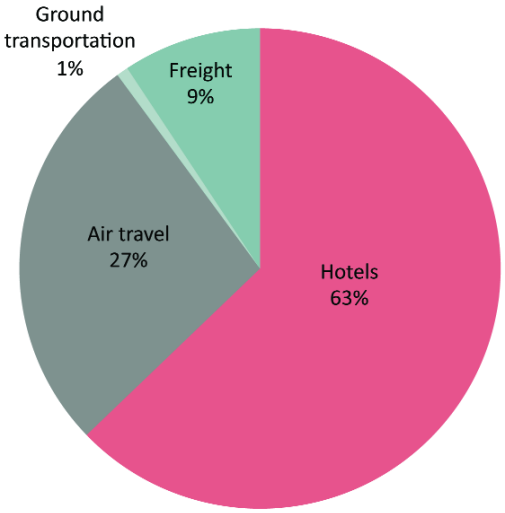
Figure 10 Percentage of GHG emissions by source for a small orchestra UK tour



5.5.2 A small orchestra North American tour

This fourteen performance date tour with a touring party of 25 people resulted in 276 t CO_2e (20 t CO_2e / performance is a third more than the initial value result of 15 t CO_2e). 63% of emissions are produced from hotel accommodation, with air travel accounting for 27% of emissions, freight accounting for 9% of emissions and ground transportation accounting for 1% of emissions (see Figure 11).

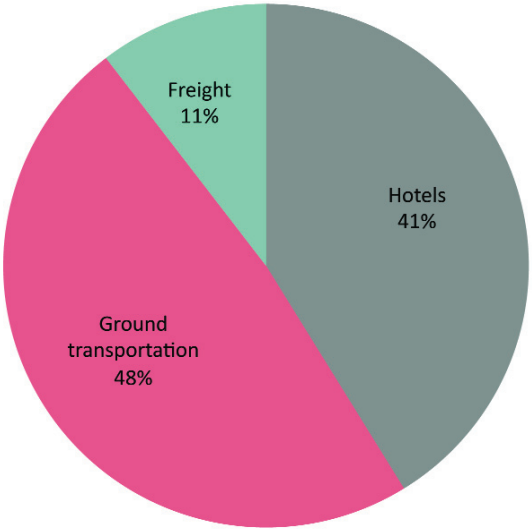
Figure 11 Percentage of GHG emissions by source for a small orchestra North American tour



5.5.3 A medium orchestra UK tour

This seven performance date tour with a touring party of 31 people resulted in 3 t CO_2e (0.36 t CO_2e / performance is a third of the initial value result of 1 t CO_2e). Ground transportation generated 48% emissions in this example, with hotel accommodation following closely behind with 41% of emissions. Freight accounted for 11% of emissions (see Figure 12). This tour example is an illustration of tour emissions savings potential if orchestras are able to organise multiple performances per tour.

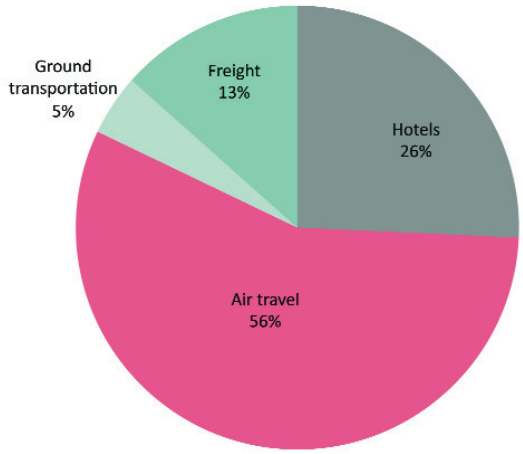
Figure 12 Percentage of GHG emissions by source for a medium orchestra UK tour



5.5.4 A medium orchestra European tour

This two performance date tour with a touring party of 37 people resulted in almost 9 t CO_2e (4.5 t CO_2e / performance is less than half the initial value result of 11 t CO_2e). 56% were produced from air travel, and 26% of the emissions were produced as a result of hotel accommodation. Freight accounted for 13% of emissions whereas ground transportation produced 5% of emissions (see Figure 13).

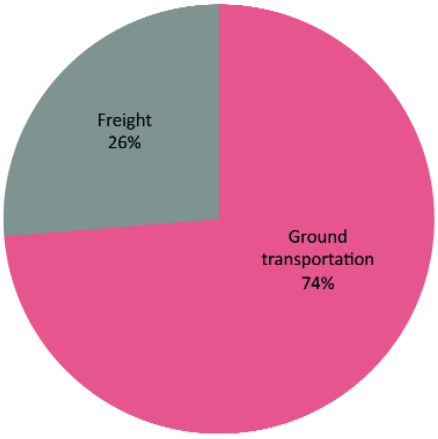
Figure 13 Percentage of GHG emissions by source for a medium orchestra European tour



5.5.5 A large orchestra UK tour

This one performance date tour with a touring party of 114 people resulted in 1 t CO_2e (1 t CO_2e / performance is a quarter of the initial value result of 4 t CO_2e). 74% of the emissions were produced from ground transportation, with freight accounting for the remaining 26% of emissions (see Figure 14).

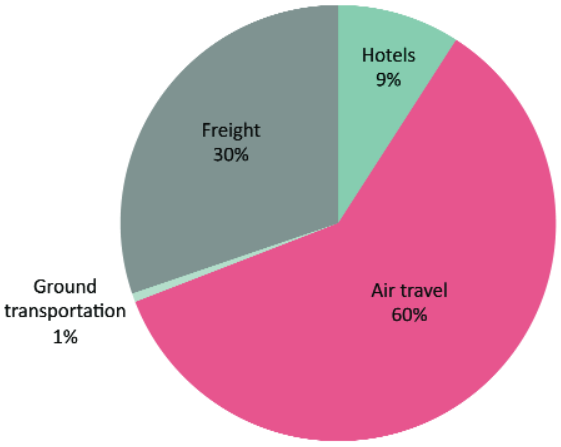
Figure 14 Percentage of GHG emissions by source for a large orchestra UK tour



5.5.6 A large orchestra Asian tour

This five performance date tour with a touring party of 108 people resulted in 416 t CO_2e (83 t CO_2e/ performance is a third greater than the initial value result of 63 t CO_2e). 60% of emissions were from air travel, with freight accounting for another 30% of emissions. Freight and ground transportation accounted for 9% and 1% of emissions respectively (see Figure 15).

Figure 15 Percentage of GHG emissions by source for a large orchestra Asian tour



5.6 UK concert hall programming

Concert halls have a pivotal role in shaping the touring GHG emission profile of the orchestral sector. Concert halls can influence the amount of GHG emissions per orchestra tour through their choice of orchestras to programme, the number of performances per orchestra, and the extent that they co-ordinate with each other. We gathered information from concert halls via a survey and a focus group to gain insights into their programming patterns and motivations for programming choices. These insights are useful in helping to inform how the orchestral sector can work together to reduce orchestral touring emissions.

5.6.1 Survey findings

The survey was a compilation of orchestral concert provision during the 2008-9 season completed by 15 concert halls during the spring of 2010 under the auspices of BACH (British Association of Concert Halls). It found:

i) Total concert hall performances

- A total of 682 performances at 15 venues during the 2008-09 season
- A total of 650 performances at 13 venues presenting both UK based and non-UK based orchestras
- A total of 32 performances at 2 venues presenting only UK based orchestras

ii) Proportions and totals of UK to non-UK based orchestras

• Of the 15 venues reporting, all had performances by 1 or more UK orchestra(s), whilst 13 also had performances by 1 or more non-UK based orchestra(s).

• 90% of the 682 performances were given by UK based orchestras and 10% by non-UK based orchestras.

• Of the 13 concert halls presenting non-UK based as well as UK based orchestras 85% of the 650 performances were given by UK based orchestras and 15% were given by non-UK based orchestras. Per concert hall the proportion of non-UK based orchestra performances ranged from between 3% and 38% of their overall orchestra programming.

• The number of UK orchestras performing at the 15 venues varied between 1 and 25, with each venue having an average of 8 different UK based orchestras performing, and an average of 6 performances at a given venue by each of those UK based orchestras.

• The number of non-UK orchestras performing at the 15 venues varied between 0 and 14, with each venue having an average of 4 different non-UK orchestras performing, and an average of 1 performance at a given venue by each of those non-UK based orchestras. From the survey it was not possible to infer if UK based or non-UK based orchestras were performing at multiple venues per UK tour.

• The variation in the volume of non-UK based orchestras performing in the small, medium and large scale halls reporting in the survey was:

- The two smallest concert halls responding reported 0 performances by non-UK based orchestras.

- The two largest concert halls responding reported a total of 35 performances by non-UK based orchestras.

- All other venues reported between 1 and 8 performances by non-UK based orchestras.

iii) Programming rationale

Of the reasons venues gave for programming non-UK based orchestras:

- 86% said artistic
- 57% said audience demand
- 21% indicated other, and from the comments this was mostly related to brand
- 7% said financial

iv) Comments on survey

• BACH's membership is composed of a total of 34 concert halls. The Survey was therefore completed by two-fifths (44%) of the members of BACH.

• Venues completed the survey on a voluntary basis. The study therefore makes no claim to be representative of British concert halls, although those reporting reflected a variety of small, medium and large orchestral programmes, including halls with 1 or more resident orchestra, and halls without resident orchestra(s).

• In the survey concert halls were not asked to provide the names of orchestras performing at each venue; therefore no figures are available to show the total number of performances in the UK in the 2008-09 season by individual UK based or non-UK based orchestras.

• In the survey concert halls were not asked to provide information on the mode of transport used by orchestras to travel to and from the venues. Therefore no figures are available to show the incidence of air, road, boat or rail as a means of arrival into and departure from UK.

• 4 of the 15 concert halls reported having resident orchestra(s) that gave concerts at their venue. However no detail is available from the study to show how many concerts were given by non-resident orchestras in or near the city of the venue.

• In terms of environmental sustainability, it is felt that by far the major disadvantage of non-UK based orchestras performing in the UK is likely to be the use of air transport as a means of arrival into and departure from the UK.

• The results have not been analysed to show the density of provision of non-UK based orchestras throughout the country, but with respect to London; 39% of UK based orchestra tour performances occurred in London; and 49% of non-UK based orchestra tour performances occurred in London concert halls.

5.6.2 Findings from concert hall focus group about programming

• Many concert halls that host orchestras have varied programming schedules with drama, bands and film performances etc. Therefore, programming decisions will be taking into consideration the scheduling of other events. Halls want to offer a varied programme of events to attract audiences.

• Concert halls mentioned moving to a model where they have more long-term relationships with an orchestra, and with orchestras performing a number of concerts and doing a number of different activities rather than a simple one-off concert. This model is especially appealing for hosting non-UK based orchestras. This corresponds with the answers given by concert halls when asked about ongoing relationships with orchestras.

• Some concert halls have very limited influence on programming decisions if an external promoter is organising the concert series.

• Programming will be a balance of artistic integrity, commercial necessity and audience demand.

• Concert halls tend to have exclusivity policies with an orchestra about when and where the orchcestra can give repeat performances in relation to the dates they are performing at that concert hall. Usually however the terms of the exclusivity policy are negotiable thus enabling orchestras to link tours between different geographic regions of close proximity within the UK.

• Some concert halls receive funding from government bodies and therefore will have certain stipulations about programming, whereas others have no funding so need to ensure overall

programming is economically viable. Concert halls want guidance and support from funders on how to best address environmental considerations.

• Concert halls felt it important that their audiences have the opportunity to be exposed to international work.

• Concert halls do not always become involved in the travel arrangements of visiting orchestras as the orchestra may directly organise this itself.

5.7 Musician travel for UK concert performances

Musician travel for UK concert performances is an important area for consideration when examining the GHG emissions produced from touring. The survey gathered information from musicians about their current travel practices and motivations for their travel choices as well as their ideas for encouraging musicians to travel more sustainably. The insights from this survey are valuable for individual orchestras and the sector collectively to strategically approach travel of musicians to concert performances in the context of environmental considerations.

5.7.1 Survey findings

A survey completed by 120 musicians (via Musicians' Union) on their travel choices to UK performances found:

• Of the contracted musicians: 58% use car, 24% chartered coach, 16% train and 2% plane as their main transport mode to travel to performances.

• Of the freelance musicians: 72% use car, 22% train, 4% chartered coach, 2% plane as their main transport mode to travel to performances.

• Other forms of transportation include bike and minivans.

• Mode of transportation depends on: convenience (especially regarding instrument transportation), economics, location of their homes and lack of public transportation to and from the concert hall. The economic incentive for musicians to travel by car is increased if they carpool, as they can share travel costs.

• Car sharing: people on average car-share with one other person.

• Chartered coach: Most respondents said that there is no chartered coach option with their orchestras (as expected for freelance orchestras). For those that do have the option a small minority said they use it, while most said they opt for flexibility especially when returning home.

• Musicians completing the survey made a number of suggestions as to what orchestra management, with the support of the Musicians' Union, could do to promote reducing the environmental impact of their travel to and from performances:

Planning

- Try to plan the start and finish of concerts to account for last train times

- Avoid scheduling rehearsals and performances at peak travel time

- Book people onto trains/coaches

Car-sharing

- Circulate car sharing lists, with people's numbers and postcodes, to enable individuals who live in the same area to keep in touch

- Reward car sharers with priority parking spots and actively encourage car-sharing

Coaches

- Use coaches for further afield performances

- Increase pick-up and drop-off points of coaches and choose them according to people's bases rather than the orchestra's base

- Make parking available at these points

Trains

- Negotiate later trains; lobby to train operators

- Negotiate rail prices to get discounts and sponsorship deals

- A discount railcard

- Train carriages with train personnel to guard instruments so as to encourage use of train services.

Other

- Provide secure places for bikes

- Pay overnight subsistence instead of late return fee

6.0 Research approach

This in-depth study has focused on the core activities of touring: the movement of people and instruments to create the live performance.

The study sought to:

1) Quantify the total annual and per performance GHG emissions from all scales of touring activity undertaken in the UK and by UK based orchestras touring overseas.

2) Identify practical actions through the business supply chains, which if taken now, will pave the way for a touring sector with a minimal environmental impact.

A steering group of experienced individuals from core professions in the orchestral sector was established at the outset to inform and guide the work. This group included orchestra directors, agents, concert halls, trade associations, funders and promoters. Critically this group brokered access into the sector and enabled us to gain a good cross-section of tour samples essential for analysis.

This section provides a synopsis of our approach with a detailed technical note being available on our website (www.juliesbicycle.com) with an explanation of the information collected and how it was used to calculate the GHG emissions from orchestra touring.

6.1 Research boundaries

Setting the study scope is critical to understanding the findings, and to ensure that the analysis can be interrogated both on its own terms but also in comparison to other reputable research and data.

6.1.1 Key definitions

I) Environmental sustainability

Environmental sustainability refers to the ability of natural ecosystems to remain diverse and productive, thus being able to support life over a period of time. All human activity is based on these ecological goods and services. Some human activities, such as the excessive production of GHG emissions (including carbon dioxide), has led to the decline in natural ecosystems and to changes in the balance of natural cycles, thus undermining and degrading the capacity of ecosystems to continue supporting life. Living sustainably, for example, by reducing carbon dioxide and other GHG emissions, will ensure the long-term viability and productivity of these ecosystems, providing both humans and other living systems with the capacity to endure. It is in this context that we create a direct link between GHG emission reductions and environmental impacts.

II) Tour

A tour is defined as one or more performances requiring travel to a venue away from the centre where the orchestra is based ('home base'). The tour samples received have been classified by general orchestra size (i.e. small, medium and large) and by territory (i.e. geographic region).

iii) Tour territory

Territory refers to the geographic regions the tour is taking place in. The territories considered in this study are:

- UK
- Europe
- Other (e.g. North America, South America and Australasia etc.)

IV) Orchestra size

For the purposes of this research, orchestras were categorised as small, medium and large according to their average indicative touring party size by the Association of British Orchestras (ABO). Touring party size varies from one tour to the next as it is dependent on the repertoire being performed and therefore an orchestra can exist in all three categories. For the purposes of this study it was necessary to classify orchestras into the following tour party size groups (which is inclusive of musicians and accompanying orchestra management personnel):

- Small orchestras: 30 or less in touring party;
- Medium orchestras: 31 – 70 in touring party;
- Large orchestras: more than 70 in touring party.

Furthermore, in order to estimate the total GHG emissions for the sector we had to classify the typical touring party size of each relevant ABO member. Of the 40 ABO members that are touring orchestras (this excludes members that tour with ballet and opera companies and those orchestras only performing at home base) 15 are large, 14 are medium and 11 are small.[3]

V) Heavy and light touring schedules

Each orchestra can have a light or heavy touring schedule in a region. For the purpose of this research we have created definitions for heavy and light touring schedules. The definition of a light or heavy touring schedule per season for each orchestra size is outlined in Table 2. These definitions were determined by data collected from a survey completed by twenty-one orchestras on their concert programme for three recent/planned seasons (i.e. 2009/10, 2008/09, and 2007/08). For example, an orchestra with a heavy touring schedule to Europe was defined as one that does two or more tours in a season. An orchestra with a light touring schedule in Europe was defined as one that did less than two tours in a season. In the case of 'other' geographic regions, an orchestra with a light touring schedule had on average zero tours per season, whereas an orchestra with a heavy touring schedule had on average one or more tours per season. The total number of tours

[3] Currently ABO has 65 member orchestras and they represent most professional orchestras in the UK.

Table 2 Definition of light and heavy touring schedule by tours by orchestra size for each region

	UK		Europe		Other	
	Light	Heavy	Light	Heavy	Light	Heavy
Small	2 or less	>2	2 or less	>2	0	1 or more
Medium	2 or less	>2	2 or less	>2	0	1 or more
Large	5 or less	>5	2 or less	>2	0	1 or more

Note: Light touring orchestras do 0 tours to 'other' geographic territories.

Table 3 3 Number of tours per annum by orchestra size for each region

	UK		Europe		Other	
	Light	Heavy	Light	Heavy	Light	Heavy
Small	1	1	0	1	0	1
Medium	1	10	1	9	0	1
Large	1	42	1	10	0	1

per annum by each orchestra size for each region is outlined in Table 3; the table is based on survey results, consultation with sector participants and on the performance schedules posted on the orchestras' website.

6.1.2 Emissions boundary

Table 4 outlines all the main areas of GHG emissions associated with live performance, which are produced directly (in the control of the organisation), indirectly (not in the control of the organisation) or embodied (cumulative emissions through the supply chain) in the goods and services on the tour. The areas of tour activity from which we calculated the GHG emissions were:

- Transportation of all performers and accompanying staff
- Hotel accommodation
- Freighting of all instruments

6.1.3 GHG emissions

The most relevant greenhouse gas (GHG) emissions resulting from touring are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), as opposed to others associated with energy production and particular forms of manufacturing. These gases are emitted as the result of combusting fossil fuels for heating, electricity and travel. Carbon dioxide will be the most dominant gas released by the touring activities with CH_4 and N_2O at much lower levels. Almost all the GHG emissions conversion factors used to translate energy use to GHG emissions were those provided by the Department for Environment, Food and Rural Affairs and Department of Energy and Climate Change in their 2009 guidelines to companies for GHG emissions reporting.

6.1.4 Sector boundary

The study has quantified an indicative estimate of the total emissions from orchestras touring within the UK and UK based orchestras performing overseas. The study did not assess the GHG emissions produced by non-UK based orchestras travelling to and performing in the UK. All of our UK orchestra tour samples were from tours that originated in the UK. However, the findings of this research can be applied to provide some indication of the likely GHG emissions of incoming tours as round-trip emissions will be similar to UK based orchestras even though the start and ending destinations are reversed. Furthermore, the study considered concert hall programming of international orchestras via a survey of the British Association of Concert Halls and a focus group with agents.

6.1.5 Timeframe boundary

The study has calculated the GHG emissions of touring for the 2008/2009 season. Orchestras follow the academic season (September-August) as opposed to a calendar year in their tour planning process, so it was decided to capture tour samples from within the 2008/2009 season as opposed to the 2009 calendar year. Therefore, all the tour data received is from tours undertaken in the 2008/2009 season, by UK based orchestras. The 2008/2009 GHG emissions from touring will be used to establish a baseline carbon footprint for the orchestral sector in the future, in combination with similar emission calculation exercises over the following years.

6.1.6 Beyond the scope of the study

- Orchestras accompanying touring opera or dance companies
- Non-UK based orchestras touring the UK.

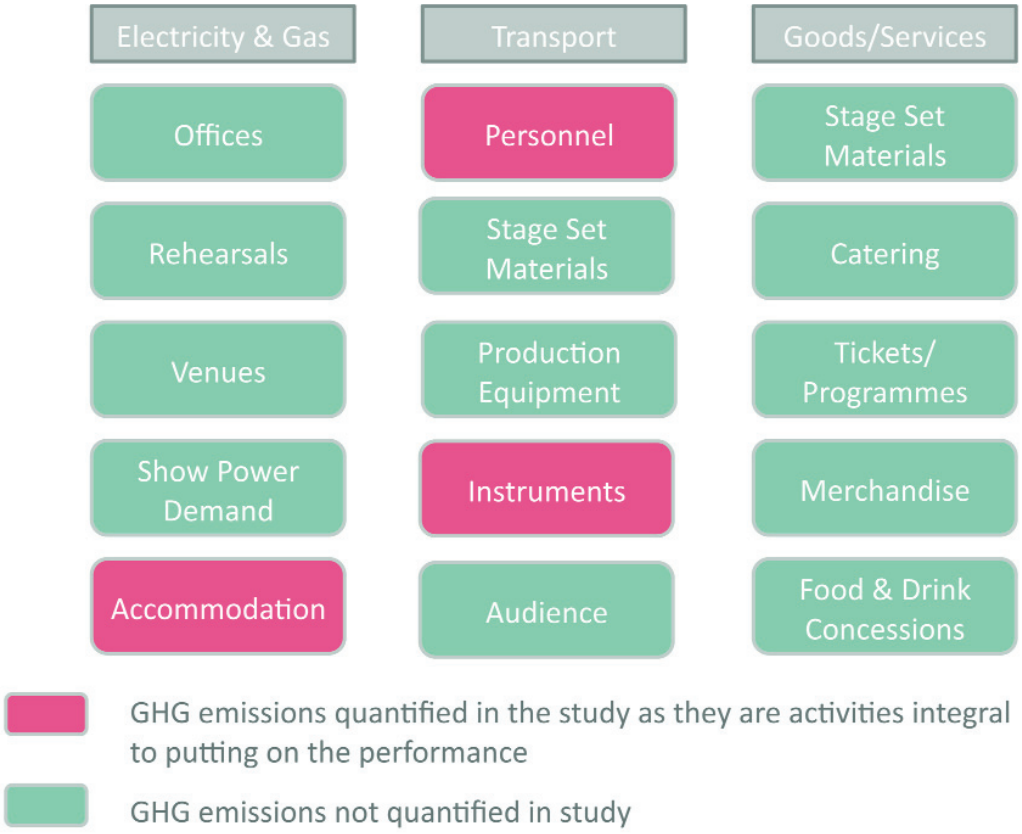
6.2 Data collection

The study collected several forms of data from which to base the analysis. The results of the study can be found in Section 5.0.

6.2.1 Tour samples

We collected data from 32 tour samples by 14 orchestras, which were then organised by orchestra size and tour territory. These samples were used to calculate emissions from touring activities, which were extrapolated to produce a GHG emissions profile for the entire UK orchestral sector for 2008/2009. Table 5 breaks down the number of samples collected by orchestra size and by tour territory.

Table 4 *Sources of GHG emissions associated with live performance*



6.2.2 Interviews with key participants

We talked to a range of people closely involved in touring activities. They included orchestra executive directors and promoters. The interviews provided us with a 'real-life' context in which to analyse the emissions calculations from the tour samples, and also enabled us to determine the power relationships and dynamics in the supply-chain of the sector.

6.2.3 Focus groups with key participants

Focus groups were used to determine the dynamics involved in the relationships between businesses in the touring supply chain. The first was with agents and the second was with concert halls and promoters. The questions explored in the focus groups were similar to those in the one-to-one interviews but captured different perspectives.

6.2.4 Surveys

Three online surveys were circulated to the orchestral sector. These surveys were used to help estimate the GHG emissions of the sector as well as develop appropriate recommendations for the sector. The surveys were as follows:

a) A survey of orchestra touring patterns over three seasons (i.e. 2007/2008, 2008/2009 and 2009/2010). The survey circulated to Association of British Orchestras (ABO) members had 21 respondents (out of 40 relevant ABO members) with a good spread of different orchestra sizes with UK and international touring activity

b) A survey of musician travel to UK performances. The survey circulated to musicians within the Musicians' Union (MU) had 120 respondents (out of 1091 relevant MU members).

c) A survey of concert hall programming. The survey circulated to members of the British Association of Concert Halls (BACH) had 15 respondents (out of an approximate 34 BACH members) with a good spread of concert halls across the country of variable size and programmes.

6.2.5 Data quality

This is the first time the majority of the participants involved have been asked to provide data on the touring activities of orchestras for the purposes of calculating the GHG emissions of touring. To the greatest extent possible, results have been based on real data received from our participants. On the occasions when this was not possible, reasonable assumptions were made in consultation with the steering group and other professionals supplying the data. Our research team assisted orchestras as much as possible to help improve the quality of data contributed to the study and made suggestions for continued self-monitoring.

Table 5 *Number of orchestra tour samples received by size and by tour territory*

	UK	Europe	Other	Total (size)
Small	3	1	4	8
Middle	2	5	3	10
Large	4	7	3	14
Total (tour territory)	9	13	10	32

7.0 Emerging technologies case studies

The following section discusses emerging technologies with environmental benefits in the live performance sector, in the key areas of: travel (e.g. musician and audience) and concert halls (e.g. energy use, recycling, accreditation schemes and environmental campaigns). Julie's Bicycle is not endorsing any of the companies mentioned but is using them as illustrations of positive recent developments for reducing environmental impacts.

7.1 Travel

Travel of musicians and audiences to performances accounts for the majority of emissions associated with live performance. A number of orchestras have in place initiatives to encourage use of coach or public transport by musicians and audiences.

7.1.1 Musician travel

How performers get to and from a concert performance is an important area for consideration when wanting to minimise the emissions produced from touring activities. A number of orchestras are using trains and coaches to travel to their performances, which will result in significantly lower emissions compared to musicians travelling by car. They find travelling by these modes is convenient and can be cost effective if organised in advance. Orchestras actively using these low carbon emission travel modes include: **City of Birmingham Symphony Orchestra** that provides a coach service for musicians; **Royal Scottish National Orchestra** has a sponsorship deal with ScotRail giving them free train travel for its musicians and staff; and **London Symphony Orchestra** takes advantage of advance planning to use inter-continental rail when possible especially now the fast train networks into Europe are opening up further. Also, **Britten Sinfonia** made special arrangements to travel by sleeper coaches for their performance on behalf of Greenpeace at the United Nations 2008 Climate Change Conference in Poznañ, Poland. In addition, a number of orchestras try to actively encourage staff and performers to car share if driving to work and performances. Furthermore, organisations such as the **Southbank Centre** provide onsite private secure cycle parking for performers, staff and contractors to encourage them to cycle.

7.1.2 Audience travel

Although measuring the emissions of audiences for touring orchestras is out of the scope of the current research, we know from other research that audience travel is likely to be the most significant area of emissions associated with holding concerts (Bottrill et. al. 2008; Bottrill and Papageorgiou, 2009). A number of orchestras offer a coach service to their audience, resulting in significantly lower emissions than had this audience been travelling by car to the performance. Two leading examples of orchestras providing a coach service for 10 years are **City of Birmingham Symphony Orchestra** and **Bournemouth Symphony Orchestra**. **City of Birmingham Symphony Orchestra** has a partnership scheme with Cheltenham Connection Coach to offer a coach service for a selection of their Midlands concerts. The scheme won the 2009 UK Coach Award for Effective Partnership. **Bournemouth Symphony Orchestra** offers competitively priced return coach trips from Swanage, Weymouth and Shaftesbury to concerts in Poole.

7.2 Concert halls

Many concert halls are taking actions to improve their environmental performance, for example, in the areas of energy use and recycling. A number of concert hall are applying to environmental accreditation schemes as a demonstration of their commitment to reduce the environmental impact of their activities.

7.2.1 Energy use

Music venues, of which concert halls are included, account for approximately a quarter of the music industry's annual GHG emissions from operational energy use. Reducing the emissions produced by buildings is very important as they account for approximately 40 per cent of the UK's total emissions. There are many opportunities to reduce emissions in concert halls from behaviour measures, energy efficiency, technology and switching to low emission energy sources. Many concert halls are iconic buildings and their efforts to reduce emissions will be sending a strong signal to patrons that climate change is a serious issue and tangible actions can be taken to meet this challenge. An increasing number of music venues, including concert halls, are actively pursuing environmental improvements and energy savings, which is also having the benefit of saving them money and enhancing their reputation amongst patrons. Many of these organisations have set up staff green teams to prioritise, implement and monitor environmental initiatives.

Examples of concert halls taking initiatives to reduce their environmental impact are:

- **The Barbican Centre** has installed a high efficiency Combined Heat and Power system
- **Royal Albert Hall** is part of a large South Kensington Estates project to use the network of Victorian tunnels and infrastructure to share heat between buildings
- **Sage Gateshead** through energy efficiency measures has reduced gas and electricity use by a quarter
- **Southbank Centre** is working to maximise energy saving processes. They operate a Building Management System in the Royal Festival Hall for optimum use of energy
- **Turner Sims** as part of the University of Southampton, benefitted from major work to improve the air duct infrastructure

7.2.2 Recycling

Orchestras and concert halls increasingly have full recycling schemes in place. This is reducing the amount of waste going to landfill, and therefore is reducing the amount of methane emissions produced. An increasing number of organisations are working with staff to minimise paper use and are sourcing recycled paper.

For example, **The Barbican Centre and St Georges Bristol** have recycling schemes in place for paper and plastics, and **Turner Sims** has a recycling scheme covering everything except food. In addition, The **Barbican Centre** won the 2009 Clean City Platinum Award as they also collect mobile phones, fluorescent lighting tubes, batteries, computers and toner cartridges for recycling. The **Southbank Centre** also has an extensive waste recycling initiatives in place as a result of which 100% of glass and over one third of all other waste from the site (including all retail partners) is recycled every month. Like the Barbican, batteries, computers, toner cartridges and small electrical appliances (e.g. microwaves, kettles, laminators and fax machines) are recycled. Southbank Centre employs compost bins and regularly explores waste food recycling opportunities with local retail partners.

7.2.3 Environmental accreditation schemes

There are a number of accreditation schemes available for organisations to be able to demonstrate with integrity their environmental efforts. The main accreditation schemes available for the sector are Industry Green, Carbon Trust Standard and British Standard 8901 for events. The first two are certification schemes focused on GHG emissions measurement and reduction. Industry Green has been specifically designed to reflect the circumstances and activities of cultural organisations, whereas Carbon Trust Standard is a generic certification scheme. British Standard 8901 is designed as a framework to check good environmental management systems are in place when organising a live event. **The Barbican Centre**, **Sage Gateshead**, and **Southbank Centre** are each working on acquiring BS8901. The Southbank Centre has energy performance certificates in place for all site buildings.

7.2.4 Supporting environmental campaigns

Orchestras help raise awareness of environment issues through both communicating the actions they are taking to staff, trustees and patrons and by participating in campaigns with other organisations. There are orchestras that have joined local and national campaigns. For example, **Wiltshire Music Centre** is signed up to Climate Friendly Bradford-on-Avon's pledge to make the town carbon neutral by 2050. **Sage Gateshead** has signed up to the 10:10 national campaign to reduce emissions by 10% in 2010. The **Southbank Centre** is working towards compliance with the 10:10 campaign, and expects to achieve this by 2011 at the latest.

8.0 Hot Topics

The following set of expert pieces cover a wide range of high-profile issues or hot topics on sustainability that are relevant to the orchestral sector.

Hot Topic 1:
Governance: for the record, we must change the system
By John Elkington

Hot Topic 2:
Putting a price on what we can't always see
By Helen Heathfield and Christina Tsiarta, Julie's Bicycle

Hot Topic 3:
Carbon offsets: cop out or climate winner?
By Dr Adam Bumpus, University of British Columbia, Canada

Hot Topic 4:
Up in the air or out to sea?
By Tristan Smith, University College London Energy Institute

Hot Topic 5:
Biofuels: solving our climate and oil woes?
By Alexandra Morel, University of Oxford

Hot Topic 6:
Leisure travel: the untapped savings
By Dr Jillian Anable, University of Aberdeen

Hot Topic 7:
Snacking on emissions
By Dr Rebecca White, University of Oxford

Hot Topic 1

Governance: for the record, we must change the system

By John Elkington

The news that Michael Jackson was working on a song about climate change not long before his death highlights at least two things. First, it underscores the fact that, in fits and starts, the global warming issue is pushing into the popular mainstream. And we should welcome that. But, second, it also spotlights the uncomfortable fact that we are still addressing what looks set to be the defining challenge of the twenty-first century with sporadic, voluntary and often self-serving initiatives.

Clearly, if a best-selling pop star wrote a song and if it became a best-seller and if it then persuaded people to change their thinking and if that, in turn, persuaded large numbers of us to change our behaviour, then we would have some degree of cultural lift-off. But that would be a rare event indeed.

So, let's celebrate individual initiative – and let's encourage people to make a difference, however small. But let's also remember that our economic, social and political systems rarely change because we think it would be a good idea. Here's the rub: if we want to move beyond changing individual hearts, minds and behaviours to the necessary transformation of cultures, paradigms and even civilizations, then we had better get good at governance.

Simply put, this is the activity of governing. No, I know, but hold on in there. Those who govern define expectations, they grant power and, crucially, they verify and incentivise performance. So far, so boring, but here's the thing: unless we get the governance dimension of our climate change responses, we are – to put it indelicately – screwed.

Look elsewhere in *Long Horizons*, *First Step* or the Julie's Bicycle website[4] for guidance on why climate change is happening, why it is important, who is going to be impacted, how the performing arts are currently responding – and what it might usefully do in future. My theme is the art and science of governance, global governance, national governance and – crucial here – industry, corporate and organisational governance.

In headlines, this is about what priorities get set, how they are tackled and who gets rewarded – or punished – as a result.

Let's start with the big picture and global governance. No question, international institutions like the United Nations, the OECD, the World Trade Organisation, the World Bank and the World Economic Forum pay much more attention to sustainability issues–including climate challenge – than they once did. But the unravelling of the UN COP15 climate conference in Copenhagen late in 2009 underscored just how weak global governance currently is when it comes to such issues. Effective global governance will come, but probably only – as in the case of CFCs – when we have discovered climate's equivalent of the Antarctic Ozone Hole.

[4] www.juliesbicycle.com

Focus down to the national level – or regional level in such cases as the EU, NAFTA or ASEAN – and the situation improves a little, but questions of growth, employment and investment still largely drown out those who argue for a shift to cleaner, greener forms of development and growth. But there are bright exceptions, among them South Korea, whose President has declared the ambition that the country will become a hub for low carbon, green growth over the next 60 years.

Still, the oil spill disaster caused by the sinking of the Deepwater Horizon rig off the Louisiana coast has dramatized the fact that even President Obama has so far failed to put in place the governance, regulatory, compliance and other systems needed to switch the United States onto a low carbon, green growth path.

Recently, we looked at the whole process of disruptive innovation – and the scaling of new solutions to challenges like climate change – and developed a simple, 5-stage 'Pathways to Scale' model of change.

In the model, Stage 1 is Eureka! – the creative moment where new opportunities for innovative solutions become apparent. Stage 2, the Experiment, is where entrepreneurs test, prototype, fail, learn, and adapt new solutions. It is the early stage venture. Stage 3, the Enterprise, is where experiments become organisations and initiatives with more developed business models, invested in by a broad range of investors. Stage 3 is about growing a business.

Yet if anything close to system change can begin to happen, there is a need to shift the spotlight from individual enterprises to an organisation's or sector's wider influence in society and markets. Stage 4, focusing on the creation of an Ecosystem of change agents, is about creating new markets, incentives, and frameworks for solutions to diffuse and mainstream. Accelerating change is critical to embed the new cultural codes and forms of governance into the mainstream functioning of the Economy, represented by Stage 5.

While stages 1-3 are extremely important, the main focus of our attention currently is on the transition from Stage 3 to Stage 4. Moving from individual business models to broader ecosystems requires collaborative forms of leadership. This is where Julie's Bicycle and its partners are operating.

Ultimately, if anything like a truly sustainable and equitable future is to be achieved as the world pushes toward a human population of 9 (or even 10) billion, campaigns and entrepreneurial initiatives must scale up further to Stage 5 system change – typified by broad-based market and societal adoption of new mindsets, models and technologies. Success in moving from Stages 4 to 5 will involve the transformation of political priorities, governance process, market rules and cultures. Here is where the music industry can play a pivotal and transformative role. Touring – the international communications tool par excellence–can be one crucial, living vehicle for propagating the relevant messages and information, and for modelling the appropriate new behaviours.

Finally, in addition to the UK performing arts sector's accelerating efforts to tackle climate change, it would be wonderful to see sector leaders doing two things. First, ensuring that the related priorities, targets and initiatives are hard-wired into their own governance mechanisms – and into the agendas of their Boards. And second, supporting the artists and creators, industry innovators, entrepreneurs and venture investors who are driving the transition towards a cooler, fairer economy.

Hot Topic 2

Putting a price on what we can't always see

By Helen Heathfield and Christina Tsiarta
Julie's Bicycle

Our economy is totally dependent upon goods and services from the ecosystems that surround us, such as water purification, soil creation, pollution dilution and waste treatment. One such ecosystem crucial for our carbon cycle is the capacity of our oceans, vegetation and soil to absorb carbon emissions. Despite being completely reliant on these ecosystems, our economy does not recognise, and therefore value these goods and services in financial terms, anything like sufficiently. A United Nations programme is currently seeking to address this problem. The Economics of Ecosystems and Biodiversity (TEEB) study is finding that the costs of conserving biodiversity compared to the benefits of doing so are in a ratio of 1:10 – 1:100. TEEB is expected to report this summer on how policymakers can make sure that business reflects the true costs and benefits.

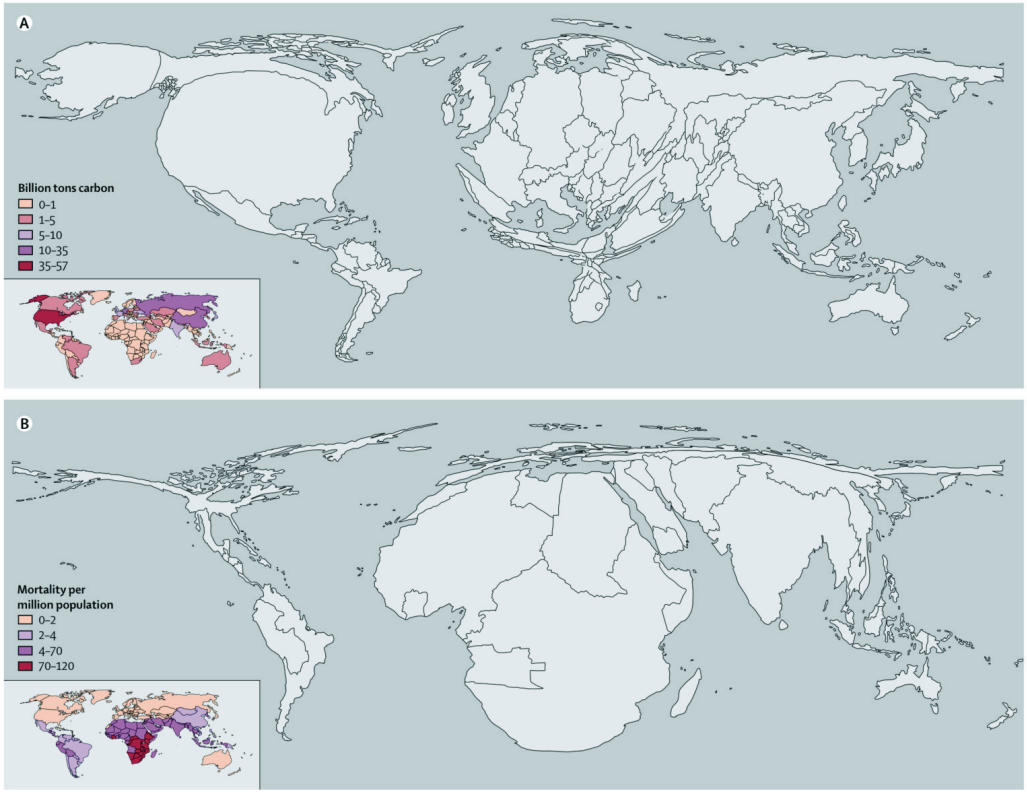
Take for example felling a tree to make a musical instrument or sheet music. Some of the costs included in the financial modelling of this product might be running the chainsaw, paying the lumberjack and transporting the log. Costs excluded might be the loss of rainfall management, a home for an orang-utan, a livelihood for an indigenous person, the soil the tree roots were holding and the future capacity of that tree and soil to absorb carbon from the air. These implicit costs are rarely factored in to the economics of a musical instrument or paper manufacturing.

Economists have termed this an externality: simply put, when a price does not reflect the full costs. Positive externalities are commonplace and unnoticed: for example a beekeeping business generating revenues from honey while the surrounding farmers receive a free pollination service.

The classic negative externality is the example of a factory polluting a river and, as a consequence, fishermen downstream catching fewer fish. The factory pollutes for free while the fishermen pay the costs of that pollution.

Climate change is perhaps the most dramatic example of global negative externalities. The illustration below (Figure 16) depicts country size according to responsibility for climate change 1950-2000 and highlights the distribution of four climate-sensitive health impacts during the same period. This shows that those generating the emissions are not those suffering the consequences.

Figure 16 Comparison of undepleted cumulative CO_2 emissions by country for 1950 (A) - 2000 (B) and the distribution of climate-sensitive health consequences (deaths from malaria, malnutrition, diarrhoea and inland flood) Source: Lancet 2009



If the negative externality of the factory versus fisherman is compared with the externalities associated with climate change it becomes clear what the scale of climate change externalities might be:

Factory v fishermen	Climate change
Only the factory is polluting, the factory will understand this, know it can stop and how much it will cost.	Everyone is responsible for emissions, we rarely have much information about how much of emissions we are responsible for, we are uncertain how we can emit less and there is huge uncertainty of what it costs in externalities.
Only the fishermen are affected and they know how much the pollution is costing as a result of loss of fish.	Everyone is affected – people are dying now as a result of climate change and it will affect all of us in the future though we are not sure exactly how or when. It is difficult to put a value on human life and whole ecosystems such as coral reefs.
The fishermen have a legal and financial system that can help identify the factory, the harm and demand damages.	Those affected now often have less economic and political power than the large emitters. Our economic and political systems are poor at accounting for future costs to ourselves.
The pollution has a short term impact and then the fish stocks bounce back.	We are now feeling the impact of emissions from 30-40 years ago. Our current emissions will have impacts for centuries. Some impacts are irreversible, such as species extinction and loss of land to sea level rise.

To solve an externality a value needs to be calculated for the damage so that it can be 'internalised' – i.e. accounted for within our economic system. This is relatively straightforward for the factory v fishermen example: the fishermen sue the factory. However the complexities of climate change expose the legal system as totally inadequate and present many barriers to businesses including externality costs in their prices. Individuals seeking to include environmental and ethical issues in their purchasing decisions are often confused. The size and complexity of the externalities requires centralised government intervention to make prices more accurate.

The previous and current UK governments have recognised their role in internalising the externality of climate change. In 2006 the UK government commissioned a study to consider the external costs of climate change. The resulting Stern Review (after Lord Stern, review lead) was the first attempt by any Government to understand the scale of the global economic impact of climate change. In 2007 Stern reported that if warming of 5°C occurred, the costs of adaption to developed countries would be 5-10% of GDP as compared to a 'no climate change' world, and that developing countries would suffer costs above 10% of GDP. The Stern Review estimated that the costs of avoiding this scale of climate change through mitigation of emissions represented 1% of GDP, ergo climate change avoidance is cost effective. Since publication of the Stern Review, Stern has acknowledged that his projections were adaptation cost-conservative, underestimated the sensitivity of the climate and too cautious about the benefits of avoiding climate change through emission mitigation.

So how best to internalise the costs of climate change: in other words to put a price on carbon? Economists argue for two approaches:

- **Fix the price**: estimating the costs of climate change and levying a tax that equals those external costs. For example in the UK, electricity users pay a Climate Change Levy on their bills. Despite best efforts, a tax may still not equal all external costs or reflect everyone's approach to the risks resulting from climate change;

- **Fix a limit on the amount of pollution**: setting a limit on emissions and then allowing emitters to trade in emissions. This sets a price for emissions through the creation of a market where carbon is traded like any other commodity, such as the EU Emissions Trading System. Industrial lobbying and uncertainty about the extent emissions convert into climate change impacts can result in the limit being too high.

New tools and frameworks to protect the environment we all fundamentally rely upon are urgently needed. Our current economic model, based on the traditional capitalist principles of a free market, competition, and private ownership of the means of production, is unfit for purpose in this new context. It needs to be redesigned to reflect environmental costs and benefits. The UK Government is developing its work on carbon valuation to help design policies effectively: see the accompanying box "How much does carbon cost?".

Tours need to recognise that there are costs excluded from the current budgets, and that government action will internalise those costs, penalising activities with high emissions. Cutting emissions now will save costs both to future tours and to the climate.

How much does carbon cost?

The financial valuation of carbon enables both government and market instruments to account for the costs associated with climate change. The value of a tonne of CO_2 is contingent on an emerging appraisal of the damage that CO_2 does. The UK government's approach to valuing carbon is based on estimating the likely costs of meeting specific emissions reduction targets.

Carbon valuation will ensure that policies the UK Government develops are consistent with the emissions reductions targets that the UK has adopted nationally, as well as with the European Union and United Nations. Giving a value to carbon helps the Government fully account for climate change impacts in appraising and evaluating public policies.

This is a new approach to carbon valuation, which until recently was implemented as a 'shadow price', and follows the EU's Climate and Energy Package (2008) rationale. It splits emissions into:

- traded sector - those emissions covered directly or indirectly by the EU Emissions Trading System (ETS);
- non-traded sector - those emissions not covered by the EU ETS such as transport fuels.

The distinction, which leads to two sets of carbon price estimates, will enable more accurate policy appraisal which will take into consideration the costs and benefits to the UK. These prices will be regularly reviewed and revised.

For the purpose of appraising policies that affect emissions in sectors covered by the EU ETS, the traded price of carbon is recommended. The short term traded price of carbon is currently set at £22 per tonne CO_2e, with a range of £12-£27.

For policies that affect emissions that are not traded, the short term non-traded price of carbon is currently set at £52 per tonne CO_2e, with a range of £26-£78.

Furthermore, the Government is reasonably assuming that from 2030 a global carbon market will be in place, and therefore a consistent price of carbon will apply to all emissions. The long term traded price of carbon is estimated to be £70 per tonne CO_2e in 2030, with a range of £35-£105. This price will be added to the price of goods and services, rather than being used to appraise policy choices.

It is possible to use the government's current estimate to give an illustration of future cost increases, assuming the external costs of climate change are internalised.

For example, the emissions from a tour relate to the transport emissions, which are not traded. Using a tour with emissions of 416 tonnes CO_2e, and multiplying that by the current price of non-traded carbon of £52 per tonne of CO_2e, will result in £21,632.

This is the amount of money the tour can expect to pay, for example through future tax changes if emissions stay constant. It is therefore a useful figure to consider when investigating emission saving actions, as anything below that amount will be a cost-efficient investment.

3

Hot Topic 3

Carbon Offsets: cop out or climate winner?

By Dr Adam Bumpus
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Carbon offsetting is a mechanism that has been used by governments, companies and individuals in order to attempt to reduce the environmental damage of their activities. The performing arts sector, especially music, is using carbon offsetting as a route to address some of the environmental impacts of their activities. Carbon offsetting should not be used as an alternative to direct actions which reduce emissions. Carbon offsetting projects have differentiated environmental and social benefits which need to be understood. This note provides an explanation of what carbon offsetting is, how it works, and guidance on how to choose a carbon offset investment.

What exactly is carbon offsetting?

A carbon offset is a mechanism that allows a company, organisation or individual to reduce its environmental impact on the atmosphere in one area by investing in projects that reduce greenhouse gas (GHG) emissions in another.

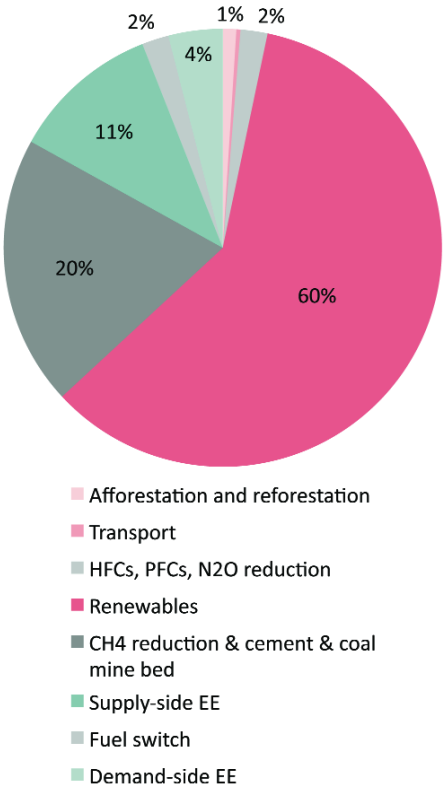
Offsets are controversial. Some offset projects have questionable emissions reductions, create unwanted local effects and open the possibility for fraud and profiteering by 'carbon cowboys'. On the other hand, carbon offsets are popular because they are often cheaper, faster and easier than domestic emissions reductions. Often carbon offsets are carried out in developing countries and in some circumstances projects have led to significant local benefits, assisting communities with direct financial benefits or project co-benefits such as access to electricity. Carbon offsets are neither the solution to climate change, nor the antithesis of carbon mitigation action. If carried out correctly and as part of a wider climate change strategy offsets can create both atmospheric and social benefits.

How does carbon offsetting work?

Project types

Carbon reductions can come in the form of removing carbon directly from the atmosphere, such as planting trees to increase carbon sequestration, or by investing in energy efficiency or new clean technology to replace fossil fuel burning. The difference in emissions that would have been emitted and the current, lower emissions (i.e. because of the new project investment) create reductions that are traded as metric tonnes of CO_2 equivalent (i.e. carbon credits). Many types of projects are used in carbon offsets. These range from industrial gas destruction to community-based agro forestry (see Figure 17).

Figure 17 Number (%) of CDM projects in each category (source: UNEP Riscoe, Feb 2010)



Markets for creating reductions

The reductions and transference of credits take place in two broad market categories. These markets differ in governance, size, project types and prices (see Table 6 below). Firstly, the compliance market includes the Kyoto Protocol's Clean Development Mechanism (CDM) and Joint Implementation (JI). Secondly, the voluntary carbon offset (VCO) market is not regulated and is used by organisations not bound by Kyoto to offset their emissions primarily for public relations and for reasons of corporate social responsibility (Hamilton et al., 2009). Although traditionally the voluntary and compliance markets differed in project types, credit sourcing in the CDM is increasingly influencing the voluntary markets as project developers sell Verified Emission Reductions (VERs) while awaiting CDM registration (e.g. 32% of project types are Hydroelectricity in both CDM and VCO markets).

Evolution of offset markets

Since the mid-2000s the carbon offset markets have evolved significantly in terms of knowledge, practice and their effective use. More recently, the Clean Development Mechanism (CDM) is being reformed away from the 'project-based approach' to programmes of activities (i.e. reducing emissions of a whole city) or reductions of emissions by industrial sector (i.e. setting standards for emissions reductions in a specific industry). These aim to provide cheaper emissions reductions at scale. In addition the voluntary market is increasingly self-regulating in the context of consumer awareness around carbon offsets. This is important to emerging markets, like the USA, that are looking to use credible carbon reductions in future climate change policy. Increasingly the compliance and voluntary markets are merging, as self-regulation increases.

Offsetting should not be seen as the immediate go-to option for carbon management. Instead it should come after all reasonable action can be made to reduce operational emissions. The UK Carbon Trust has suggested a useful way of engaging offsets through a three stage process:

1. Focus on direct emissions reductions through efficiency;
2. Look at reducing indirect emissions up and down the supply chain;
3. Develop an offset strategy.

Table 6 Characteristics of the compliance and voluntary carbon markets (source: Capoor and Ambrosi 2009; Hamilton et al. 2009).

Market	Rationale	Governance / Standards	Market Size & Value (2008)	Average credit price (2008)
Compliance	Cheap compliance under Kyoto regulations	*Governed by UN processes:* Clean Development Mechanism (CDM) Gold Standard CDM Joint Implementation	1481 million metric tonnes US$33 billion	US$16.78/ tCO_2e
Voluntary	Public relations and Corporate Social Responsibility	*Outside of formal regulation:* Voluntary Carbon Standard Gold Standard VER Climate Action Reserve	123.4 million metric tonnes US$705 million	US$7.34/$tCO_2e$

Guidance on what to look for when purchasing a carbon offset for your tour

Rather than project type or size, the best way to ensure credible carbon offsets is to use a credible standard. The Clean Development Mechanism (CDM) is the most regulated standard, but the Voluntary Carbon Standard is increasingly seen as an alternative for project types and geographic regions not allowed under the CDM. For organisations that want to promote the local community development stories associated with carbon offsets, then the Gold Standard (GS) or the Climate Community and Biodiversity Standards (CCBS) will help source credits that have explicitly channelled finance into development projects. Any credible standard should produce offsets that are additional to business as usual practices, measureable, reportable and verifiable. Standards should also encourage the use of a carbon registry to track offset credits in order to prove that they have been retired (taken out of circulation) when they are bought.

Conclusions

Carbon offsets have matured since they first became mainstream climate mitigation tools in the late 1990s and early 2000s. The markets have evolved significantly, and there are choices in both the compliance and voluntary markets for organisations wishing to purchase offsets. A robust offset strategy involves achieving internal reductions as far as possible, and then sourcing carbon offsets that are registered to credible standards and tracked through carbon registries. Carbon offsets can be forces for good, but they should be considered as a tool in the box of climate solutions, not as an end in themselves.

HotTopic 4

Up in air or out to sea?

By Tristan Smith
University College London Energy Institute

International touring is, by definition, contingent on travel – often by air and sea. However, aviation and shipping rely on fossil fuels and, in the short to medium term there are no viable alternatives. Both these sectors are growth sectors and therefore it is inevitable that the greenhouse gas emissions they generate will also increase. This note gives an overview of the environmental issues associated with air and sea travel, where government policy is heading and some guidance to reduce environmental damage.

Why the environmental concern about aviation and shipping?

Our best guess at the moment is that anthropogenic greenhouse gas (GHG) emissions created by aviation and shipping are of a similar magnitude – each accounting for approximately 3% of global emissions. Analyses to break down that figure for the EU and UK return similar estimates of more localised proportions. Given such a diminutive share of the carbon problem, and considering the complexities of regulating international businesses, it is tempting to focus on the bigger carbon criminals; agriculture, industry, power generation and the like.

But aviation and shipping are the workhorses of globalisation. Together they move an overwhelming majority (80% of global trade travels by ship) of the raw materials, fuels, manufactured products and labour force around the world that has been fundamental to high consumption lifestyles typical of the West, as well as the inexorable industrialisation of China and the Far East.

As a result, both sectors have experienced feverish growth rates over the last few decades. Growth projections assuming business as usual suggest that, if we fail to control emissions from aviation and shipping, they could contribute as much as 30% of anthropogenic emissions by 2050. If that happens we will be left wondering why we ignored such a large and fundamental part of the problem.

Beyond the headline figures on emissions proportions, both shipping and aviation have separate and additional climate challenges. Aircraft emissions are complicated by the physical and chemical impacts of their emissions on the upper atmosphere. Some analyses apply a metric or multiplier to the quantity of GHG's emitted by a flight in order to produce a more accurate representation of its climate impact.

Shipping's dirty secret is that it burns some of the lowest grade fuel that we extract from the ground. When crude is distilled to produce petrol and diesel for road transport, the high sulphur content 'heavy fuel oil' is a comparatively cheap by-product and consequently the fuel of choice for the cost conscious shipping industry. Acid rain, smog and health issues associated with burning high sulphur fuels such as heavy fuel oil and coal have led to legislation that has all but banned it from most of its previous applications.

The regulatory complexity and the 'out of sight, out of mind' nature of the shipping industry has meant that burning high sulphur fuels in ships has gone unchecked. Through the International Maritime Organisation (IMO), there is now a framework in place to bring shipping's sulphur emissions down from current levels (about 4.5% of exhausted emissions) closer to that of a modern car. This will be achieved either by switching to low sulphur fuels, or fitting technology to ships that will 'scrub' the sulphur from the engine's exhaust. Similar regulatory attention is being paid to nitrous-oxides and particulate emissions.

One way to solve the land-based anthropogenic GHG problem is to decarbonise energy supply. This might involve increased provision of renewable energy to the grid or the revival of the nuclear power industry. However, it is not easy to plug a plane or

a ship into a wind turbine. For these reasons neither the aviation nor the shipping sector currently foresees an imminent switch away from liquid fossil fuels. The physics of flight constrain planes to energy dense fuels and compact high-power–to-weight ratio engines, which currently limit their options for large long distance aircraft to gas turbines burning aviation fuel (which is currently distilled from oil).

Ships are less restricted from a technological perspective, and have more space and carrying capacity to explore the application of emerging (or recurring) technologies. The motive force for global trade was originally derived from the wind. Tea, wool, spices and many staples of our ancestors' lives were distributed by sail power and some now see the combined challenges of high fuel prices and GHG emissions stimulating resurgence in wind powered shipping. Many modern ships are too large to be powered wholly by sail, and nor would modern expectations of punctuality tolerate such a whimsical service. However, giant kites, flettner rotors (a rotating column which generates lift from the wind) and folding deployable wings have all been studied, and in some cases trialled on large ocean-going ships, to investigate their technical and economic viability. Similarly, solar panels can be used to augment the power generated through internal combustion and their integration into ship design could become commonplace in the future.

Renewable power sources are not reliable and so future ships and planes still need to carry either fuel or energy storage that can be tapped into when the sun stops shining or the wind is not blowing. Biofuels are the most obvious technological answer because they require minimum disruption to our existing liquid fossil fuel infrastructure (See biofuels hot topic). Indeed, blends of biofuels (where biofuel is mixed with fossil fuel to reduce the modifications required to existing engines but incorporate a proportion of the benefits of a low carbon fuel) are already in use. However, the true sustainability of this miracle cure to mankind's oil addiction is now being questioned. As demand for biofuels in all sectors increases, constraints on supply due to the large surface areas and resources (e.g. water) required for their production are likely to constrain their viability. This leaves synthetic fuel, such as hydrogen, ammonia and methanol. Low carbon generation of these fuels is technologically feasible, but the high costs associated with this will prevent their widespread uptake until sufficient regulation is in place.

Government aviation and shipping policies

Aviation and shipping are both included in the UK government's commitment to reduce GHG emissions by 80%. However, it is hard for the UK to act without international collaboration because both are 'mobile' industries that could easily re-route to hubs in neighbouring countries, with negative consequences for the UK's economic growth. This dilemma is epitomised by the current debate regarding the expansion of Heathrow. The turgid progress of global negotiations witnessed at Copenhagen in December 2009 suggests that international consensus on emissions reductions and a framework to enforce it is a long way off. Progress on this international framework is crucial before effective global regulations on aviation and shipping can be used to drive and incentivise emission reduction in these sectors.

Fortunately, as we await those global commitments, the EU has been busy pioneering a GHG Emissions Trading Scheme (ETS) which places caps on the GHG emissions in certain sectors and provides a market so that the higher emitters can buy 'permission' to emit GHG from lower emitters: this effectively redistributes the burden of GHG emission reduction to the emitters for whom the cost implications are lowest whilst ensuring the cap provides a simple high level control that obviates the need for micromanagement of many industries and sectors. This ETS is now in its second phase and in 2012 will start a third phase that will include aviation within its scope. The terms for including aviation mean that any flight landing or taking off from the EU will be covered (i.e. even those to and from non-EU destinations) and so depending on the market price of carbon this could start to drive up flying costs and encourage adoption of lower carbon technologies and operating practices. Like fuel price forecasts, carbon prices will fluctuate and so it is hard to assess the scale and timing of the impact of this regulation. Current expectations are that even by 2020 price effects created by the EU ETS are unlikely to exceed 50% and could be a substantially lower portion of ticket cost.

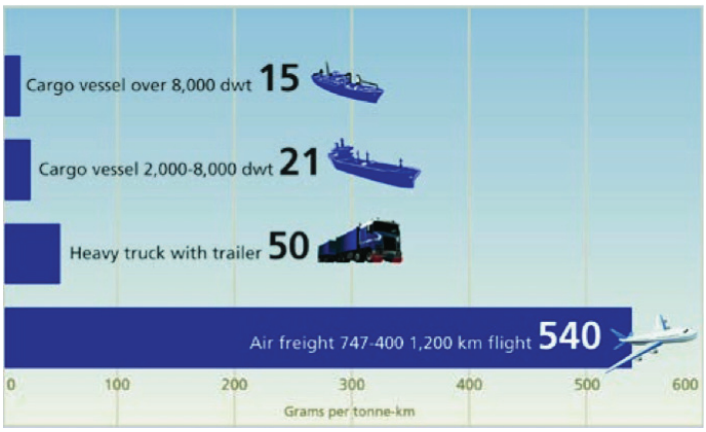
Shipping is further behind aviation from a GHG emissions regulation perspective. The United Nations Framework Convention on Climate Change (UNFCCC) has delegated the responsibility of developing emissions regulation for shipping to the IMO, a UN agency. A variety of tools that could form the basis of emissions reduction implementation is under discussion, including a global ETS for the shipping industry, but all currently face significant technical and political challenges. As a result, only voluntary energy efficiency standards have been introduced so far, and it is expected that it will take some time before legally binding global regulations are introduced. The EU is concerned about the rate of progress at IMO, although it recognises that only global regulation can produce the fundamental changes in the sector that are required for it to achieve a substantial reduction in emissions. To bring the subject into close focus the EU is threatening that should the IMO make insufficient progress towards introducing regulation over the next two years it may incorporate shipping into the EU ETS, perhaps following the model applied to the aviation sector.

So, without substantial regulatory impacts on the horizon, unless we see a dramatic increase in fuel price due to scarcity of supply it is unlikely that in the next ten years we will see significant changes to the aviation and shipping sectors, or to the planes and ships on which freight and passengers travel. This means that emissions reductions are only likely in the shorter time scale if individuals and businesses make careful decisions about how much demand for these sectors they create. Only travelling when absolutely necessary and ensuring that preference is given to sourcing raw materials and products locally is the most effective and immediate response that individuals and companies can take.

Guidance for reducing aviation and shipping emissions when touring

Air freight is easily the worst emitter, and whenever possible preference should be given to transport by ship, even over rail and road transport, although clearly any decision must be based on the details of the specific route (See Figure 18). Unfortunately, the timescales associated with global freight movements by ship may not be consistent with a hectic touring schedule. Perhaps ports will become the preferred concert venues of the future - you could do worse than Sydney, New York and London.

Figure 18 Grams of CO_2e per tonne-km associated with each type of freight



Source: NTM (Swedish network for transport and the environment) – cited in British Chamber of Shipping (2009)

When it comes to passenger transport, it is harder to generalise about the relative GHG impacts of different types of transport. Whilst long distance sea passages are still possible, either on a modern liner like the Queen Mary II or by hitching a lift on a container ship, factoring in weeks of travelling time, romantic though the voyage could be, is a luxury few busy people can afford. Because we demand short passage times, ferries have been getting faster. Even the Queen Mary II travels at approximately 35 mph, in order to keep the voyage length to a week. Combining such higher speeds with the space and levels of comfort that passengers demand mean that in practice a switch from flying to travelling by sea in our current passenger ships would rarely result in significant emissions savings.

If aviation is the selected mode of passenger transport then you can make some contribution by choosing the most efficient type of flight. The equation is simple: it's all about getting the most people into the largest possible plane flying your route. Unfortunately this means that the responsible thing to do is to shun being pampered in first class, as first class seats reduce the number of more spatially efficient economy class seats you can fit on a plane and therefore increase the GHG. Airlines would stop fitting out large areas of their aircraft to higher class travel if there was no longer the customer demand for this service.

So to sum up, the choice when it comes to travelling or moving equipment long distance is between a bad option (a combination of land and sea transport) and a worse option (flying). As is so often said about GHG emissions, there is no silver bullet which can be applied to revolutionise either of these sectors. However, there are steps being taken to bring in regulation which will provide a framework for implementing change in the future. In the meantime, the best advice if you want to create the minimum GHG impact is to take your time and to enjoy your journey. Take a slower ferry and enjoy the views from a train – its better than the cloudscape you see from the window of an aeroplane.

Hot Topic 5

Biofuels: solving our climate and oil woes?

By Alexandra Morel
University of Oxford

The Issue

Parts of the creative industries, such as music and film, have shown a particular interest in biofuels as offering a partial solution for reducing the environmental impacts of tour travel, and a significant number of iconic artists, especially in the USA, have used biodiesel in their trucks and buses. However, concerns about the environmental benefits of biofuels remain and have implications for all those who tour. This is a short overview of the science and policy and some guidance.

What are biofuels?

In the quest to reduce burning fossil fuels alternative fuels are being developed. One such group of fuels is biofuels, which refers to a wide range of plant material used to create the fuel. There are three "generations" of biofuels, a term which refers to the type of plant material used to create the fuel.

The best-known "first generation" fuels are ethanol and biodiesel. Ethanol is produced from fermented sugar, which can be derived from corn, wheat, sugar cane and sugar beet. It can be blended with petrol and gas or be used on its own in a flex-fuel vehicle (a vehicle adapted for its use). Biodiesel has similar properties to petroleum diesel. It is produced by processing vegetable oil, such as soybean oil, palm oil, rapeseed/canola oil, wild flaxseed oil and waste cooking oil.

"Second generation" biofuels are meant to overcome the dilemma of using a plant material that is also a food source, explored below. Ethanol can be derived from cellulosic material (e.g. pulp and paper byproducts, switchgrass, corn stover, etc.) or for biodiesel inedible oil such as from the jatropha plant. There are several methods for converting cellulose to a usable biofuel.

Finally, algae are considered a "third generation" plant material for biodiesel. Unfortunately few of the second and third generation technologies are economically viable at present.

Controversy surrounding biofuels is manifold. First generation fuels compete with food production, causing spikes in food prices and/or displacement of food cultivation to currently un-cleared lands. This latter issue can take many forms and has been given the name indirect land use change (ILUC). Often these new areas are in tropical countries that are not limited by temperate seasons, have plentiful solar radiation and (ideally) ample rainfall.

In many parts of the world this is linked to the clearance of logged rainforest, loss of biodiversity and displacement of local communities. Expansion of agricultural commodities (not specific to biofuels) has already been the cause of considerable rainforest loss in Southeast Asia; however, in the potential race to produce enough "green fuel" greater attention is being paid to Sub-Saharan Africa and South America by multi-national biofuel companies. Tanzania is an example where several American and European companies interested in producing biofuels for export have been accused of displacing local farmers. In addition, sections of the vast tropical forest of the Congo Basin have been sited for extensive oil palm plantations to meet some of China's demand for biofuels.

Aside from the obvious **human rights issues** associated with the land-grab are the environmental consequences of this expansion. The question of carbon savings is key if biofuels are intended to be a carbon-mitigating measure.

Carbon emissions can result from the clearing of carbon-rich forest; loss of carbon through soil erosion; addition of fertilizers to grow biofuels (including the embedded emissions from fertilizer production and Nitrogen Oxides (NO_x) emissions after application) and transport of feedstock before its conversion.

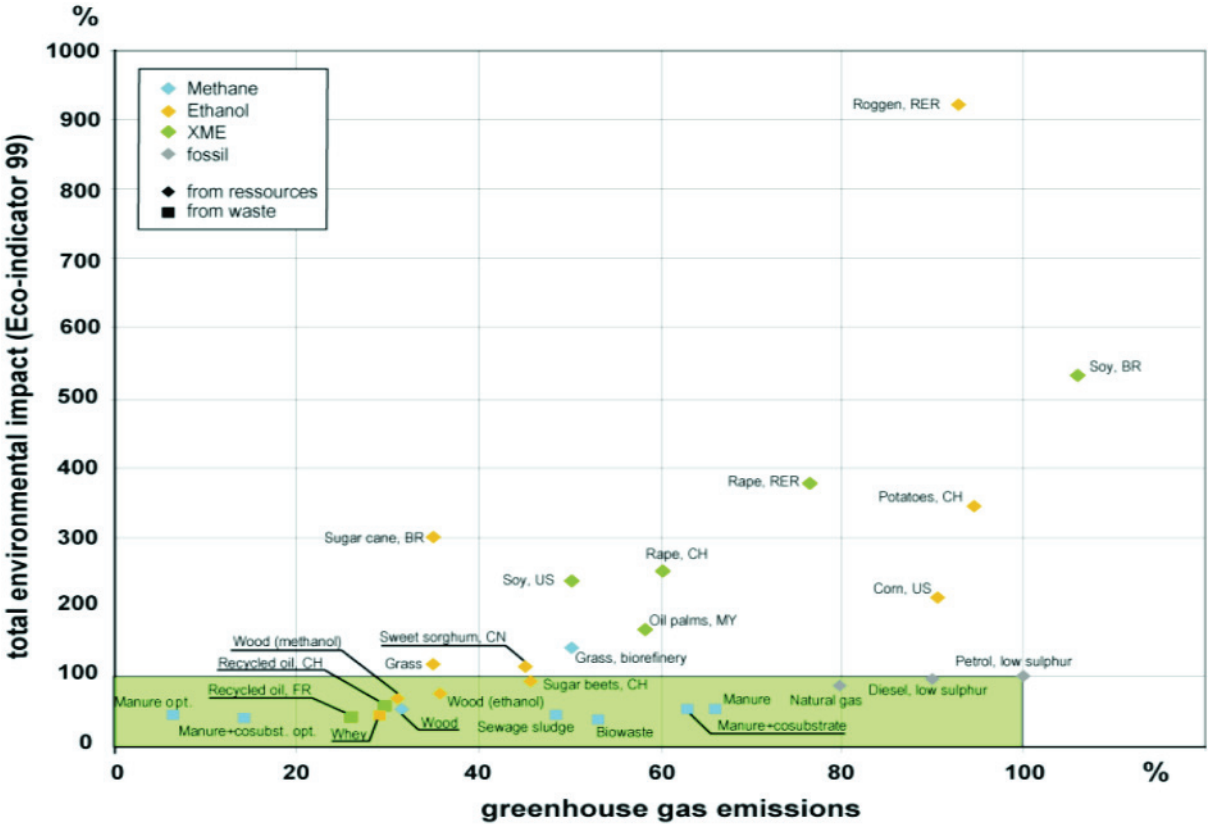
In order to have a greenhouse gas saving, production of a biofuel should not release more carbon than would have been emitted by combusting the same volume of fossil fuel. Currently, the carbon emissions from combusting the actual biofuel is not included in a carbon lifecycle analysis of the fuel, due to the assumption that the carbon released through burning can be reabsorbed through the re-growth of the biofuel feedstock.

The energy balance of a biofuel refers to the amount of fossil energy used to produce a biofuel compared to how much energy the biofuel has available for combustion. The carbon saving and energy balance among biofuels is significantly different across plant materials. For example, US corn-ethanol barely breaks even both in terms of carbon savings and energy balance; while, Brazil's sugarcane ethanol has roughly eight times the energy benefit. Swiss researchers have provided a helpful graph comparing biofuels from their net energy saving benefit (see Figure 19). This graphic shows the estimated carbon savings of the fuel and also their "total environmental impact" described by a single eco-indicator value.

Government biofuels policies

Currently biofuels are having a difficult time competing with the relatively low price for crude oil, and therefore its respective industries are buoyed by government subsidies and mandates. The EU has one of the largest biofuel mandates as part of its **Renewable Energy Directive (RE-D)** which stipulates that 10% of the EU's transport fuel must come from renewable fuels by 2020 (EU 2009). This policy has been blamed for much of the international hysteria to produce biofuels. As a means of ameliorating the impacts of this mandate, the recently published RE-D provides detailed sustainability criteria, including the requirement that the biofuel used must have a 35% greenhouse gas saving compared to the relevant fossil fuel it is replacing. However, it appears increasingly likely the EU will be reducing its mandate due to a recent study capping the "sustainable" volume of biofuel at 5.6%, after which negative impacts such as ILUC will overwhelm any carbon savings of the policy. At the same time, not all biofuels

Figure 19 Greenhouse gas emissions versus environmental impacts for several biofuel feedstocks, including wastes (Source: Zah, R. et al. 2007).



sold in the EU necessarily meet the sustainability requirements because only biofuel counted toward the RE-D's mandate must meet these criteria. Unfortunately, even the sustainability of these volumes is unclear, as many of the leading fuel retailers in the UK have not properly reported the source of their fuels to the Renewable Fuels Agency (RFA).

The US has both a mandate - the Renewable Fuel Standard (RFS) - that requires fuel blenders to use 36 billion gallons of renewable fuel by 2022 and significant subsidies for biodiesel blending of $1.00 per gallon of blended biodiesel. This policy has affected the viability of the EU biodiesel industry due to the phenomenon known as "splash and dash", whereby biodiesel produced in other parts of the world are brought to a US port and blended with 1% petroleum diesel in order to receive the tax credit. It is then taken to Rotterdam where it is "dumped" on the EU market. The German government responded by establishing a ban on 20% biodiesel blends from the US, but this does not stop cheap 19% biodiesel blends being traded. Nevertheless, the US biofuel industry (particularly the ethanol industry) is suffering from narrow margins and uncertain markets.

The US biofuel industry recently benefited from an Environmental Protection Agency (EPA) ruling, which increased the ethanol blending volume to increase from 10% to 15% in gas/petrol based on findings this blend could be used in conventional engines after 2001. This effectively increased ethanol demand by 50%, thereby allowing for further investment in the industry. It is possible to purchase an 85% blend of ethanol, which can only be used in a flex fuel vehicle (FFV). This new ruling also includes greenhouse gas saving requirements of 20% for any new biofuel producing facility (e.g. corn starch-based ethanol powered by natural gas, biogas or biomass), 50% for biomass-based diesel or advanced biofuel and 60% to be classified as cellulosic biofuel (EPA 2009). The EPA is continuing to develop environmental rules regarding the treatment of indirect land use change (ILUC) for their greenhouse gas savings estimates and carbon savings for biofuel plant materials, asking for support from the National Academy of Sciences.

Parallel to these efforts, the Roundtable on Sustainable Biofuels (RSB)[5] is developing sustainability criteria. It is following developments in other certification schemes such as: the Roundtable on Sustainable Palm Oil (RSPO), the Roundtable on Responsible Soy (RTRS) and the Better Sugarcane Initiative (BSI).

Guidance on what you should look if wanting to source biofuels

If sourcing biofuels in the EU, it is important to be sure it meets the RE-D requirements (especially if it has been imported). Alternative certification is not an adequate assurance of the fuel's carbon benefits. For example, the RSPO does not have greenhouse gas emission requirements yet, therefore there is no guarantee that the biodiesel is reducing or preventing carbon emissions. Hence, meeting the EU RE-D requirements is the most important for the carbon savings of the biofuel you purchase. However, by buying a biodiesel produced from edible oil there is always a concern the same volume of oil may be consumed as food from a cheaper less environmentally responsible source. Nevertheless, you can always refer to Figure 18 to see the impact of the plant material in question.

Biofuel derived from waste products (such as used cooking oil or animal carcasses) has minimal environmental and carbon issues, so is the most straightforward to source.

In the US, the EPA is in the process of developing similar environmental regulations to the EU; however, most of the biofuel available has been produced domestically and therefore the relative impact of the feedstock can be assessed from Figure 18.

Where to source biofuels

If your tour wants to use biofuels in trucks, buses and other vehicles it is easier to source biodiesel separately, as ethanol is usually blended with petrol and can only be used in flex-fuel vehicles in its pure form. Make sure to source biofuels in Europe that meet EU RE-D requirements.

Updated information on EU biodiesel regulations: http://www.ebb-eu.org/

To identify stations selling biodiesel globally: http://findbiodiesel.org/.

For stations in the US that sell E85: http://e85vehicles.com/e85-stations.html

For a guide to buying biodiesel in the US: http://www.biodiesel.org/buyingbiodiesel/guide/

Useful Sources

Low-Impact Living Initiative (LILI) (useful links on biofuels): http://www.lowimpact.org/linksbiofuels.htm

Scientific Facts on Liquid Biofuels for Transport: Prospects, Risks and Opportunities. (peer reviewed). Green Facts: http://www.greenfacts.org/en/biofuels/index.htm#2

[5] The Roundtable on Sustainable Biofuels (RSB) (2009). RSB Principles & Criteria for Sustainable Biofuel Production. École Polytechnique Fédérale de Lausanne (EPFL), Lausanne

Hot Topic 6

Leisure travel: the untapped savings

By Dr Jillian Anable
University of Aberdeen

Audience travel is the largest cause of greenhouse gas emissions in the performing arts sector. However, leisure travel has had little attention by government policy-makers, transport operators, and researchers to understand the travel choices and how these choices could be shifted to be more environmentally sustainable. There is incredible scope to reduce leisure travel emissions and have a knock-on effect in other areas of travel. This note provides an overview of why a focus on leisure travel is so important to target and what can be done to reduce its environmental impact.

Why leisure travel is important?

The apparently insatiable demand for the movement of goods and people, particularly by road and air, means that the transport sector is consistently responsible for around a quarter of carbon dioxide emissions in developed countries. About two-thirds of these emissions are accounted for by individual passenger movements, and the rest by freight demand. Most importantly, transport is one of the few sectors of the economy where emissions continue to increase year on year despite improvements in vehicle efficiency and the increasing potential for some journeys to be substituted by information and communication technology.

Policy, media and research attention focuses on the plight of the (urban) commuter, the problems created by the increasingly car oriented journey to school and, more recently, the unprecedented growth in air travel. This is despite the fact that, in the UK, these segments of transport activity currently account for only 24%, 2% and 2% respectively of domestic emissions from personal transport.[6]

By contrast, leisure travel, in all its guises (but not including shopping), is responsible for around 30% of personal travel emissions and represents one of the only journey purposes with essentially universal participation. Importantly, nearly everyone participates in some kind of discretionary activity away from home at some point whereas, at the very most, only around 50% of the population travel to work, have children in school or fly in any one year. More poignantly, in terms of car dependency, leisure comprises one of the fastest growing sectors of car based travel demand. This applies to the UK context but will be typical for many western economies.

Yet, apart from the occasional focus on holiday traffic 'mayhem', leisure travel rarely hits the headlines or is afforded the policy and research attention it deserves. It is also true to say that within the black box of 'leisure' which encompasses a diverse array of activities, we understand little of the contribution of specific demands such as audience travel to cultural events.

Government transport policies

It is true to say that leisure journeys present a particular set of challenges for policy that is attempting to encourage lower carbon choices. In the study of leisure sociology and psychology, most authors agree that leisure participation is an expression of identity, personal values and attitudes. Precisely the same factors closely associated with leisure also conjure up notions of a state of mind connected with the 'love affair with the car' such as freedom of choice, freedom from obligation, liberty and free access, enjoyment, relaxation, a lack of evaluation, voluntary participation, and so on. Consequently, for policy to be successful in this area, interventions need to replicate the necessary conditions for this state of mind to be created whilst using transport modes other than the car.

In very broad terms, the options for policy to reduce carbon emissions fall into four categories: each tackling a main source of energy demand and emissions from transport. These include policies, which incentivise, invest in or regulate for:

(i) The technical efficiency of engines used to power the vehicles

(ii) The operational efficiency with which vehicles are used, including their occupancy and how they are driven

(iii) The mode of transport used to meet a given demand

(iv) The demand for movement (distance travelled), itself derived from the need or desire to access goods and services and largely determined by land use patterns.

In the UK and elsewhere, the overwhelming balance of effort lies with technical solutions at the expense of attempts to alter mode choices and patterns of movement. The UK's low carbon reduction strategy for example, published in July 2009, expects 94% of the carbon savings from the sector by 2020 to come from technical based solutions, mainly improvements to car efficiency.[7]

On the one hand, the push for further improvements in vehicle and fuel technologies to reduce the environmental impacts of motorised transport without limiting distances travelled is an obvious priority. However, this emphasis leaves the problem that travel demand is growing faster than capacity possibly can. It also ignores the problem that efficiency gains can be offset by the uptake of vehicles with greater power and additional features and neglects the social issue that a significant share of the population cannot drive or does not have access to a car, for reasons of income, age, or ability.

The emphasis on vehicle and fuel technologies ignores the increasingly large body of evidence now pointing to the potential for the right combination of incentives, service improvements and information to alter travel choices over relatively short time periods, for many different types of journey at low cost. This evidence comes from the relatively recent attempts to address problems of ever increasing demands for road space by focussing on a range of activities defined as mobility management. This broad approach is aimed at encouraging the use of alternative modes by changing behaviour on behalf of organisations and individuals and utilises interventions such as travel plans, ticketing and pricing

[6] Department for Transport (2008). Carbon Pathways Analysis: informing development of a carbon reduction strategy for the transport sector. Department for Transport, London

[7] Department for Transport (2009). A Carbon Reduction Strategy for Transport: Impact Assessment. Department for Transport, London

alterations, car clubs and car sharing schemes, personalised journey planning and promotional campaigns.

The important point is that the definition of 'behaviour change' in mobility management is not simply restricted to mode choice and 'getting people out of their car'. Solutions are built around making the best use of the available infrastructure and this relies, at least in part, on the cooperative behaviour of transport users, with car sharing being a common example of a means by which considerable efficiency savings can be made. It also involves using the transport mode most appropriate for each journey, flexible use of travel time and route choice. Most of all it involves increasing understanding of travel behaviour and the reasons for individual journeys within specific contexts and organisational settings in order that interventions can be designed and targeted accordingly.

This is where the lack of emphasis on leisure travel, and especially travel to cultural events, has been an incredible missed opportunity. Successful mobility management requires tapping into social influences on individual's decision making and altering the bounds of what is considered 'normal behaviour'. What could be considered more influential than popular culture and the associated social networks as a source of inspiration, creativity and alternative behaviour?

Guidance for how to reduce audience travel emissions

Targeting audience travel to venues hosting festivals, music, sporting and theatrical events has the potential to have an impact much greater than the sum of its parts. By altering aspirations, experiences, information channels and behavioural norms, successful changes achieved in audience travel behaviour could have a trickle down effect and help to embed lower carbon choices into a wider set of travel decisions. For instance,

- The development of sophisticated information communication technology tools to facilitate car sharing could add to its position as a viable alternative to single occupancy car travel for a number of journey purposes
- Exposing people to the benefits of coach travel could have far reaching impacts given that it is the most efficient mode of transport over longer journey distances
- Altering just a small proportion of long distance journeys to cultural events could have a disproportionately larger impact than altering a larger number of short distance commuting and school travel journeys
- Stimulating the market for 'green' car hire and car clubs could even have the potential to reduce car ownership and the development of associated car dependent lifestyles.

The latter is based on the fact that many people are car owners and own large family cars chosen with the relatively infrequent number of annual leisure and holiday journeys in mind. Helping to alter car purchasing patterns and a shift away from owning large cars which are primarily used for single occupancy short urban journeys could have a far reaching impact on emissions from the transport sector.

Efforts to influence audience travel patterns necessitate excellent partnership working between transport operators, promoters, local authorities and venues. As the transport psychologists and sociologists suggest, the key will be to create and market journey experiences which rival the independence, flexibility and perceived lack of stress offered by the private car. The journey experience itself needs to become an integral part of the whole cultural and leisure experience. This includes integrated methods of payment which at least offer the illusion of 'free travel' to rival the often perceived 'free' marginal costs of car travel. Information between all the relevant actors needs to be shared to develop targeted and innovative information and exploit existing social networks. Most importantly, lower carbon alternatives need to be aspirational experiences to alter social norms and expose audiences to alternative ways of doing things which, if mainstreamed into everyday life, could have far reaching consequences on emissions from the transport sector.

Hot Topic 7

Snacking on emissions

By Dr Rebecca White
University of Oxford

Eating and drinking are absolutely central part of live performances – whether that be in keeping musicians and management going through intensive work schedules, or for audiences as part of the live event experience. Large quantities of food and drink are consumed, for which considerable resources are required in the production stages; and when we don't finish our food and drink, these resources effectively go in the bin, so there is also the issue of waste. Both food production and disposal leads to the emission of GHG, alongside other environmental impacts.

There are plenty of good reasons to engage with reducing food's GHG impact including economic, environmental and marketing drivers. Through awareness and targeted action by those responsible for food provision in the live performance sector, GHG emissions can be reduced. This sheet is aimed at those who procure food, lease catering tenders and cook/ prepare food in the live performance sector. A brief introduction to the GHG emissions of food is provided here, alongside the policy context and some guidance.

Food – a climate change contributor

Food is thought to be responsible for 20-30% of our national GHG emissions[8] (Audsley, Brander et al. 2009). Similarly, at the EU level food has also been calculated to contribute 30% of total emissions. Climate changing gases arise at all stages of food production, preparation and disposal. See Figure 20 for a diagram of two supply chains for foods commonly sold at live performance venues – beer

[8] This figure includes all the emissions from food that we consume in the UK, whether that food has been made in the UK or abroad. The higher figure of 30% also includes emissions from changes in land-use (e.g. cutting forest to grow animal feed) that can arise in the process of making some foods.

and beef burgers. These also happen to be relatively GHG intensive food stuffs.

Farming in particular, through the production and use of fertilisers, the creation of feed for livestock, the emission of methane (CH_4) burps from ruminant (cows, sheep) digestion and nitrous oxide (N_2O) from soil[9], emits comparatively more GHGs than other stages of the food chain. That is not to say however that other stages of production – whether that be transporting food, processing, manufacturing, packaging or cooling it – do not also warrant looking into. In fact, in many cases it can be easier to reduce emissions from the non-farming stages as methane and nitrous oxides in particular are harder to measure and manage.

The impact of climate change on food

Climate change will also impact food in the longer run. As the climate changes the conditions for growing food will alter. While it is anticipated that this might be beneficial for northern latitudes in the shorter term to 2050, it is likely to have a negative impact for less developed countries in mid to low latitudes. Assuming we continue to emit greenhouse gases globally at the current rate, towards the end of this century climate change is expected to have an increasingly negative effect on agriculture across all countries (Parry et al 2007). Extreme weather events will also affect distribution and other production infrastructure.

Government policy on food and climate change

The government has signed up to 80% reductions in GHG emissions by 2050 – a large target that will affect each stage of the food chain. To date the food industry has not been specifically targeted by regulations to reduce emissions although a number of policies, such as the climate levy (a tax on energy) and the EU Emissions Trading Scheme do affect some parts of the supply chain. The most specific development for encouraging the food and drink industry to assess and improve environmental performance has been the Food Industry Sustainability Strategy, an industry lead initiative, and PAS 2050, a product carbon footprinting and labelling scheme developed by the Carbon Trust.

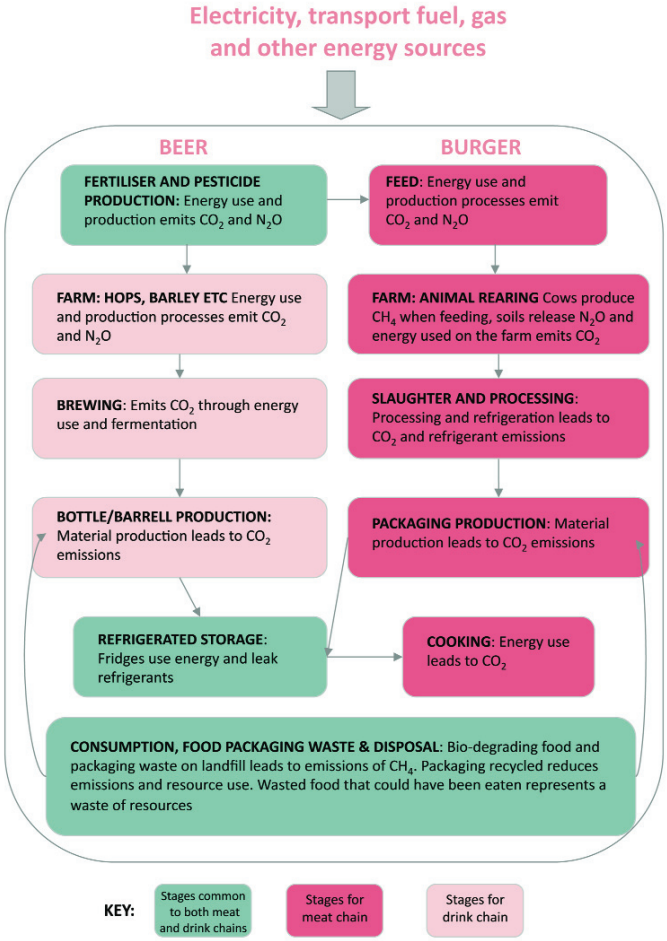


Figure 20 *Sources of emissions from food consumed in the UK*

Table 7 *Approaches to reducing food and drink GHG emissions*

Approach	Example Action
Increase efficiency of production	Consider the energy use of your premises, appliances and transport modes. When it comes to replacing equipment (if not before) use energy ratings, labels and advice to buy the most efficient.
Reduce waste	Monitor how much food you buy-in and have to dispose of. Minimise packaging. Recycle and assess the viability of installing compost facilities or an anaerobic digester to recover energy from food waste.
Change production and disposal to eliminate GHG intensive stages	Consider having freely available water fountains/drinking water taps. Consider using the Incredible Cup company at your event to reduce plastic waste by using their re-usable cup system, which has successfully been implemented at large venues, arenas and stadium events.
Reduce consumption of GHG intensive foods	As a general rule minimise animal products as these are more energy and resource intensive. Offer customers, artists and crew good quality and imaginative vegetarian options. Procure local and seasonal food.
Change to no/low carbon energy sources	Source your energy from a renewable energy provider or generate your own renewable energy, e.g. using solar PV for electricity, heat pumps or solar thermal to heat space and water, and anaerobic digestion to turn your waste into electricity.

[9] CH_4 is a greenhouse gas 25 times more powerful than carbon dioxide. N_2O is a greenhouse gas 298 times more powerful than carbon dioxide.

Voluntary initiatives underway

Adnams - A brewery that has developed an environmental and social policy that shapes their business development. They have taken a number of environmental initiatives such as producing a carbon neutral beer and a distribution centre with grass roof, rainwater collection, renewable energy sources, and environmentally benign materials and design. To learn more go to: http://www.youtube.com/watch?v=_YjlAqc8opY

E-CO_2 - The E-CO_2 Project seeks to carbon footprint farmers and growers, and gives advice on renewable energy generation on farms. They have been working with McDonalds.

Large Retailers - Retailers are taking increasing interest in the greenhouse gas emissions in their supply chains, including carbon labelling. For example Tesco is working with dairy farmers to examine emissions in the supply chain and opportunities for improvements.

Guidance to the live performance sector

There are a number of strategies that will reduce the emissions created by food and drink consumption. Table 7 outlines five broad approaches and gives examples of the types of actions that can be taken under each approach.

Suggestions for concert halls

- Develop a sustainable procurement policy for food and drinks.

- Learn about the environmental impacts of food and drink sold at the concert hall.

- Assess the energy used for food and drink provision and identify opportunities for energy savings.

- Work with contracted food and drink concessions to offer consumerables with low environmental impacts.

- Communicate efforts to reduce the environmental impact of food and drinks to audiences.

Suggestions for incoming productions

- Hire caters with environmental policy and credentials.

- Ask concert halls about their food and drinks procurement policy and about the actions they are taking to reduce its environmental impacts. This could be part of a green rider.

Finally, some links for further reading and watching:

The Food Climate Research Network - lots of information, research and reports: http://fcrn.org.uk/

Low Carbon High Potential video about SMEs and the environment: http://www.youtube.com/watch?v=_YjlAqc8opY

Sustain - lots of food-environment-society information, especially initiatives.: http://www.sustainweb.org/

WRAP - All things resource efficiency, recycling and waste.: http://www.wrap.org.uk/

Business in the community: http://www.bitc.org.uk/

Appendix 1 - Guidance, tools, awards and regulation

Name, category, link	Description
Guidance	
Best Foot Forward bestfootforward.com	Carbon and ecological footprinting experts, conducted analysis for Radiohead.
Eco Action Partnership Ecoactionpartnership.com	Consultancy offering guidance on sustainable event management and ethical PR.
Julie's Bicycle juliesbicycle.com	Not for profit offering free resources, research and initiatives to support GHG emissions reduction in the creative industries.
Reverb reverbrock.org	US-based organisation that educates and engages musicians and their fans to take action toward a more sustainable future.
Sustainable Events Guide sustainableeventguide.com	A practical guide to reducing the environmental impacts of large events.
Sustainable Touring sustainabletouring.com	Team of specialist music and media sustainability consultants who provide in depth support in all areas of event management.
Online Tools	
Eventberry eventberry.com	Provides step by step support for achieving BS 8901 (see below), identifying all documentation required, providing check lists, database and project management functions.
IG tools juliesbicycle.com/ig-tools	Free online tool that automatically calculates an "audit snapshot" of the GHG emissions produced by tours (by leg), offices and venues (annually). Results are measured against industry benchmarks where available.
SMEasure smeasure.org.uk	Free online tool that tracks a venue or office's weekly energy use and GHG emissions. Analyses performance against external temperature and identifies over/under-spend. Provides projected EPC ratings.

Name, category, link	Description
Awards, Certifications, Standards	
BS 8555	British Standard (ISO) guidance for any organisation wanting to set up a system to ensure improvement of environmental performance. Particularly suited to small to medium companies (SMEs) wanting a clear phased approach before moving to ISO 14001.
BS 8901	British Standard (BS) guidance for events organisers, venues and suppliers wanting to set up management systems that ensure improvement of sustainability performance. (environmental, economic, social). Events organisers, venues and suppliers can be certified to this British Standard.
ISO 14001	International Standard (ISO) guidance for any organisation wanting to set up a system to ensure improvement of environmental performance.
Carbon Trust Standard carbontruststandard.com	For companies (including venues) who wish to demonstrate reductions in GHG emissions.
Carbon Reduction Label carbon-label.com/	Assesses the GHG emissions of products (eg beer or t- shirts) using the PAS 2050 life cycle methodology.
Green Tourism Business Scheme	In the music industry, most suited to iconic venue owners who wish to demonstrate their sustainability credentials to the tourism market.
Industry Green juliesbicycle.com/industry-green	For creative industry companies (including venues and festivals) who wish to demonstrate reductions in GHG emissions.

Note: Many Standards and Certification schemes use internationally recognised protocols that are freely available, for example the GHG Protocol provides guidance for organisational footprinting. These are however quite technical and not recommended for complete beginners to carbon accounting.

Regulation	
Carbon Reduction Commitment environmentagency.gov.uk/business/topics/pollution/98263.aspx	Mandatory GHG emissions trading scheme for large businesses whose annual half-hourly metered electricity use is above 6000 megawatt-hours (MWh) (approximately over £500k per year). Affects large music venues and venue groups.
Display Energy Certificate	Mandatory for any building occupied by a public authority or institution and more than 1,000m2 in floor area (including venues) – requires external assessment of building energy use, including A to G ranking
Energy Performance Certificate	Mandatory for any building being built, sold or rented (including venues) – requires external assessment of building energy use, including A to G ranking.

Appendix 2 - Background to orchestral sector and its touring practices

Most orchestras share a common mission: to perform music of artistic merit to as wide an audience as possible. The number of musicians for an orchestra performance will be determined by the repertoire so a single orchestra might perform at a wide range of scales. An orchestra might specialise in a genre or style, such as early music or contemporary compositions. There are also orchestras with specific remits for broadcasting (e.g. the five BBC orchestras) or formed to accompany ballet or opera (e.g. Opera North). In addition, most orchestras run music education and outreach programmes as well as music recording, which may be conducted in conjunction with a concert programme or as separate projects.

Live performance and touring are integral to developing relationships and profile with audiences. Whether the orchestra's touring activity is 'heavy' or 'light' in any particular territory will depend on its mission and different income streams. Some orchestras have a mandate to perform extensively within specific regions (e.g. City of Birmingham Symphony Orchestra, Royal Scottish National Orchestra and Bournemouth Symphony Orchestra), while others have an international reach (e.g. the Royal Philharmonic Orchestra or the London Symphony Orchestra). For many orchestras, maintaining an international profile is critical to their brand and is often important to both public and private funders who understand the global significance and reputation of the UK's performing arts.

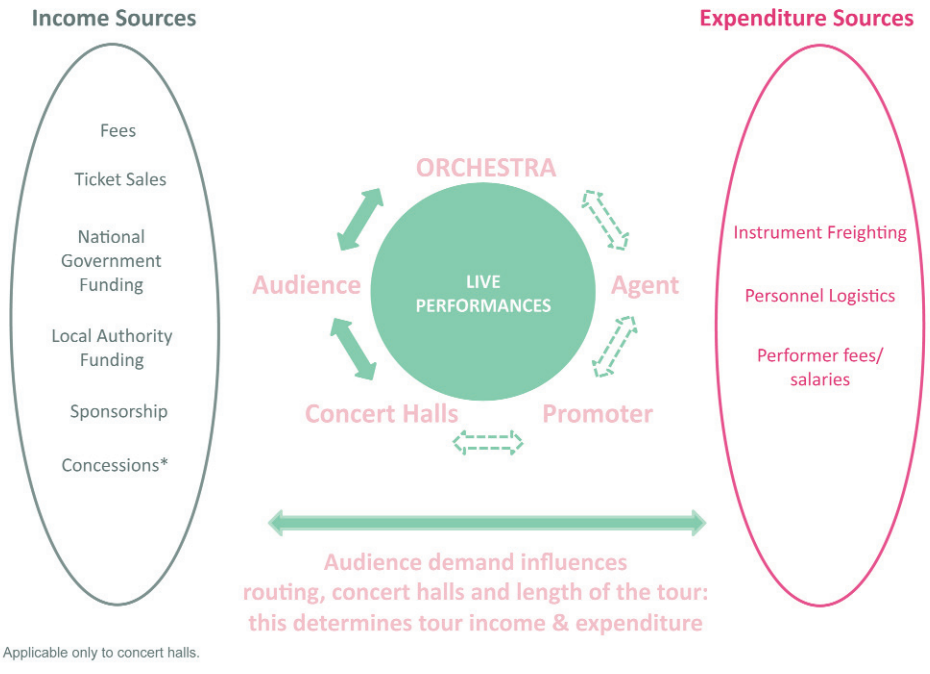
a. Financial context

Invariably the financial margins that orchestras operate within are very tight. Touring work represents both a significant and necessary income stream and this has become even more so as a consequence of the inexorable decline in recording revenues and the growing appetite for live performance. Ticket sales and fees generated by live performances typically make up a large proportion of an orchestra's income. Some orchestras are in receipt of public funding and for these orchestras touring is often a stipulation of this funding. For those orchestras not in receipt of public funding touring will be a crucial income stream.

Many orchestras are in receipt of public funds, primarily from Arts Council England (and its counterparts in Scotland and Wales) and Scottish Government but also, importantly, local authorities. A number of orchestras are Regularly Funded Organisations (RFOs) of the Arts Councils receiving core funds provided to them annually for a fixed term. Another funding source is Grants for the Arts, an Arts Council England lottery funding programme, focusing on specific projects and subject to the conditions of lottery funding.

Public funding usually accounts for between 20-25% of an orchestra's annual turnover with some orchestras, although this varies. Public funding is generally intended to enable high quality orchestral provision to be available to a wide range of people in the UK. At the time of writing, the funding of the Arts Council, like all public sector bodies, is not known beyond March 2011. Other income sources include sponsorship, trusts and foundations, and individual giving.

Figure 21 *Core relationship determining flow of income and expenditure in orchestra touring*



* Applicable only to concert halls.

Any financial base that is dependent on public and private funds for support is vulnerable to the prevailing economic climate - and at the time of writing the UK is anticipating contractions in all sectors of public expenditure, and reductions in private sector support as well. Thus far the orchestral sector has not been dramatically affected by the economic downturn, a consequence partly of the long lead times (averaging two years) in performance planning, which includes securing finance at that early stage. In addition, those organisations which receive regular funding from the Arts Councils are guaranteed a stable subsidy until March 2011. The Arts Councils also supported a number of orchestras (RFOs and non-RFOs) through Sustain funding, a time-limited fund established specifically to support organisations that are experiencing a negative impact due to the recession, in private sector fundraising and other areas.

Orchestras may also increasingly experience the strain on the economy through their relationships with promoters, who are likely to be working to tighter budgets. This may affect fees and may also result in pressure to present 'safer' repertoire on the assumption that this poses less risk to ticket income. (However, one orchestra in the study noted that their more unusual or distinctive programmes are more popular than perceived 'safe' programmes despite the higher ticket price – perhaps reflecting a view from the audience that their limited disposable income is better spent seeing something really special).

b. Sector relationships

A number of protagonists collaborate to organise a concert performance: performers, conductors, orchestra administrative team, agents, promoters, concert halls and, of course, audiences (See figure 21 on the previous page).

Orchestral musicians are either employed on a contract or are freelance. Most orchestras have a membership or first call basis arrangement with musicians. A musician might perform for a number of orchestras in order to maximise professional opportunities and to ensure a relatively stable income. Most musicians will be members of the Musicians' Union, the trade union which negotiates with the Association of British Orchestras (ABO) and its members on the regulations and guidelines controlling the payment structure for musicians including ancillary payments for travel expenses.

An orchestra's relationship with conductors and soloists is often pivotal. The market for top international conductors is a global one, and orchestras need to offer something unique, which may include the chance to tour exceptional projects, to secure the top names.

The ABO is the UK trade body working to represent most professional orchestras to funders, policymakers, the Musicians Union and other relevant stakeholders. It has a membership of 65 orchestras of which 40 were identified as touring orchestras. The other key representative body for the orchestral sector is the British Association of Concert Halls (BACH), which is a membership body for 34 concert halls across the UK.

Orchestras Live is the national development agency for professional orchestral music in England. It works in partnership with local authorities and other promoter partners to reach communities and parts of the country which do not have access to high quality orchestral music and collaborates closely with a wide range of professional British orchestras. In 2009/10, it worked with 37 professional orchestras on 304 events which reached over 83,000 people in England.

c. UK touring

A UK tour project will typically start with internal discussions concerning the repertoire, who should be involved and where it might be performed. The orchestra will typically approach the programming director of a concert hall directly. The booking of a performance(s) will be determined on repertoire, artists and also finance: the balance of income (fees, ticket sales, public funding, and sponsorship) and expenditure (instrument freighting, personnel logistics, musician fees and concert hall hosting fees).

Orchestras have a strong network of relationships built up over many years with UK promoters and concert halls and so normally conduct negotiations themselves. Audiences are developed through the artists, repertoire, the location and the reputation of the orchestra as well as the concert hall.

A number of orchestras have longstanding fixed performance commitments each year with concert halls, especially some of the regional orchestras. These commitments will limit the need and availability of the orchestra to tour additional performances.

d. International touring

At the international level, an orchestra will often work through an agency and the orchestra, conductor or agency might lead on artistic direction. Agents also represent conductors and soloists and negotiate contracts between their clients and an orchestra. An orchestral touring agent will sell a project to a number of concert halls in several cities that are in geographic proximity so the project works both financially and logistically. Additionally, international promoters or concert halls might approach an orchestra directly or via an agent to create a tour with them.

e. Orchestra touring patterns

Most orchestras perform predominantly in the UK, with a number of international touring projects typically to Europe, North America, Asia and occasionally South America. The majority of orchestra tours in the UK consist of a single performance; distances in the UK are often short and therefore musicians will do a round trip in a day. This scenario is also quite common for performances in Northern Europe, although orchestras prefer to perform more than one concert when touring overseas, usually in different cities for each performance. A long-haul tour project to, for example, North America or Asia, will usually run between one and two weeks with performances in multiple cities. A small

number of orchestras have established residency projects, both in the UK and abroad, where they are based for a number of days and might combine their concert series with educational outreach activities.

f. Tour planning

For many orchestras key performance dates are booked into the calendar at least 18 – 24 months in advance. Large orchestras with international profiles will often begin tour planning at least two years out as highly prized conductors and soloists can be booked years in advance, as can major concert halls. Such advance planning is necessary in part because the concert season of an orchestra or a concert hall is typically published in January/February with the season commencing in September and running through to May. An orchestra will try to plan the season as early as possible with a well balanced schedule of dates so that musicians are able to perform at their best and the orchestra is financially secure. Through the summer months an orchestra might participate in national and international music festivals.

Key stages in planning an orchestra tour

1. Creative development of the project
2. Discussion of project with venues (UK) and agents (international)
3. Negotiation of fees for the project
4. Booking of venue(s) to perform the concert(s)
5. Organisation of instrument freighting and the travel logistics for performers and accompanying staff.

g. Travel logistics

Transport decisions are strongly determined by cost. For performances within the UK, musicians will usually travel by car or coach with less frequent trips by train and air. Typically musicians are responsible for their own travel and claim expenses, a practice which can contribute significantly to their income. Musicians often self-organise into car shares and save money on travel costs. Travelling by car is the preferred option because it is convenient, usually quicker with no waiting time, safer, especially for women at night and for musicians with valuable large instruments, and avoids late night public transport services. A number of orchestras provide a coach service to and from performances, popular because it takes the hassle out of organising travel and ensures that they arrive on time. The train is used less frequently for performances outside London as it can be difficult to make last trains after a performance. A few of the orchestras have either coach or rail sponsorship (see Musician travel case studies). Air travel is an occasional option within the UK, but distances are usually not great enough to warrant a flight.

The travel logistics for overseas tours might be organised by the agent, or by the orchestras themselves. For performances outside the UK musicians will usually be flown to the first city destination and then make ground transfers by coach. Some orchestras do make an effort to use intercontinental trains when it is priced competitively with air travel and reasonably time efficient. As inter-continental rail networks extend with more high speed trains, orchestras are more likely to use them.

Logistics are still determined by cost: examples were given in interviews of irrational travel patterns, such as having to fly to a European city for a concert performance, return to the UK only to go back a couple of days later for another performance. The costs of accommodation and wages prohibited the orchestra staying in the country between performance dates.

Instruments are usually transported by truck within Europe and air freighted to other global regions. Instruments will usually be transported ahead of musicians. Some orchestras have their own trucks for transporting instruments and fuel efficiency and high standards for low particulate emissions were cited as important when choosing a vehicle. Otherwise specialist rental services are used. Sourcing local instruments apart from percussion is rare as the instrument quality is not reliable.

Glossary

Environmental terminology

Adaptation: Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Biofuels: A wide range of fuels derived directly from living matter. The term covers solid biomass, liquid fuels and various biogases. Examples of biofuels are bioethanol, biodiesel and algal fuel (see Hot Topic 5 for more information on biofuels).

Carbon Dioxide (CO_2): A naturally occurring gas, and a by-product of burning fossil fuels and biomass, as well as of land-use changes and of other industrial processes. It is the principal anthropogenic greenhouse gas that affects the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1.

Carbon Dioxide equivalent (CO_2e): The universal unit of measurement used to indicate the global warming potential (GWP) of each of the six Kyoto greenhouse gases. It is used to evaluate the impacts of releasing (or avoiding the release of) different greenhouse gases.

Carbon footprint: The total set of greenhouse gases (GHG) emissions caused by an organisation, event or product. For simplicity of reporting, it is often expressed in terms of the amount of carbon dioxide or its equivalent of other GHGs emitted.

Carbon offsets: A carbon offset is a mechanism that allows a company, organisation or individual to reduce its environmental impact on the atmosphere in one area by investing in projects that reduce greenhouse gas (GHG) emissions in another (see Hot Topic 3 for more information on Carbon offsets).

Carbon valuation: In order to be able to incorporate, in monetary terms, the cost of potential damage to the environment caused by GHG emissions, a consistent carbon pricing or carbon valuation should be applied to public policies and project budget appraisals – this will provide a complete costing of a policy or project which includes the often hidden, but nevertheless real cost of the policy or project, even if that cost is not borne directly by the customer (see information box on internalising the price of pollution by adopting carbon valuation).

Climate: Climate in a narrow sense is usually defined as the "average weather," or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands of years. The classical period is three decades as defined by the World Meteorological Organization (WMO). These quantities are most often surface variables such as temperature, precipitation, and wind.

Climate change: A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere, and which is in addition to natural climate variability over comparable time periods.

Climate change mitigation: Measures or actions to decrease the intensity of radiative forcing in order to reduce global warming. Mitigation is distinguished from adaptation, which involves acting to minimise the effects of global warming. Most often, mitigations involved reductions in the concentrations of greenhouse gases (GHG), either by reducing their sources or by increasing their sinks.

Disclosure: The action of making new or secret information known. In the context of climate change, it refers to the disclosure of direct and indirect emissions produced from buildings, transport, the production and movement of goods and services, etc.

Direct emissions: Emissions that are produced by organisation-owned equipment or emissions from organisation-owned premises, such as carbon dioxide from electricity generators, gas boilers and vehicles, or methane from landfill sites.

Embodied carbon emissions: The term "embodied carbon" refers to carbon dioxide emitted at all stages of a good's manufacturing process, from the mining of raw materials through the distribution process, to the final product provided to the consumer. Depending on the calculation, the term can also be used to include other GHGs.

Emissions: The release of a substance (usually a gas when referring to climate change) into the atmosphere.

Environmental sustainability: Environmental sustainability refers to the ability of natural ecosystems to remain diverse and productive, thus being able to support life over a period of time. All human activity is based on these ecological goods and services. Some human activities, such as the excessive production of GHG emissions (including carbon dioxide), has led to the decline in natural ecosystems and to changes in the balance of natural cycles, thus undermining and degrading the capacity of ecosystems to continue supporting life. Living sustainably, for example, by reducing carbon dioxide and other GHG emissions, will ensure the long-term viability and productivity of these ecosystems, providing both humans and other living systems with the capacity to endure. It is in this context that we create a direct link between GHG emission reductions and environmental impacts.

Global Warming (GW): The continuous gradual rise of the earth's surface temperature thought to be caused by the greenhouse effect and responsible for changes in global climate patterns.

Global Warming Potential (GWP): The GWP is an index that compares the relative potential (to CO_2) of the six greenhouse gases to contribute to global warming i.e. the additional heat/energy which is retained in the Earth's ecosystem through the release of this gas into the atmosphere. The additional heat/energy impact of all other greenhouse gases are compared with the impacts of carbon dioxide (CO_2) and referred to in terms of a CO_2 equivalent (CO_2e) e.g. Carbon dioxide has been designated a GWP of 1. Methane has a GWP of 21.

Table 8 Definition of light and heavy touring schedule by tours by orchestra size for each region

	UK		Europe		Other	
	Light	Heavy	Light	Heavy	Light	Heavy
Small	2 or less	>2	2 or less	>2	0	1 or more
Medium	2 or less	>2	2 or less	>2	0	1 or more
Large	5 or less	>5	2 or less	>2	0	1 or more

Note: Light touring orchestras do 0 tours to 'other' geographic territories.

Greenhouse effect: Trapping and build- up of heat in the atmosphere (troposphere) near the Earth's surface. Some of the heat flowing back towards space from the Earth's surface is absorbed by water vapour, carbon dioxide, ozone, and several other gases in the atmosphere and then reradiated back toward the Earth's surface. If the atmospheric concentrations of these greenhouse gases rise, the average temperature of the lower atmosphere will gradually increase.

Greenhouse Gases (GHG): The current IPCC inventory includes six major greenhouse gases. These are Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF6).

Indirect emissions: Emissions that are a consequence of the activities of the reporting company but occur from sources owned or controlled by another organisation or individual. They include all outsourced power generation (e.g. electricity, hot water), outsourced services (e.g. waste disposal, business travel, transport of company-owned goods) and outsourced manufacturing processes. Indirect emissions also cover the activities of franchised companies and the emissions associated with downstream and/or upstream manufacture, transport and disposal of products used by the organisation, referred to as product life-cycle emissions.

Light-emitting diode (LED): A light-emitting diode is a semi-conductor light source. LEDs are used as indicator lamps in many devices, and are increasingly used for lighting. LEDs present many advantages over incandescent light sources including lower energy consumption, longer lifetime, improved robustness, smaller size, faster switching, and greater durability and reliability.

Sector terminology: Orchestras

Green rider: An additional provision provided with the live performance contract for an event or festival which stipulates the necessary sustainable requirements of the band or artist. This can include an organic or locally-sourced food and drink section, specific lighting and sound requirements and commitments by the venue / promoter in the sustainability issues surrounding the performance including travel/transport by staff and crew, recycling, and more.

Heavy and light orchestras: For the purposes of this study, orchestras have been classified as light or heavy touring organisations by size and by region of touring. Table 8 below provides our classifications for which orchestras are considered to be light and which are considered to be heavy by tours by size and by geographic territory. For example, a small orchestra touring the UK twice or less in a given season is considered to be light. A small orchestra touring the UK three or more times in a given season is considered to be heavy. The same would apply to a small orchestra touring Europe. In the case of the 'other' geographic territories, an orchestra of any size with no tours in a season to these territories is considered to be light. An orchestra with one or more tours in a season in 'other' geographic territories is considered to be heavy.

Size (small, medium and large): For the purpose of this research we have attempted to generally classify orchestras into the following touring party size groups: small orchestras having less than 30 people (i.e. musicians and orchestra management personnel in the touring party), medium orchestras having 31 – 70 people and large orchestras having more than 70 people.

Tour: One or more performances requiring travel to a concert hall away from the town where the majority of orchestra performers are based "home base".

Touring party: The people travelling on tour form the touring party. For orchestras a touring party is comprised of musician and orchestra management personnel.

Tour territory: Refers to the geographic region being toured i.e. just UK dates, or just Europe dates, or just US dates etc.

Abbreviations

ABO: Association of British Orchestras

BACH: British Association of Concert Halls

CO_2: Carbon Dioxide

CO_2e: Carbon Dioxide Equivalent

Decc: Department of Energy and Climate Change

Defra: Department for Environment, Food and Rural Affairs

EU: European Union

EU ETS: European Union Emissions Trading System

GHG: Greenhouse gases

Kg/kgs: Kilogram/kilograms

Km/kms: Kilometre/kilometres

kWh: Kilowatt-hours

NO_x: Nitric Oxide (NO) and Nitrogen Dioxide (NO_2)

MU: Musicians' Union

t: Tonnes

UN: United Nations

Units

1000g = 1 kg

1 tonne = 1000 kg

1 mile = 1.61 km

Contributing authors

Dr Jillian Anable is a Senior Lecturer at the Centre for Transport Research at the University of Aberdeen. She is one of the leading figures in current research on transport, energy and climate change and has made a major contribution to the understanding of the potential to achieve carbon reduction through voluntary and other policy instruments in the transport sector. Contact details: j.anable@abdn.ac.uk

Catherine Bottrill has been a researcher for Julie's Bicycle for the past three years starting with *First Step*, but then going onto CD packaging, festival audience travel and now touring. Catherine has helped inform the development of the Industry Green framework and accreditation scheme. She is doing her PhD studies with the University of Surrey's RESOLVE group which is examining relationships of lifestyles, values and environment. Her doctorate work is studying the opportunities and constraints for music industry's engagement on climate change. She is co-developer of two building energy management software SMEasure (www.smeasure.org.uk) that is being used by a number of music companies and venues and also imeasure (www.imeasure.org.uk) for home energy. Contact details: catherineb@juliesbicycle.com

Dr Adam Bumpus wrote his doctoral thesis on carbon offsets at the University of Oxford's Environmental Change Institute. He is postdoctoral fellow at the ISIS, a Research Centre at the Sauder School of Business, University of British Columbia, Canada. He spent time with carbon financiers, policy makers and communities in developing countries involved in carbon offsets. He has also helped UN agencies, charities and companies engage offsets as strategic tools to manage their carbon emissions though his consultancy business, The Climate Consultancy. Contact details: adam.bumpus@sauder.ubc.ca or adam@climateconsultancy.co.uk

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Alexandra Morel is finishing up her PhD at the Environmental Change Institute of the University of Oxford, which focused on the carbon emissions from converting tropical rainforest to oil palm plantations on Malaysian Borneo. She is continuing her research on trade in vegetable oils as a driver of land use change at the University of Columbia's Earth Institute. Contact details: alexandra.morel@ouce.ox.ac.uk

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Christina Tsiarta joined Julie's Bicycle in October 2009 following her master's graduation from the Bren School of Environmental Science at Management at the University of California, Santa Barbara, to work on the touring research project. Her background is in GHG accounting, carbon auditing and sustainability through her work in the financial services industry and in the Ministry of Agriculture, Natural Resources and the Environment in her home country, Cyprus, as well as through her placements in UK sustainability consultancies. She is now working full-time for Julie's Bicycle as a researcher, leading the Green Guide for the Visual Arts initiative for the Mayor of London. Contact details: christina@juliesbicycle.com

Dr Rebecca White has just finished her PhD at the Environmental Change Institute, University of Oxford, which investigated the role of supply-chain based carbon governance in reducing emissions from liquid milk in the UK. This was the culmination of a longer-term interest in climate change and food systems. She is now putting this learning to use further afield, looking at emissions in agricultural sectors in India. This current research is being undertaken in the School of Interdisciplinary Area Studies at Oxford. Contact details: rebecca.white@area.ox.ac.uk

Helen Heathfield trained as an environmental economist and has been applying it to buildings, energy, climate change and our behaviour ever since. As Director of Energy and Environmental Management at Julie's Bicycle, Helen has been undertaking carbon audits and reduction advice since its inception. Helen is passionate about transforming our relationship with ourselves and with our planet. Contact details: helen@juliesbicycle.com

Contributors

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Jillian Anable	University of Aberdeen
Kevin Appleby	Turner Sims Concert Hall
Kathryn Aldersea	BBC Symphony Orchestra
Louise Allen	BBC Concert Orchestra
Keith Ames	Musicians' Union
Elizabeth Andrews	Scottish Ensemble
Peter Ansell	Academy of Ancient Music
Neil Bennison	Royal Concert Hall, Nottingham
Adam Bumpus	ISIS Research Centre, Sauder Business School, University of British Columbia
Andrew Burke	London Sinfonietta
David Butcher	Britten Sinfonia
Manus Carey	Manchester Camerata
Stephen Carpenter	Orchestra of the Age of Enlightenment
Alice Clay	Royal Philharmonic Orchestra
Matthew Cleaver	The Anvil
Donagh Collins	Askonas Holt
Chris Cotton	Royal Albert Hall
Simon Clugston	The Sage Gateshead
Barbara Crabb	Barbican
Becky Dibben	Bridgewater Hall, Manchester
Hannah Donat	Britten Sinfonia
Sarah Earney	Royal Scottish National Opera
Kevin Eason	The Hawth Theatre, Crawley
Susanna Eastburn	Arts Council England
Sarah Ecob	Venue Cymru
John Elkington	Volans
Gijs Elsen	Barbican
Emma Fisher	Bournemouth Symphony Orchestra
Liz Forbes	Royal Philharmonic Orchestra
Simon Funnell	London Mozart Players
Hattie Garrard	London Philharmonic Orchestra
Rebecca Goode	Bournemouth Symphony Orchestra
Cathy Graham	British Council
Anne Greenwood	Wiltshire Music Centre
John Hartley	Arts Council England
Peter Harrap	Welsh National Opera
Paul Hughes	BBC Sypmhony Orchestra
Charlotte Hunt	Orchestra of the Swan
Tim Husbands	Belfast Waterfront/Ulster Hall
Peter Ireson	Derby Live Assembly Rooms
Andrew Jamieson	IMG Artists
Byron Jenkins	BBC National Orchestra of Wales
Ben Jones	Abbey Road
Ceri Jones	Orchestra of the Age of Enlightenment
Andrew Jowett	Birmingham Town Hall & Symphony Hall
Emily Kay	Julie's Bicycle
Stuart Kempster	Halle
Bill Kerr	Abbey Road
Susan King	St. David's Hall
Tom King	Royal Albert Hall
Catherine Langabeer	Julie's Bicycle
Helen Larmouth	Sage Gateshead
Ben Larpent	Intermusica
Matthew Lax	Sinfonia Viva
Henry Little	Orchestras Live
Miriam Loeben	London Symphony Orchestra
Tracey Low	Manchester International Festival
Fiona Macintosh	BBC Philharmonic Orchestra
Stephen Maddock	City of Birmingham Symphony Orchestra
Jonathan Manners	English National Opera
Marshall Marcus	Southbank Centre
Nigel McCune	Abbey Road
Kathryn McDowell	London Symphony Orchestra
Elizabeth Menzies	Southbank Centre
Andrew Moore	Academy of Ancient Music
Alexandra Morel	University of Oxford
Joan Morrison	BBC Scottish Symphony Orchestra
Keith Motson	Association of British Orchestras
Keith Nimmo	Wiltshire Music Centre
Mark Pemberton	Association of British Orchestras
Tara Persaud	Academy of St. Martin in the Fields
Paul Preager	Colston Hall, Bristol
Bob Riley	Manchester Camerata
Suzanne Rolt	St. George's, Bristol
Anthony Sargent	Sage Gateshead
Tom Shore	The Elders (formerly Britten Sinfonia)
Matthew Sims	Leeds Town Hall
Graham Sinden	Carbon Trust
John Smith	Musicians' Union
Neil Smith	Turner Sims Concert Hall
Tristan Smith	University College London Energy Institute
Doug Taylor	Music Hall, Aberdeen
Simon Taylor	Bournemouth Symphony Orchestra
Leonora Thomson	Barbican
Mark Turner	Turner Sims Concert Hall
Simon Wales	Birmingham Town Hall & Symphony Hall
Craig West	Northern Sinfonia
Rebecca White	University of Oxford
Helen Wilson	Opera North
Simon Woods	Royal Scottish National Orchestra
Trudy Wright	Harrison Parrott
Eva Wuestum	City of Birmingham Symphony Orchestra

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