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Carbon soundings: greenhouse gas emissions of the UK music industry

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Abstract

Over the past decade, questions regarding how to reduce human contributions to climate change have become more commonplace and non-nation state actors—such as businesses, non-government organizations, celebrities—have increasingly become involved in climate change mitigation and adaptation initiatives. For these dynamic and rapidly expanding spaces, this letter provides an accounting of the methods and findings from a 2007 assessment of greenhouse gas (GHG) emissions in the UK music industry. The study estimates that overall GHG emissions associated with the UK music market are approximately 540 000 t CO₂e per annum. Music recording and publishing accounted for 26% of these emissions (138 000 t CO₂e per annum), while three-quarters (74%) derived from activities associated with live music performances (400 000 t CO₂e per annum). These results have prompted a group of music industry business leaders to design campaigns to reduce the GHG emissions of their supply chains. The study has also provided a basis for ongoing in-depth research on CD packaging, audience travel, and artist touring as well as the development of a voluntary accreditation scheme for reducing GHG emissions from activities of the UK music industry.

Keywords: music industry, creative industry, corporate responsibility, climate change, greenhouse gas emissions, energy use, and emission reduction

1. Introduction

1.1. Climate change, climate policy and the private sector

Unequivocally increases in global temperatures are associated with rising emissions of greenhouse gases to the atmosphere due to human activity and this is already producing impacts on ecosystems and livelihoods (IPCC 2007). There is widespread consensus that to limit dangerous climate changes, emissions must be rapidly and steeply reduced by at least 50% of 1990 levels worldwide by 2050, with at least an 80% cut by industrialized countries, proposed in the declaration of

the Major Economic Forum held in summer 2009. The UK government passed in the Climate Change Act mandating an 80% reduction in GHG emissions by 2050 from 1990 levels with a mid-term target of at least 34% by 2020 (Defra 2007). The chasm between rhetoric and action has been found to be quite vast (Pielke 2009). Delivering these reductions requires the participation of government, business and citizens as the UK attempts to transform from a high carbon to a low carbon economy through an appropriate governance and economic framework (Stern *et al* 2006).

Over the last decade, an array of non-nation state actors (NNSAs) and organizations have undertaken careful

considerations of how to effectively address the mitigation of GHG emissions from sources contributing to climate change (Boykoff *et al* 2009). These efforts have gained increasing attention in the public arena (Boykoff 2009), and have enrolled a broad spectrum of actors from sectors such as popular culture, business groups, think tanks, and environmental non-government organizations (ENGOS). Involvement from these groups has contributed to vigorous debates and constructive discussions on effective policy measures aimed at achieving GHG emissions reductions. As NNSAs have increasingly accepted ideas for a low carbon society they have pursued demonstration of their commitment. These include, for example, the support of renewable energy, the development of low carbon goods and services and the use of carbon offsetting schemes. However, the environmental merit of these activities varies and, some have praised such activities as a first awareness-raising step toward ongoing decarbonization of industrial practices while others have fiercely critiqued these claims as 'greenwashing' actions (Lipshutz and Rowe 2005).

The music industry has had difficult experience with the public scrutiny when efforts go awry. A case in point is the experience of Coldplay, a globally successful UK band, who endeavoured to make the production of their 2006 album 'A Rush of Blood to the Head' carbon neutral by supporting a reforestation project in Karnataka, India. Initially heralded as a positive step, it was later discredited by the *Sunday Telegraph* newspaper who uncovered that only a fraction of the planted trees had survived (Dhillon and Harnden 2006). The failure of the project was shown in incomplete scientific evidence of carbon saving from tree planting and no market standards for carbon offsetting projects. Fault lay with many parties but such cases still fuel accusations of the 'hypocrisy' of such artist efforts, given the environmental impacts of worldwide rock tours and perceptions of celebrity consumption (Hickman 2006, Goodman 2009). The latest high profile case has been the criticism of U2's 360 worldwide tour for its carbon footprint and their fall back use of carbon offsetting (Kot 2009). To resolve scepticism about music industry commitment requires credible actions that focus on reducing the actual emissions resulting from the overall industry activity itself, involving the co-ordinated efforts of artists and their industrial supply chains.

So while carbon-based industry interests have often been the ones criticised for defending their political economic interests over social and environmental concerns, the debate has certainly become more textured and nuanced in recent years. Yet, the business sector—of which the music industry is a part—remains widely seen as pivotal to efforts to decarbonize society through both voluntary actions as well as through regulatory compliance with government programmes that seek to cap and reduce emissions. Therefore, the constructive engagement of business in the policy and regulatory process can catalyze complex institutional and the infrastructure shifts needed for transitions to low carbon societies.

Business organizations, with the music businesses being no exception, are motivated to engage and participate in an environmental agenda and carbon reduction for a variety of reasons. These can involve financial benefits from reducing

energy use and increased consumer confidence through the perception of environmentally responsible branding. Other reasons for engagement include pre-emptive response to the possibility of regulatory controls, business leaders or shareholders seeing a moral imperative to act and the comparative advantage in being the business forerunner, gaining experience, innovating early, and setting best practice standards which may influence policy (Okereke 2007, SustainAbility and WWF 2007).

An important starting point for all businesses—including the music industry—wanting to take systematic action on their climate impact is to scope their greenhouse gas (GHG) emissions. This involves setting a boundary for responsibility—ranging from the direct impact of operations to emissions in a longer supply chain—and quantifying those emissions. A systemic GHG accounting framework enables business to track emissions over time and monitor effectiveness of reduction efforts. A variety of methods, tools and standards exist and are being developing to enable businesses to delineate and quantify their emissions. Direct emissions are defined as those produced by the business burning fossil fuels such as oil or natural gas in its operations. Indirect emissions are defined as those produced by agents over whom the business does not have immediate control such as an electric power generator or third party supplier providing a product or service. Value chain emission accounting draws on lifecycle analysis and follows a product from raw material to product or final disposal. These assessments can be highly complex and replicable methodologies are still being developed and tested (e.g. PAS 2050). Robust and standardized GHG accounting is beneficial for comparison across organization or products and also across time.

1.2. The UK music industry

This letter presents the key findings of a major study to scope the annual GHG emissions of the UK music industry (Bottrill *et al* 2008) and discusses how the findings have been used to inform and design campaigns to reduce music business emissions. The project was developed in collaboration with Julie's Bicycle, a non-profit organization formed by UK music industry business leaders, to develop a strategic response to significantly reduce GHG emission reductions across the music industry supply chain. In a highly competitive industry such as popular music, this type of coordinated approach is unusual, but provides the opportunity to build consensus and develop rapid strategies for a lower carbon future for this sector. This innovative industry-wide approach can be crucial for creative industries such as music where artists are amplified and influential voices, as well as pivotal tastemakers of popular culture connecting to their fans in symbolic and meaningful ways (Boykoff and Goodman 2009). In addition, a number of artists within the music industry are firmly committed to social and environmental issues, including Annie Lennox, KT Tunstall, Peter Dinklage, Radiohead, Sting, Coldplay and U2, but until efforts such as those of Julie's Bicycle, these artists did not have the coordinated support of their industry behind them.

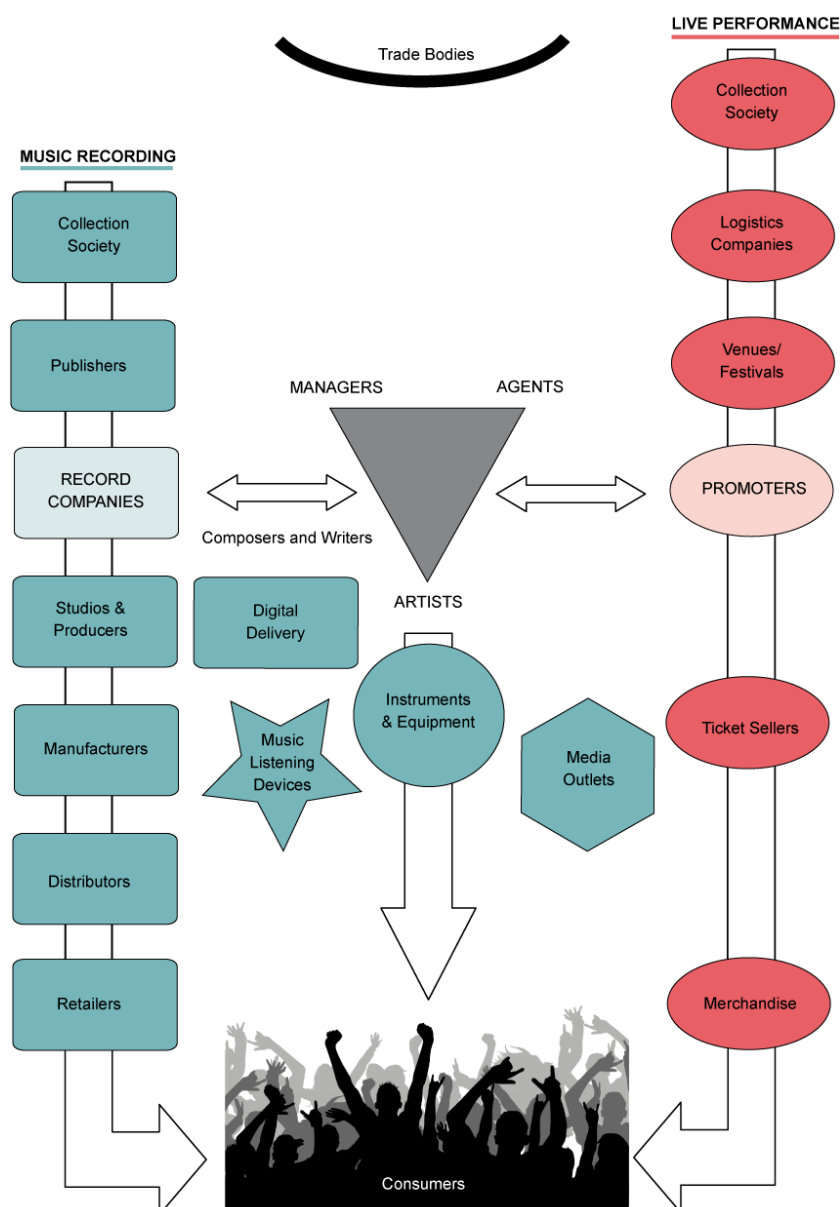


Figure 1. The UK music industry.

The UK music industry is a part of the ‘creative economy’, defined by the UK Department of Culture, Media and Sport as, ‘those industries which have their origin in individual creativity, skill and talent and which have a potential for wealth and job creative through the generation and exploitation of intellectual property’ (DCMS 2001, p 4). The music industry focuses on two main activities—music recording and publishing, and live music performance (figure 1). In both areas there are a handful of large international companies (e.g. Universal Records and Live Nation) and a large number of smaller independent companies with 97% (about 18 000 companies) in the sector classified as micro or small to medium-sized enterprises (Creative and Cultural Skills 2007a). There are approximately 100 000 people officially employed in the music industry and 30 000 people employed in music education (Creative and Cultural Skills 2007b). These official estimates do not capture well the large component of temporary

or part-time work generated by the industry. The UK has the highest per capita sales for music worldwide with approximately 134 million physical album sales and 86 million legally downloaded tracks sold on 2006 (BPI 2007). In recent years live music performance has thrived. In 2006 direct UK ticket sales generated £743 million (Mintel 2007).

The contemporary UK music industry is very dynamic with the traditional boundaries shifting between industry players whose business lies in the connecting the artist to the audience—managers, publishers, live promoters, or record labels. Companies that previously may only have focused on one aspect of the music market such as recording or performing are now offering, for example artists deals that combine recording, publishing, merchandising and touring. Furthermore, digital technology is changing every aspect of how the music business operates from how talent is discovered to how music is produced, recorded, promoted and retailed. In

addition, significant new business actors have become involved in the distribution of music such as Amazon, Spotify, Google and Apple. These new structures of the industry as well as the shifts in products and services provided all have implications for the GHG emission profile of the industry, and for where emissions reduction can most effectively be achieved.

2. Methodology

This scoping study set out to comprehensively investigate the annual GHG emissions of the UK music market across both music sales and live performance. A full carbon audit was deemed infeasible because of the difficulties in obtaining appropriate and accurate data from the full population of thousands of small companies. To therefore provide an indicative appraisal, we used a set of representative case studies of sector companies and activities (e.g. tour, festival, or arena concert) and then scaled-up based on the estimated number of each type and size of company and activities in the sector. We selected participants for the study from those who responded to a call to music companies in a leading trade magazine as well as through the Julie's Bicycle network and direct email. Data for the emissions assessment was primarily collected through a company and music festival energy survey designed specifically for the study. We also used company and touring carbon audit reports when available (typically prepared by environmental consultants with expertise in carbon footprinting) and conducted 33 unstructured informational interviews with music company chief executives and key informants. The results of these interviews and data collection from 100 companies and operations were used to develop an estimation of the UK music industry's GHG emissions (table 1). The data gathered from music companies was from a recent 12-month period (mostly in 2006 and 2007). In addition, some key secondary information and statistical sources were used. The First Step Report (Bottrill *et al* 2008) and accompanying technical note (Bottrill 2008) presents in detail how the case studies, together with informed assumptions, were used to derive GHG emissions estimates for each activity, sector and then the industry as a whole. Finally, the findings from the emissions analysis, interviews and relevant literature were used to identify key areas where reductions were most important and most easily achieved.

To frame the assessment, we drew on standards in the GHG Protocol, which is internationally recognized for accounting company emissions (WBCSD and WRI 2004). The GHG Protocol is designed to guide companies in engagement, measurement, reduction and disclosure of GHG emissions produced from business operations. Its focus is on the direct and indirect sources of GHG emissions created by business operations. Direct sources are defined as emissions resulting from fuel use and indirect sources as emissions associated with electricity, employee travel, third party suppliers, outsourced activities and waste. Important limitations of the GHG Protocol for an industry emissions assessment is that it is not designed for quantifying the emissions through the value chain of a product or service, neither can it be use to quantify the

Table 1. Data collected from industry sources.

Music industry activities	Energy data	Interviews
Agencies	2	2
Arenas	4	1
Artists (air travel)	5	—
CD distribution	2	1
CD manufacturing	1	2
Collection societies	2	—
Digital delivery	1	1
Education	5	1
Festivals	10	3
Management	5	3
Music media	Na	2
Merchandising	1	—
Orchestras	2	1
Promotion	7	4
Publishing	8	3
Recording—independents	2	—
Recording—majors	4	2
Retail	2	1
Studios	5	2
Tour trucking	1	1
Touring carbon audits	2	—
Trade bodies	4	3
Venues	25	—
Total	100	33

emissions embodied within materials nor those resulting from the use of a product or service.

The only value chain emissions included in the study were those associated with the production and distribution of CDs and audience travel to music event. These are integral emissions of the industry because of their relation to the main product (recorded music) and services (live performance) of the industry. The estimates for the GHG emissions associated with CD production, manufacturing, marketing and retailing are based on an in-depth lifecycle assessment done for a major record company in 1998/1999 for a high selling CD album (see the technical note for further details: (Bottrill 2008)). The audience travel GHG emissions were estimated through a scenario approach that defined different types of music events (small, medium, large venue and festivals) and made informed assumptions about the distance travelled in different transport modes (e.g. car, bus, train). We then used industry data on ticket sales for different events to extrapolate overall audience travel emissions. The technical note outlines all audience travel scenarios for different types and size of venue and festival music events. As illustration: for an arena music event it was assumed 6300 people per event, 60% travelling two-person per car of which a quarter travel 100 miles return and three-quarters travel 50 miles and then the 40% coming by public transport are travelling 30 miles return.

The music industry is an energy user rather than an energy producer and the most relevant GHGs are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Carbon dioxide is the most dominant gas released by the music industry with CH₄ and N₂O at much lower levels. The main GHG emissions sources from the industry are from the heating, lighting and powering of buildings (e.g. offices, music venues and retail outlets); from the manufacture of

CDs; from transport of music products and touring equipment; from international air travel of artists and staff; and from audience travel to live performances. The GHG emission conversion factors used in the study were those from Barlow *et al* (2001), Defra (2007), EEA (2000), IPCC-NGGIP (2000), Netcen (2003). The table of all the emission conversion factors applied in the study are given in the technical note (Bottrill 2008).

The UK music industry is diverse, international and fragmented with many activities occurring at the margins and overlapping with other sectors. Therefore, identifying a precise boundary for the music industry is not clear cut. This study defined a boundary for the GHG emission assessment to be those emissions produced as the result of the demand for music products and live performance by UK consumers. This meant, for example, that the GHG emissions from the manufacturing of CDs, which are done mostly in continental Europe, would be captured within the boundaries of the GHG emission assessment.

Our study included recorded music (record labels and companies; recording studios, CD supply chain (manufacturing, CD disc, packaging, distribution, and retail) and storage of the digital music master); music publishing; management, agent and promotion; UK live music performance (music venues, music festivals, tour logistics and audience travel); and collection societies and trade bodies. We do not, for the moment, analyse international recorded music sales and performance touring; music instruments and equipment; music listening devices (i.e. manufacturing, distribution, and customer use); non-music merchandise (i.e. t-shirts); music education and training; music media (print and digital); and community music projects. We excluded some activities because: (1) there was a lack of good data or it was difficult to collect; (2) it was difficult to set an international emission boundary and allocate a share to the UK; and (3) emissions would be better represented using the GHG emission boundary of the relevant contributing industry (e.g. electronics, education and media).

Before presenting the complete findings of the study, we provide an illustration of the approach taken for calculating the GHG emissions of the music industry activity-by-activity and sector-by-sector. For example, to calculate the GHG emissions associated with arena energy use, data was gathered through four arena case studies and statistics from the National Arena Association (NAA). For each arena case study the electricity and gas used in a recent 12-month period was obtained. The energy use was converted to GHG emissions using the UK 5-year rolling average electricity emission conversion factor ($0.523 \text{ kg CO}_2 \text{ kWh}^{-1}$, $0.008 \text{ g CH}_4 \text{ kWh}^{-1}$, $0.007 \text{ g N}_2\text{O kWh}^{-1}$) and the gas emissions conversion factors ($0.206 \text{ kg CO}_2 \text{ kWh}^{-1}$, $0.004 \text{ g CH}_4 \text{ kWh}^{-1}$, $0.008 \text{ g N}_2\text{O kWh}^{-1}$) as published by Defra (2007). We determined that the emissions from the arena case studies ranged from 1100 CO₂e to 2200 CO₂e per annum. In 2007, the 17 member arenas in the NAA have a capacity ranging from 5500 people (the Royal Albert Hall) to 23 000 (the London O2 Arena) people. Therefore, for arenas with a capacity of less than 7000 people the per annum GHG emissions assumed was

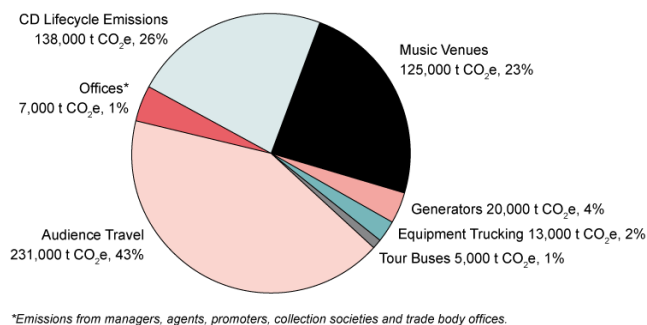


Figure 2. GHG emissions per annum from the UK music market: recorded and live performance totals at least 540 000 t CO₂e.

1100 t CO₂e; for arenas between 7000 and 12 000 people it was 1700 t CO₂e; and for arenas with over 12 000 people it was 2200 t CO₂e. The final step for estimating the total annual GHG emissions associated arena-based music events was to allocate only 56% of these emissions to the music industry as the NAA reports that only 56% of arena events are music rather than, for example, sporting events (Bottrill 2008).

3. Findings

3.1. Overall emissions

We estimate the greenhouse gas emissions of the sale of music products and live music performances to UK consumers at least 540 000 t CO₂e per annum. Approximately three-quarters of the industry's GHG emissions are attributable to the live music performance sector and approximately one-quarter to the music recording and publishing sector. The major GHG producing activities are audience travel (43%), live venue music events (23%), and music recording and publishing (26%), with smaller contributions from music festivals (5% excluding audience travel) and music organizations (1%) (figure 2). We have not placed uncertainty or error bars around these estimates for this initial study but are involved in benchmarking assessments of the industries activities that will allow some quantification of uncertainty in the future.

3.2. Live music performance

Previous reports have overlooked the overall role of live music performance in industry emissions, especially the overall impact of performances at venues and festivals. There are more than 2200 music venues and 500 music festivals each year, not including the hundreds of music performances in bars, hotels and restaurants. For live performance we estimated the greenhouse gas emissions from venues energy use, festival generator use, equipment trucking, tour buses and audience travel. Based on the case studies and estimates of overall attendance, we calculate that GHG emissions from live music events in venues and at festivals is upwards of 400 000 t CO₂e per annum at least including audience travel. This is two-thirds of the UK music market's total GHG emissions. If the GHG emissions of a music event for venue energy use, touring logistics and audience travel are allocate on a single

ticket basis, the average emissions embodied in an event ticket is approximately 5 kg CO₂e for a music venue, 18 kg CO₂e for an arena, and 25 kg CO₂e for a festival. At least two-thirds of those GHG emissions associated with a music event will likely be the result of audience travel, especially if the car is the predominant audience travel mode.

3.2.1. Emissions associated with venue-based live performance. For venue-based live performance we estimate that about 75 million tickets are sold for live music performances at more than 40 000 events in the UK each year ranging from a music event attended by a few hundred people in a small music venue to a concert at an arena with an audience of over 10 000 people. About a third (32%) of live performance GHG emissions is associated with energy used at the venues (125 000 t CO₂e per annum). Audience travel to music events at venues totals 175 000 t CO₂e per annum of which car travel is estimated to be over half (58%) of the GHG emissions.

The study calculates that touring trucks and buses produce about 13 000 t CO₂e per annum in supporting the estimated 3000 plus UK-based artist venue-based tours happening annually (note: figure 2 has presented trucks and tour buses findings in general rather than split between venue or festivals). Two-thirds of these emissions are associated with the trucking of equipment and one-third is from artist tour buses. We estimate a UK arena tour doing 10 shows (6300 people per show) requiring two articulated trucks and two tour buses each travelling 2000 miles will result in at least 15 t CO₂e. At the other end of the spectrum, we estimate a UK club tour doing 12 shows (500 people per show) where all the band and equipment travel in a van also travelling 2000 miles will result in less than half a tonne of CO₂e. The main factors affecting touring production GHG emissions are cost, time, and practicalities around the availabilities of venues, artists, and crew, and therefore this may not result in the most environmentally optimal routing or modes of travel.

3.2.2. Emissions associated with festival-based live performance. For festival-based live performance we estimate there are in the order of 5 million tickets sold in total from the 500 licenced music festivals in 2007. We estimate festivals produce in the order of 84 000 t CO₂e per annum. The main GHG emissions associated with festivals are on-site generators (the majority of festivals cannot use mains power as they are on greenfield sites so have to install diesel power generators to meet all the power needs required for the event); trucking; tour buses; and audience travel within UK (we have not estimated international audience travel to UK events). Audience travel is found to be the most significant emission source for all festival categories producing at least two-thirds (57 000 t CO₂e) of CO₂e emissions. The largest on-site (i.e. non-travel related) source of GHG emissions produced by festivals is from diesel fuel used in power generators. The total GHG emissions from the diesel generators used for powering the 500 festivals is estimated at nearly 20 000 t CO₂e. At the individual festival level the study estimates a large festival to produce almost 2 000 t CO₂e; a medium festival to be about 500 t CO₂e; and a small festival to be close to 100 t CO₂e.

3.2.3. Emissions associated with live music companies. Music management, agency, promotion companies as well as collection societies and trade bodies undertake the core business activities of the industry. There are a handful of large companies and organizations, but the majority of them are small companies with two to twenty employees and there are a great number of sole traders. The GHG emissions of these companies' business activities for the UK music market are primarily the result of office building energy use, which combined are estimated to be approximately 7000 t CO₂e per annum.

3.3. Music recording and publishing

The study found that GHG emissions produced through the supply chain from the creation to the sale of music to be at least 138 000 t CO₂e per annum (table 2). Our analysis is based on the 2007 UK sales figure of 134 million albums, more than 90% of which were sold as a physical CD format. The average CD album sold in the UK results in just over 1 kg CO₂e from recording, manufacturing, packaging, distribution, transport and promotion (table 2). There are three key areas where the cumulative GHG emissions from CDs are particularly significant—packaging, distribution and retailing. CD packaging and booklet contributes to over a third (53 000 t CO₂e) of music recording and publishing sector's emissions, and one-tenth of the estimated total emissions for the UK music market (540 000 t CO₂e). In addition, the office energy use for the business operations of record company and publishers is at least 15 000 t CO₂e per annum.

4. Implications and response

Our research identified a number of exemplary and innovative practices taking place within the industry to reduce energy use and emissions. But these are generally limited in scale. For example, we found examples of auditing of energy use and carbon emissions; carbon disclosure; improving energy efficiency in buildings; purchasing renewable electricity; photovoltaic powered recording studios; biodegradable CD packaging; a green festival awards scheme; combined coach and festival tickets to reduce car use; biodiesel powered generators; LED stage lighting; staff green teams; and the use of hybrid/low emissions cars and taxis. However, only a very small number of companies have appointed dedicated staff with responsibilities for developing and coordinating carbon reduction and energy saving strategies.

From the findings of this study the music industry identified three initial campaigns to prioritize its emission reduction efforts: CD packaging, music venues and audience travel (Bottrill *et al* 2008). For the CD packaging campaign a group of record labels have committed to GHG emission reduction by switching from plastic jewel case to low carbon-based packaging options. This is based on further in-depth research on CD packaging (Arup, ECI and Julie's Bicycle 2009). For the venue campaign a group of music venues (i.e. clubs, theatres, arenas and stadium) have committed to measure and reduce building energy use through improved

Table 2. GHG emissions in the CD album supply chain (per album and 2007 album sales).

Stage of CD lifecycle	g CO ₂ e/CD album	Per cent/CD album	Total t CO ₂ e, CD albums 2007
Recording studio			10 000
Energy emissions	37	3%	
Waste emissions	3	<1%	
Manufacturing			75 000
Energy emissions	100	9%	
Materials lifecycle emissions (excl. CD packaging)	100	9%	
Plastic jewel case and clear tray	376	34%	
Paper booklet and insert card	64	6%	
Waste emissions	6	1%	
Marketing—office energy emissions	114	10%	10 000
Distribution			22 000
Transport from factor to distribution centres	76	7%	
Transport distribution centres onwards	51	5%	
Transit packaging	7	1%	
Waste emissions	28	3%	
Retail—store energy emissions	132	12%	16 000
Record Label and Publishing			5 000
Office energy emissions	2	<1%	
Business office waste emissions	1	<1%	
Promotion			
Business hotel emissions	7	1%	
Business train and taxi travel emissions	2	<1%	
Business air travel emissions	5	<1%	
Total	1111 = ~1 kg	100%	138 000

energy management practices as well as investment in refurbishment. Furthermore, because there is poor data available for benchmarking energy performance of music venues, energy data is being pooled to be able to develop benchmarks appropriate to cultural sector venues. In addition, a number of venues are piloting a new accreditation scheme for GHG emission reductions (the Julie's Bicycle Industry Green certification label). For the audience travel campaign an in-depth study of audience travel behaviours and patterns to UK festivals was undertaken (Bottrill and Papageorgiou 2009) and will be followed by a study of venue-based audience travel. From this evidence base a strategy and information resources will be developed to join-up music promoters, travel operators, local government authorities and the audience to reduce travel emissions. Julie's Bicycle is also undertaking an in-depth piece of research investigating the GHG emissions impacts of UK-based artists touring within the UK and globally and how the touring supply chain might reduce these impacts.

5. Conclusions

Climate change, a collective action problem, requires multi-actor and multi-strategy approaches to effectively transition to a low carbon society. In the public sphere within which climate science and its politics finds meaning in our everyday lives, the boundaries between who constitute 'authorized' speakers (and who do not) is consistently being interrogated, challenged, and expanded (Gieryn 1999, Eden *et al* 2006). Such developments have direct and growing implications on the changing architecture of the cultural politics of climate

change, providing opportunities to reach places where many citizens reside, both discursively and materially.

The actions of the UK music industry to reduce GHG emissions provide a case study for more effective decision-making by business and government. But also perhaps more significant is that the actions of music industry have important symbolic value because this culture industry plays such a vital role in shaping consumer desires and behaviours. The actual and symbolic value of their efforts is especially relevant given the influence the music industry has with young people, who will inherit the contemporary climate challenge. However, as many business sectors are learning, actions on climate change cannot be tokenistic, they must take serious actions if meaningful results are to be achieved. In the case of the music industry this means reconstructing its supply chain to place sustainability as a guiding principle so that its goods and services have a minimal environmental impact. It also means effectively communicating these sustainability efforts to their consumers.

It is in this context that this GHG emission assessment of the UK music industry has helped to facilitate the decision-making by music industry leaders on how to respond to climate change. First, it has helped build understanding and relevance of the climate change issue to the music industry. Second, it enabled the identification of priority areas where reduction efforts should be focused if the industry wants to tangibly reduce GHG emissions. And third, it has provided an evidence base to galvanize music leaders to work in cooperation for the common purpose of acting on climate change. This approach of drawing together the commitment of music leaders with the science at it relates to industry will help to create the

structures and processes, as well as business models, that can most effectively support the climate response of the creative community. Furthermore, it will be through this cooperative process that the music industry will be able to assert its cultural leadership to support the social transformation towards a low carbon society.

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Note added. To read the full study upon which this article is based see Bottrill et al (2008). There is also an accompanying technical note with details of the how findings were derived. These are available from the Julie's Bicycle website: www.juliesbicycle.com.

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