JULIE'S BICYCLE ***

TAKING THE HEAT OUT OF MUSIC

REPORT

First Step
UK Music Industry Greenhouse Gas Emissions for 2007

"The UK music industry is a pivotal cultural and creative industry, nationally and internationally; it therefore has the power – and the responsibility – to be a proactive leader in taking and driving climate change action"

Conducted by

UNIVERSITY OF OXFORD

ENVIRONMENTAL CHANGE INSTITUTE

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JULIE'S BICYCLE ✱✱✱✱
TAKING THE HEAT OUT OF MUSIC

The Board of Julie's Bicycle would like to thank the following:

Catherine Bottrill for her herculean determination to complete a thoroughly challenging piece of research so well, Geoff Lye for continuing wisdom, expertise and generosity, and Diana Liverman for faith and finality.

Also thanks to Max Boycoff (ECI), Will Moore (Sustainable Touring), Malcolm Carruthers, Andrew Haworth (Live Nation), Gavin Starks, Helen Heathfield and Julia Haltrecht (Julie's Bicycle).

Key

1000 g = 1 kg

1,000 kg = 1 metric tonne

t = tonne

~ = approximately

GHG = greenhouse gas

CO_2e = carbon dioxide equivalent

CO_2 = carbon dioxide

CH_4 = methane

N_20 = nitrous oxide

First Step
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REPORT

Table of Contents

Forewords – Jazz Summers and Diana Liverman 2

Executive Summary 4

Section 1: Climate Change & Energy Use 9

1.1 Overview 9

1.2 GHG Emissions and Energy Use in the UK 12

Section 2: Context – The UK Music Industry . 17

2.1 Overview 17

2.2 Industry Transformation 17

2.3 Sector Trends and Issues 17

2.4 Summary 20

Section 3: Research Approach and Methodology 21

3.1 Overview 21

3.2 GHG Protocol 21

3.3 Setting the Study Boundaries 22

3.4 Data Sources 25

3.5 Data Assumptions and Quality 26

3.6 Summary 27

Section 4: Emissions from Music Recording and Publishing for the UK Market 29

4.1 Overview 29

4.2 CD Packaging 29

4.3 Studio Recording 33

4.4 CD Manufacturing 33

4.5 CD Distribution 34

4.6 Music Retailers 34

4.7 Hidden GHG Emissions in the CD Supply Chain 35

4.8 Digital Music Downloads 36

4.9 Record Companies & Labels 37

4.10 Music Publishing 39

4.11 Summary 39

Section 5: Emissions from Live Music Performance for the UK Market 41

5.1 Overview 41

5.2 Music Venues 43

5.3 Audience Travel 44

5.4 Tour Logistics 46

5.5 Music Festivals 48

5.6 Management of Live Music Performance 52

5.7 Summary 53

Section 6: Emissions from International Touring and Industry Air Travel 55

6.1 Overview 55

6.2 International Touring by UK Artists 55

6.3 Air Travel of Record Companies & Labels 58

6.4 Air Travel of Management, Agency and Promotion Companies 58

6.5 Summary 59

Section 7: Issues, Observations & Recommendations 61

7.1 GHG Emissions of the UK Music Industry 61

7.2 GHG Emissions of the UK Music Industry in Context . 62

7.3 Key Issues and Constraints 62

7.4 Concluding Observations 64

7.5 Recommendations 64

7.6 Taking the Research Forward 65

Section 8: References 67

Contributors 70

Acknowledgements 71

Appendix 72

GHG Emissions Conversion Factors 72

List of Figures, Tables and Information Boxes 72

Foreword
Jazz Summers

Since Al Gore's masterpiece of docudrama, An Inconvenient Truth, people have woken up to the implications of climate change. Al Gore did a superb job explaining the science in a way that is entertainingly terrible. Shortly afterwards, Alison Tickell came to me with an ambitious vision to get the music industry moving on climate change, and the rush of energy and urgency that I felt had a focus: we pulled together a board of like-minded people from across the industry and established Julie's Bicycle.

This report is the first step in the journey that Julie's Bicycle has embarked on: to find a path for the music industry to reduce its own carbon emissions and thus make a contribution to solving what is the most serious issue of the time.

The research has given us an insight into the constraints and the opportunities that are inherent in tackling climate change. We have encountered the difficulties presented in finding rigorous and useful information on energy use in all the activities of our highly complex industry. As you will see in this report many of these issues are contrary and uncertain. But nevertheless the subject requires us to act in good faith and optimism.

The music industry is often viewed from the outside as disjointed and fiercely competitive, but on this issue we have come together. Julie's Bicycle has discovered that consensual and cooperative leadership within the industry is alive and well. JB (as Julie's Bicycle is often known) has brought together, in our Board and our Working Group, a motivated and authoritative group of almost 30 senior leaders from across the industry who are committed to finding solutions – even when it means putting competitive edge to one side.

On the basis of this report we are developing practical and effective carbon reduction programmes.

Commitment from the music industry is high and together we are:

- *reaching agreements on emission reduction targets, working with artists, managers, agents, promoters, record companies, publishers, collection societies, trade bodies, manufacturers, not-for-profits and community organisations and educators – in fact the whole supply chain from the creative idea to the final product;*
- *providing the music industry with evidence-based knowledge of, and solutions to, energy reduction and climate change;*
- *providing environmental audits;*
- *developing a grants scheme.*

We are learning all the time. We don't claim to have all the answers but we do want to make a difference, and be part of an industry that is prepared to change itself and leave a legacy of positive action for future generations as music has, so often, prompted in the past.

Jazz Summers
Chair, Julie's Bicycle

Foreword
Professor Diana Liverman

The scientific community has identified an urgent need to reduce greenhouse gas concentrations in the atmosphere if we are to reduce the risks of dangerous climate change. The UK has taken a lead in both public and private sector commitments to reducing greenhouse gas emissions and it is clear that this will require innovation based on careful analysis across all sectors of the economy. Oxford's Environmental Change Institute has made the study of climate change, climate policy and lower carbon energy futures a major focus of our current research. We think it is important that the scientific community partners with key stakeholders, such as we have established with the music industry, to undertake research and help shape responses to climate change.

From our perspective, the UK music industry excels in inspiration, creativity and communication. It has been a pleasure to collaborate with them to exchange our technical expertise for their insights and environmental commitment within such a culturally influential industrial sector.

The opportunity to partner with the music industry on this report ' First Step' gave ECI an unprecedented opportunity to understand an influential sector of the UK economy with a global reach, high profile, and a commitment to analyzing and reducing its carbon emissions. Julie's Bicycle, led by Jazz Summers and Alison Tickell, took the initiative to commission and raise funds for the study. They worked closely with us, along with the Board of Julie's Bicycle, to frame the research questions, provide access to data and informants, and to ensure that we communicated our results in ways that are useful to the music industry while maintaining high scientific standards.

It is important to emphasise that this study is the first analysis of the carbon emissions of the UK music industry; much of the data needed for a detailed analysis across the value chain had not been collected and aggregated before. We need to be aware that the results are indicative and will inevitably require revision over time. We welcome any comments as to how we could improve the technical analysis and expand our database and boundaries for the study.

One of the most rewarding aspects was the enthusiasm shown by music industry representatives and their willingness to act on some of the recommendations to reduce their energy use even in advance of publication. For example, the Julie's Bicycle Working Group has created a space for cross-industry joint action on climate change. This study has created a strong partnership between researchers and the music industry that opens up avenues for future collaboration on climate change. Oxford's Environmental Change Institute is part of several national initiatives that are potential partners for the industry, including the UK Climate Impacts Programme, the UK Energy Research Centre, the Tyndall Centre for Climate Change, the James Martin 21st Century School and the Smith School for Enterprise and Environment.

The authors are grateful to those who provided data to the study and to those from the Tyndall Centre and the Environmental Change Institute who were willing to undertake peer review of the report. I want to personally acknowledge the outstanding work of Catherine Bottrill who took on the role of lead researcher for ECI, going far beyond the call of duty (and the hours we had originally planned for the study). Geoff Lye's experience in understanding the business case for sustainability was invaluable, and Max Boykoff helped to frame and edit the report with great insight. I am also grateful to the Julie's Bicycle energy team in working with us to collect data and engage with music companies on this foundational study.

We hope that our academic colleagues will find this as fascinating a case study of carbon emissions in an industrial sector as we have, and that it will contribute to the wider understanding of patterns of emissions and paths to lower carbon futures in the UK and elsewhere.

Professor Diana Liverman,
Director, Environmental Change Institute,
Oxford University

Executive Summary

First Step
UK Music Industry Greenhouse Gas Emissions for 2007

1. Background and Introduction

1.1 Climate change is the defining environmental issue for the 21st Century. It will require a radical transformation of society's relationship to energy use and resource consumption. The best estimates of action needed to prevent catastrophic climate change require that CO_2 emissions – the principle greenhouse gas (GHG) – must be reduced by 60–80%[1] by 2050; these emissions are mainly generated by the combustion of fossil fuels.

1.2 The United Kingdom has committed in its Climate Change Bill to reduce greenhouse gas emissions by at least 60% from 1990 levels by 2050[2]. Transforming to a low carbon emissions society will involve:

- Energy conservation and efficiency;
- Switching to renewable and alternative energy sources;
- Embracing innovative, low carbon technologies;
- Regulatory and market instruments to promote behaviour change.

1.3 Emerging international, national and regional legislation is clearly signalling a global policy commitment to shift energy use so that citizens from all countries understand the environmental and social costs of GHG emissions. This in itself, however, is unlikely to be radical or fast enough to deliver the scale of emissions reductions needed. Progressive companies are already acknowledging this by taking climate mitigation actions unilaterally and voluntarily.

1.4 The UK music industry is a pivotal cultural and creative industry, nationally and internationally; it therefore has the power – and the responsibility – to be a proactive leader in taking and driving climate change action. If the industry commits to becoming a climate leader, it needs to ensure, as a first step, that its own commitments are aligned with emissions reduction targets. Julie's Bicycle is developing as an industry collaboration which aims to catalyse a sector-wide strategic response, starting with an understanding – and progressive management of – its own carbon footprint.

[1] As recommended by the Intergovernmental Panel on Climate Change and Stern reviews (IPPC 2007a; Stern 2006).
[2] The UK Government on 18th February 2008 announced a statutory review of the 2050 CO_2 emission reduction target to strengthen the Bill to set an 80% emissions reduction target (Defra 2008).

2. Research Aims and Methodology

2.1 In July 2007, Julie's Bicycle commissioned a scoping study by Oxford University's Environmental Change Institute to:

- Develop indicative estimates of the annual GHG emissions of the UK industry across its core sectors and activities;
- Identify the key blockages and opportunities for reducing GHG emissions;
- Make initial recommendations for specific actions and priorities for the medium term.

2.2 The study's primary focus was on the GHG emissions produced from the demand for music products and live performances by UK consumers, including artist management, agency & promotion; live performance; recording; publishing; distribution; retail; and collection societies (including trade bodies). The UK music industry is, however, a global industry with over £6 billion in consumer spending per annum[3]. An initial impression of the scale of emissions from international touring was therefore included within the brief.

2.3 Activities linked to the music industry, but beyond the scope of this first phase of research were: music listening devices; merchandising; music instruments and equipment; music education; and music media.

2.4 The boundary set for this first research phase was to estimate GHG emissions resulting from building energy use, CD manufacturing and transportation. The study:

- Collected and analysed data from over 100 industry sources;
- included 100 case studies of energy use by business activities across the recording and live music performance supply chain;
- gathered data from a cross-section of large and small businesses across the industry in order to develop a representative picture of the industry in its current form;
- interviewed over thirty chief executives and key informants to gather qualitative data on what music companies are currently doing to address climate change and what they perceive as possible in the short to medium-term.

3. Key Findings

3.1 The industry is categorised as a service sector with some manufacturing and is not therefore characterised as energy or carbon intensive. The main GHG emissions sources of the industry are from using fossil-based energy and materials for the heating, lighting and powering of buildings (offices and music venues); for the manufacture of CDs; for trucking music products and touring equipment; for international air travel of artists and staff; and for audience travel to live performances.

3.2 The study finds that the sale of music products and live music performances to UK consumers is currently creating at least approximately 540,000 t CO_2 equivalent[4] a year. To put this in perspective, annual emissions at this level are roughly equal to the average annual emissions of a town of 54,000 inhabitants or the annual emissions from 180,000 cars[5].

3.3 For the UK music industry to reduce emissions from the consumption of music products and services to UK consumers by at least 60% means annual emissions should be no higher than ~200,000 t CO_2e. An 80% reduction would require emissions to be cut to just ~100,000 t CO_2e per year.

3.4 The breakdown between the key emission sources by activity are approximately as shown below:

UK MUSIC MARKET GHG EMISSIONS IN BRIEF – 2007:

- Recorded Music – 134 million albums were sold in the UK, approximately 90% of which were sold in the CD format. The average GHG emissions per CD album from recording through to retail are approximately 1 Kg CO_2e

- Live Performance – In the order of 75 million tickets are sold annually, 90% are venue-based and 8% are music festivals. There are ~2,200 venues in the UK regularly playing live music and almost 500 festivals annually. A music venue with a capacity of 2,000 people is likely to produce over 400 t CO_2e per year. A large music festival (more than 40,000 people) including audience transport will produce in the order of 2,000 t CO_2e.

- Live music performance sectors together with audience travel account for three-quarters (~75%) of the UK music industry's GHG emissions. Recorded music sectors account for a quarter (~25%) of GHG emissions.

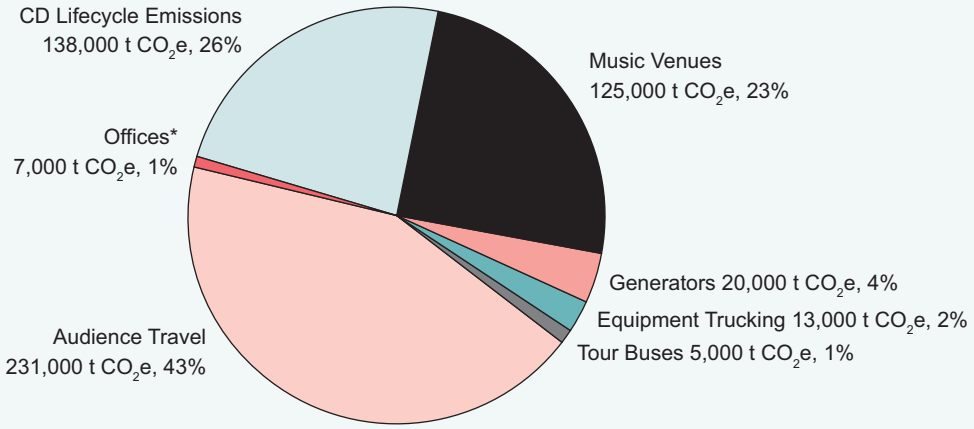
[3] Creative & Cultural Skills and DCMS

[4] CO_2 equivalence measures all GHGs and converts them to their equivalent global warming potential

[5] The UK annual average per capita emissions are ~10t CO_2 (CDIAC, 2007). The UK annual average mileage of all cars is 8,770, which result is 3t CO2 per car if assuming it is an average petrol car (DfT. 2007).

As seen in Section 7, figure 7.1

Figure 7.1: GHG emissions per annum from the UK Music Market: Recorded and Live
Total GHG emissions = ~ 540,000 t CO_2e



**Emissions from managers, agents, promoters, collection societies and trade body offices.*

INTERNATIONAL TRAVEL AND TOURING GHG EMISSIONS:

- There is limited data available on international touring. An initial estimate for USA and European Rock and Pop touring by UK artists, inclusive of audience travel, puts these emissions at, at least 400,000 t CO_2e per annum.

- Air travel is conservatively estimated to be at least 16,000 t CO_2e per annum generated from the travel of industry employees.

3.5 The most significant components of the industry's carbon footprint – which should be priority areas for the industry to address – are:

- CD packaging
- Venue energy use
- Audience travel (*This is an indirect emission source and part of the value chain so not the exclusive responsibility of the music industry)*

4. Key Issues and Constraints

4.1 The indicative estimates of GHG emissions come with a health warning.

The estimates are based on the data currently available from music companies. Many companies were willing to input information to this study, but in many cases they did not have sufficiently accurate energy data available to quantify GHG emissions[6]. The music industry is at the beginning of the learning process in energy and carbon management. Indeed, most companies are not yet systematically collecting and analysing the information needed to accurately quantify and monitor – let alone manage – the GHG emissions produced from their business activities.

4.2 The fragmented nature of the industry presents problems in data collection and coordination of an industry wide response.

At one end of the business spectrum the industry is highly consolidated (recording, publishing, promotion and agency). As a consequence across the recording and live performance sectors the majority of products and services are sub-contracted, such as CD manufacturing and trucking logistics. At the other end the industry is characterised by thousands of small-to-medium enterprises (SMEs) and sole traders. Individually, these companies have small emissions profiles, but collectively their emissions become significant. This sets particular challenges for industry prioritisation and collaboration on climate but initial industry soundings elicited enormous enthusiasm for coordinated action.
A collaborative and shared knowledge base response will reduce the risk of any one company or sector, and ensure a more effective and rigorous action plan. The industry needs to work together in its response to climate change to have the greatest concentrated impact and ensure the mainstreaming of positive efforts.

4.3 ***The emissions boundaries set for this study do not include the industry's full global impacts.***

The industry is global in its business activities and so are its emissions. For example, the majority of CD and musical instrument manufacturing is done in continental Europe and Asia respectively and international touring is precisely that – international. This research set the boundaries by including emissions which result from decisions made in the UK.
It will be important over time to understand the full global emissions which result from the UK music industry's activities.

[6] It should be noted that this study does not represent a formal audit of the industry's carbon footprint.

4.4 ***The shift to digital will significantly alter the industry's lifecycle GHG emissions profile over the coming years***.

These changes will result in the greater proportion of GHG emissions coming from indirect sources; for example, the energy used by servers hosting digital music; the embodied carbon in the materials of music listening devices; and audience travel to and from live music performances. An industry-wide climate positive strategy needs to recognise and anticipate the changing shape of its emission profile. The industry will need to work with other industries (e.g. manufacturers of music listening devices) and consumers to ensure its products and services are measured, and result in minimal GHG emissions. Work needs to be done that takes into account consumers' patterns, notably in music downloading and music on demand.

4.5 ***The music industry is exposed to a high level of media scrutiny, which can discourage public statements on climate change action.***

The issue of climate change is complex and scientific and technological responses are constantly evolving. The industry needs reliable, up-to-the-minute and authoritative advice on measures to tackle change so it does not fall behind latest best practice and risk being pilloried for choices which are seen in hindsight to have been flawed.

4.6 ***There are already a number of exemplary and innovative practices taking place within the industry, but these are generally small in scale and at the single company level.***

These include: auditing energy use and carbon emissions; carbon disclosure; purchasing renewable electricity; photovoltaic powered recording studios; biodegradable packaging; green festival awards scheme; combined coach and festival tickets; biodiesel power generators; LED venue and stage lighting; staff green teams; hybrid/low emission car and taxi use; rationalised travel (including flights) and energy efficient venues and office buildings.

5. Concluding Observations

5.1 **The UK music industry is not carbon intensive but still will find reducing GHG emissions by 60-80% a challenge.** It is currently not well prepared to deliver this level of climate responsibility. There is a growing understanding in the industry that it faces both commercial and moral imperatives to act on climate change.

5.2 **The business case for action is rooted in the inevitability of costs which will attach to GHG emissions** as carbon regulation, taxes and trading progressively penalise carbon emissions; equally there will be positive savings and intangible benefits to businesses which reduce their carbon footprint. Furthermore, climate responsible companies find competitive advantage with their stakeholders (especially consumers and increasingly their own staff).

5.3 **The moral case reflects the power this particular industry has to influence society more generally** through its cultural leadership and role modelling. With this power comes the opportunity – and arguably the responsibility – to set an example by mitigating its own emissions and encouraging climate responsibility among its global audiences.

5.4 **The industry is made up of many small companies and sectors. The sum total creates a latent mass of interconnected power.** There are several factors which inhibit the exercising of that power to tackle climate change, the most significant being that no single company or sector can afford to over expose itself to financial or branding risks. If the industry acts together within and across sectors the risk will be minimised and the effect will be greater. In addition strong industry support needs to be given to industry champions so that they are not acting in isolation.

5.5 **Energy management is the first step towards carbon disclosure**, whereby companies produce an annual statement of their carbon emissions with forward-looking reduction targets and strategies. This is becoming standard practice for corporate accountability. The music industry could take a lead by being prepared and willing to participate, pre-regulation, in this transparency process.

6 Recommendations

6.1 On the basis of this study, it is clear that there **is widespread support for coordinated industry actions on climate.** As first steps towards climate leadership, it is recommended that the industry agree both short and medium term goals.

6.2 In the short term, it is proposed that **reducing the industry's own carbon footprint should be the clear priority**. This should include:

- Undertaking regular greenhouse gas emissions audits of business activities.
- Committing to joint action, whereby the industry is able to take collective decisions, recognising that the sum is greater than its parts, and that new climate commitments are inhibited by a perception of individual company risk.
- Managing building energy use, especially of music venues, offices and retail stores to target energy savings and low carbon technology investments by developing GHG/energy accounting systems similar to financial accounting systems.
- Switching to a green (i.e. low carbon emissions) electricity tariff or, better still, 100% renewable energy sourcing.
- Improving the availability and quality of data, especially in the area of live music performance (in the UK and internationally).
- Creating a variety of travel schemes, and working with local authorities, travel companies and events organisers to reduce audience transport emissions.
- Moving to low emissions CD packaging.
- Identifying and investing in low carbon business opportunities.
- Organising regular training, knowledge sharing and advice on environmentally responsible choices (best practice, procurement, innovative business models) between companies, artists and staff across the industry.
- Engaging suppliers in GHG emission reduction programmes, including as a first step requesting information on their own carbon footprints.
- Developing strategic partnerships for joint action – e.g. Greater London Authority Climate Change Action Plan.

6.3 Within these programmes, it is recommended **that 'beacon' commitments should be made to demonstrate real commitment and achievable quick wins.** Initial proposals include:

1) Switching to green (i.e. low carbon emissions) electricity tariff or, better still, a 100% renewable energy sourcing.

2) Exploring an industry-wide initiative on low carbon CD packaging.

3) Installing low carbon lighting (eg LED) in live music venues.

4) Identifying, and highlighting all options for beacon travel plans for event goers, especially those already operating, as well as transferring music companies' taxi contracts to 'green' suppliers.

6.4 In the medium term, **the industry should identify its 'levers of influence'** and use these to effect policy interventions and public education on climate. It will be essential to establish credibility for moving in this direction by delivering a serious and visible set of programmes to reduce its own carbon footprint. Leadership through practical demonstration of actions to reduce GHG emissions will be more lasting and meaningful than only artist led campaigns.

6.5 The music industry is centrally influential in lifestyle choices and therefore has **an opportunity to be an important leader in the transformation to a low carbon economy**, as emissions are closely tied to decisions on lifestyle. As a service industry, it could and should be an exemplar in the UK and internationally for demonstrating how business works in partnership with its sub-contractors and customers to transform its products and services; to minimise the emissions generated; and to bring an amplified voice for changes in the energy infrastructure and for a drive towards a low carbon economy. The mobilisation of the industry's critical mass will be key to its becoming a climate leader.

Section 1: Climate Change & Energy Use

1.1 Overview

Climate change is the defining issue of the 21st century. Most scientists agree that heavy reliance on carbon-based sources for energy over the past century and a half has produced a warmer climate: if we do not reduce our emissions of greenhouse gases (GHGs) the climate will continue to warm, accompanied by rises in sea levels, damage to ecosystems and, eventually, critical shortages of resources such as water and food (see Box 1a). Avoiding dangerous climate change requires major re-organisation of the energy system and the economy – innovations in infrastructure, markets, technology and behaviour (see Box 1b).

All the solutions – whether imposed by government or emerging from the private sector – need to be ambitious. If we are to prevent dangerous climate change, we may need to reduce greenhouse gas emissions (usually termed mitigation) by 60–80% from present levels by the middle of this century. The Stern Review, commissioned by the British government and published in 2006, estimated that with prompt action the costs of dealing with climate change could be limited to approximately 1% of the current global Gross Domestic Product (GDP) each year and could avoid damages that might be as much as 20% of global GDP (see Box 1c).

Industry has a vital role not just in reducing its own emissions, but as a catalyst for change. Businesses have tremendous potential to influence suppliers, retailers and consumers. By taking the initiative industry can influence government policy, gain consumer confidence, and learn how to operate successfully in a lower carbon world. The UK music industry is poised to seize this opportunity and – importantly – make its voice heard in discussions about legislation to deal with climate change that will inevitably have an impact on the music business.

In this report, we identify opportunities for reducing greenhouse gas emissions in the music sector based on the first comprehensive attempt to estimate the industry's energy and emissions profile. The emphasis here is on real and lasting commitments within the music industry, from which inspiration and enthusiasm will emanate to other segments of society.

Box 1a What is Human Induced Climate Change?

The climate on planet Earth is moderated by the input of energy from the sun and the loss of this energy back into space. GHGs prevent the loss of some energy and warm the atmosphere. These gases include Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), tropospheric ozone (O_3), halocarbons (CFCs, HFCs, HCFCs) and water vapour (H_2O_v).

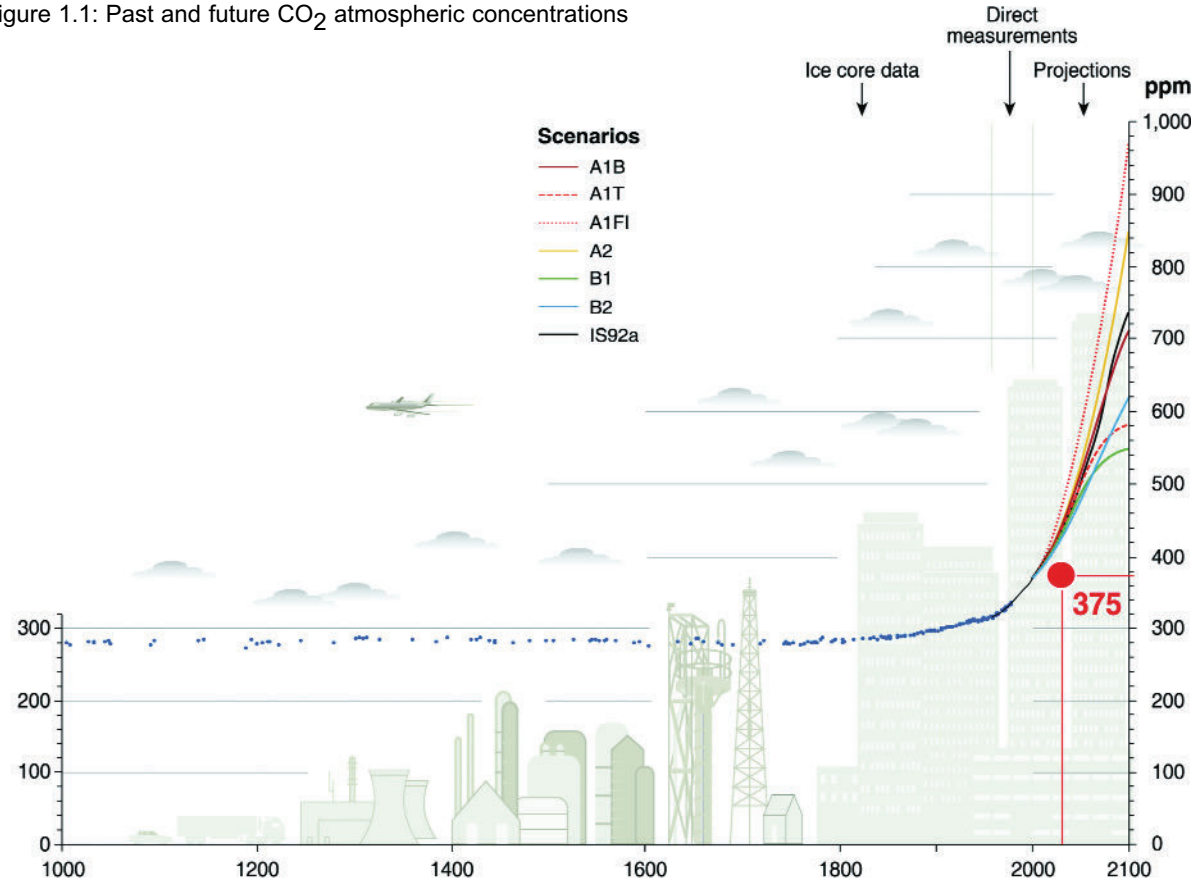
Gases have varying abilities to trap outgoing energy and to linger in the atmosphere. Each gas can be denoted with an atmospheric 'warming potential', which is greater for a molecule of methane than carbon dioxide for example. Many of the GHGs emitted into the atmosphere stay there from around a century on average (for CO_2) to a millennium (for CFCs). CO_2 emissions from the Model T Ford in 1911 are still contributing to climate changes today.

Over the course of the 4.6 billion year record of planet Earth, the earth has been warmed by 'natural' emissions of greenhouse gases from vegetation and other geochemical cycles. Without the natural greenhouse effect the Earth would on average be much cooler and the planet would be covered with ice. With this natural greenhouse effect, humans and other species have been able to enjoy a liveable climate, freshwater, and food resources.

Human activities have contributed to the 'enhanced greenhouse effect'. Emissions of GHGs have increased dramatically since the industrial revolution and are mainly associated with the combustion of fossil fuels – coal, oil, natural gas – as well as land use changes, especially deforestation. Scientists have reconstructed past GHG concentrations using evidence from air trapped in ice cores and the chemistry of sediments to show that the recent increase in atmospheric GHGs exceeds the bounds of natural variability experienced during the preceding 650,000 years. Global GHG emissions due to human activities have increased by 70% between 1970 and 2004 (IPCC, 2007). Scientists are now convinced that these increases are associated with a detectable change in climate including warmer temperatures and the melting of glaciers and icecaps.

The United States accounts for approximately 25% of global CO_2 emissions. Largely due to heavy coal consumption, China follows second. However, some recent assessments have calculated that China is now

Figure 1.1: Past and future CO_2 atmospheric concentrations



GRID Arendal

Designer and Cartographer: Philippe Rekacewicz, Emmanuelle Boumay, UNEP/GRIS-Arendal.
Source: Past and future CO_2 concentrations.

surpassing the US as the top GHG-emitting nation. The UK is the seventh largest emitter producing 2.5% of global emissions. The US also leads the planet in per capita emissions, but China ranks much lower using this metric: the individual emissions of a typical citizen in China are less than 1/8th that of the US (NEAA, 2007). The emissions of a UK citizen are on average approximately 10 t CO_2 per annum, which is about one-half that of a US citizen (Marland, 2007).

If we convert all the major greenhouse gases to a carbon dioxide equivalent or CO_2e (based on their warming potentials) we can see that atmospheric GHG concentrations have now risen from 280 parts per million or ppm (a unit used to describe the relative proportions of carbon dioxide in the atmosphere) in 1850 to 420 CO_2e ppm today. If GHG concentrations continue to rise at the current rates of ~1 ppm each year then we will reach a doubling of pre-industrial levels by 2050 (IPCC, 2007b).

Figure 1.1 shows the long term record of carbon dioxide concentrations since the year 1000 as well as 7 scenario projections to the future designed to reflect different possible mixes of economic development, population growth and policy options. The 'Business as Usual' scenario usually considered is the one marked A1B projecting emissions of more than 700ppm by 2100 (IPCC, 2007a).

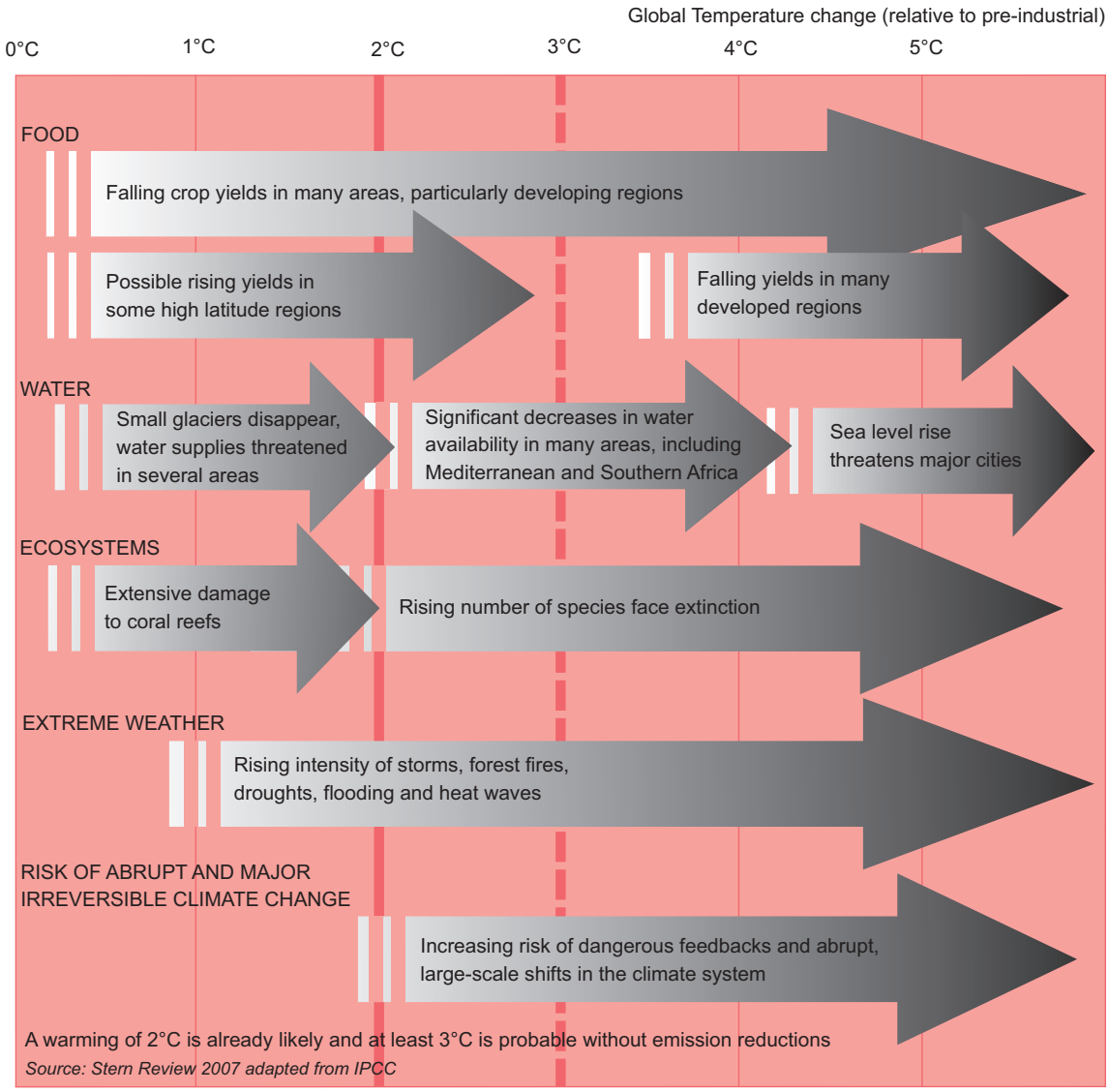
The sensitivity of the climate to this doubling has been tested using a range of computer models which suggest that concentrations of 450 to 550ppm could cause global average temperature increases of 2 degrees centigrade (°C). Even at 2°C the impacts could be severe with much greater warming at the poles, more intense floods and droughts in many regions, and major shifts in ecosystems (see Figure 1.2). Beyond 2°C the changes could be much more dangerous because some systems may reach 'tipping points' – the Amazon could begin to dry out, melting permafrost in regions such as Siberia could release methane (a potent GHG), ocean currents could shift bringing major weather changes, and melting icecaps could collapse causing sudden sea level rise (IPCC, 2007c).

If We Don't Act Can We Adapt?

Climate change may exceed the adaptive capacity of many people and regions (see Figure 1.2). Conservationists are concerned that key species will be unable to adapt to warmer and drier climates, especially those that move slowly or where a shift to cooler climates is prevented by physical barriers or human occupation of the landscape. Many regions of the world are predicted to become drier and there may be insufficient water for cities and food production, especially in the tropics. Those already vulnerable – the poor, children and elderly and species that are endangered – may not be able to cope (IPCC, 2007c).

The Stern Review calculates that the potential economic damage from climate change could wipe out 5–20% of world Gross Domestic Product (GDP) each year. In the worst case scenario, the costs of adaptation would be huge, including: the construction of massive barriers to counter rising sea levels; the relocation of entire populations of low-lying cities; costly new high-tech measures to maintain food production; and the desalination of seawater for drinking in drought-ridden regions. Often the most vulnerable countries and peoples are those bearing least responsibility for causing climate change.

Figure 1.2: Probable impacts from climate change



Source: Stern Review 2007 adapted from IPCC

Box 1b Reducing Greenhouse Gas Concentrations

It is still possible to prevent the worst case scenarios for climate change. The Stern Review identified many measures to reduce emissions at relatively low cost, including efforts to increase energy efficiency and reduce energy demand. Some of these measures would save money for firms and consumers that would otherwise be spent on energy. Mitigation may also require new or large scale technologies for burning fossil fuels more efficiently, including capturing carbon (such as geological carbon sequestration), non petroleum transport and widespread investment in renewable energy. Many of these solutions are costly, not yet fully proven, or face public opposition.

Stern and other economists argue that it is time to include the costs of damages from climate change in the costs of doing business (making external costs internal) and thus to create incentives to reduce emissions. A range of options can encourage mitigation including:

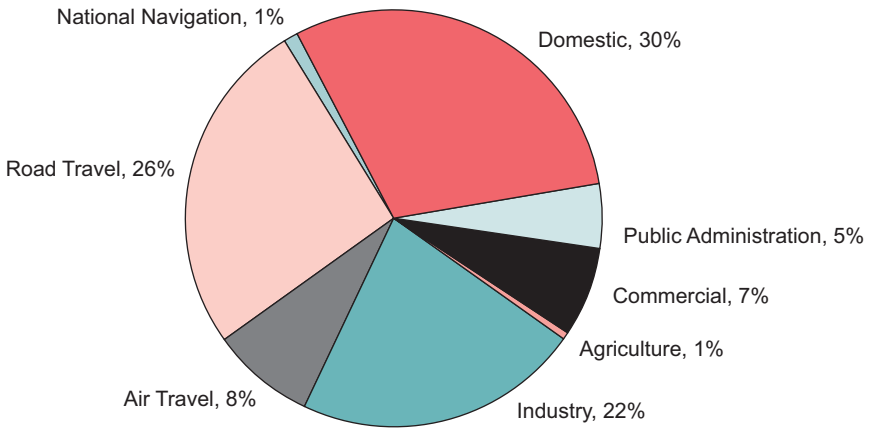
- A tax on emissions of carbon dioxide and other GHGs;
- Regulations and quotas that require companies to reduce emissions to certain levels;
- Systems of credits for buying and selling emission reductions (carbon markets);
- Public and investor pressure to operate greener practices.

1.2 GHG Emissions and Energy Use in the UK

In 2006 the UK overall GHG emissions totalled 652 million tonnes of CO_2e (Defra, 2007b).

Industry, transport and residential homes are each responsible for roughly a third of these emissions (Figure 1.3). Between 1990 and 2005 industrial emissions dropped by approximately 20%, emissions from transport increased by approximately 13% while domestic demand remained almost constant. The overall total UK energy demand has increased by 3.5%, with fossil fuels meeting most of the energy demand but with lower emissions partly because of a switch from coal to gas fired electricity generation (Berr, 2007a).

Figure 1.3: Energy demand by energy user



Source: BERR, 2007

Reducing energy demand is a first order principle and often lowest cost option for creating a lower carbon economy. Many of the technologies and behaviours needed to move to a low carbon economy already exist.

Within the UK, emissions from the music industry comprise a small portion of total emissions because the industry itself is a relatively small component of the overall economy. Nonetheless, the music industry represents an exceptional voice that can motivate, lead and deliver reductions in GHG emissions by making its own commitment to emission reduction and becoming a role model for its staff, artists and consumers.

Reducing demand for carbon-based energy in business operations by adopting energy efficient practices and technology; changing energy using behaviour; investing in on-site energy generation; using low-emission transport; and creating low emission business models. These are some of the most significant ways for the industry to take a lead in reducing the GHG emissions for the UK overall.

Box 1c The Emerging Policies and Regulatory Frameworks to Combat Climate Change

A. INTERNATIONAL POLICY

UN Framework Convention on Climate Change

In recognition of the need for global cooperation to deal with climate change the UN established the Framework Convention on Climate Change (UNFCCC), a non-binding declaration committing the 192 member nations that signed up to a set of objectives to reduce greenhouse gas emissions. A key tenet of the UNFCCC is that while every country has a responsibility to combat climate change, the industrialised world carries a historic responsibility to take the lead. The Kyoto Protocol, which came into force in 2005, set 34 industrialised countries a target of reducing their emissions by 5.2% by 2012 from 1990 emissions levels. Countries can reduce emissions by making their own reductions or by emissions trading, thus transforming carbon from a natural phenomenon into a global commodity. Under the EU Kyoto committment the UK government has agreed to reduce emissions by 12.5% from 1990 levels by 2012 (UNFCCC, 2008). The UK government is on track to surpass this goal although much of this success is down to easy reductions associated with the closing of coal-fired power plants in favour of natural gas in the 1990s and the recovery of methane from landfill sites.

With the Kyoto Protocol expiring in 2012 the recent round of climate negotiations in Bali in December 2007 focused on a new set of global bargains around reducing emissions and adaptations to climate change. Scientists recommended a cut of at least 50% in global emissions by 2050 but countries were unable to agree on even a 20% target in Bali. However they did agree to move forward on low carbon technology transfer, carbon credits for protecting forests, and funds for adaptation to assist those communities most vulnerable to the impacts of climate change. The next major deadline is to reach an agreement on a serious set of emission reduction commitments for the UNFCCC conference in Copenhagen at the end of 2009.

B. EUROPEAN POLICY ACTION

Europe has gone further than the international community in its response to climate change, proposing to cut emissions from a 1990 baseline by up to 30% by 2020. Implementing these cuts poses a challenge, which the EU is meeting through a combination of directives and emissions trading, many of which are of relevance to the music industry.

EU Emissions Trading Scheme

The EU Emissions Trading Scheme (ETS) is a regional cap-and-trade scheme using market forces to reduce emissions. Phase I of EU ETS ran from 2005 through 2007 and Phase II is focusing on 2012 in alignment with the Kyoto Protocol timetable. Currently the EU ETS includes only large energy users (using greater than 20 megawatts of energy per annum) and power generators and only covers carbon dioxide emissions, but is likely in future phases to extend to other greenhouse gases and sectors (European Commission, 2003a). Music companies are indirectly exposed to the carbon prices set in the EU ETS through their electricity bills. This is because power generators participating in EU ETS have passed on the additional costs of the carbon emission permits to their customers.

EU Energy Performance in Buildings Directive

This directive aims to promote the improvement of energy performance in buildings through cost effective measures. 'Building Regulation Part L' of the Directive sets a maximum amount of carbon dioxide emissions associated with building energy use applicable to all new buildings and renovation of existing buildings with a total surface area over 1,000 m^2. In addition, all buildings will be required to have a certificate indicating energy performance using a grading system similar to that used for white goods (which are rated from A-G) (European Commission, 2002a). Many music companies and venues will need to prepare and possibly publicly display their buildings' energy performance certificate.

EU Biofuels Directive

This Directive requires 5.75% of all transport fossil fuels (petrol and diesel) to be replaced with biofuels by 2010 (European Commission, 2003b). Emerging evidence that the demand for biofuels – especially produced from corn and palm oil – is leading to deforestation and food insecurity in tropical countries means this policy is now being reevaluated. There are also doubts about how much certain biofuels, such as ethanol, actually contribute to lowering emissions because of the energy needed to grow crops and produce the fuel[1] (UK Parliament, 2008).

With significant demand for petroleum-based fuels for product and equipment distribution, tour buses and festival power generators, it is essential for the music industry to stay abreast of legislative developments and technology innovations around biofuels. Music companies considering the use of biofuels should seek guidance on the environmental and social integrity of the fuel, including the emerging proposals for sustainable certification of biofuels, and should work in strategic partnership with government and suppliers to ensure responsible development of the market.

EU Electricity Disclosure

Electricity disclosure, part of the directive to liberalise the European electricity market, requires power generators (i.e. utility companies) to make information available to their customers about the fuel mix and carbon content of their electricity. Electricity disclosure in power generation gives music companies the information to make informed purchasing decisions (Boardman and Palmer, 2003).

EU Waste Electrical and Electronic Equipment Directive (WEEE)

This Directive has sought to address the life cycles of electrical and electronic products, and thus reduce emissions from production and disposal in the process (European Commission, 2002b). The musical instruments and equipment sectors of the music industry are directly affected by this Directive (Cooper, 2002).

C. UK CLIMATE POLICY

The UK has made some of the most significant discursive commitments to climate change among nations including a target of 60% reduction in carbon emissions by 2050 (Berr, 2007b). Implementing this commitment requires tough policies, and the partnership of the private sector and the public.

UK Climate Change Bill

The 2007 UK Climate Bill provides the legal framework for CO_2 emissions reductions of 26–32% by 2020 and 60% by 2050. These targets would be achieved by setting five-year carbon budgets established by an independent Climate Committee (the first budget runs from 2008 to 2012) (Defra, 2007a).

Carbon Reduction Commitment (CRC) for Large Non-Energy Intensive Industries

As an addition to the UK's role in the EU Emissions Trading Scheme, the UK government is developing a bespoke trading scheme for large non-energy intensive organisations. This new scheme, the Carbon Reduction Commitment (CRC), aims to reduce the emissions of these industries by 1.2 million tonnes of carbon per year by 2020 and will start in 2009. The scheme will target approximately 5,000 organisations (mostly in the service and public administration sectors) with electricity consumption of greater than 6,000 MWh/yr – equivalent to an annual electricity bill of ~£500K (Defra, 2007c). All energy other than transport fuels will be covered. Some of the larger music companies in the music industry could fall under the scheme.

[1] Biofuels – fuels derived from plant materials – are one potential alternative to petroleum products. However, a recently published report by The Royal Society on the 'Sustainability of Biofuels' concludes the relative future contribution of biofuels to transport requires careful assessment. Biofuels is a collective term for a range of plant based fuel products. Each plant will have a different environmental impact and total GHG emissions over the lifecycle of growing, harvesting, producing and burning the fuels. Therefore, each biofuel crop must be assessed on its individual merit in terms of: 1) emissions savings; 2) the full economic and environmental lifecycle cost; 3) implications for land use; 4) global, regional and local impacts (The Royal Society, 2008). In addition to primary delivered biofuels, there are secondary biofuels such as vegetable frying oil that can be processed into biodiesel. Although these secondary biofuels sources would only meet a fraction of the industry's diesel use it would be a good use of the waste vegetable oil created from catering at live performances.

D. CARBON OFFSETS

At the international scale Kyoto created flexible mechanisms for meeting emission reductions by which an industrialised country, rather than reduce emissions domestically, could purchase emission reduction credits from projects that reduce emissions in the developing world (through the so-called Clean Development Mechanism). The logic behind these 'carbon offsets' is that because the atmosphere is global and mixed uniformly it does not matter where emission reductions occur so long as they lead to a reduction in overall concentrations of GHGs. The economic logic of carbon offsets is that carbon reductions are often cheaper and easier in the developing world and so the atmosphere can benefit from trading investment in expensive domestic reductions for investment in offsets. In some cases carbon reduction projects may have additional side benefits for developing countries including jobs, protection of forests, low carbon electricity, and reduced energy costs and air pollution.

In parallel to the Kyoto driven international market in carbon offsets, a voluntary offset market has emerged, which provides carbon credits to individuals and firms who wish to offset their emissions. The carbon offset companies develop or purchase credits from emission reduction projects that include renewable energy, efficient woodstoves, methane capture from waste, or reforestation. These credits are then sold to consumers who wish to offset their emissions from flying or driving, offices and homes with the emissions estimated using carbon calculators that convert, for example, distance flown to kilograms of carbon. Carbon offsetting has become an important strategy for companies seeking 'carbon neutrality' and may range from investment in a local wind farm to carbon credits from a project in Africa.

Criticisms of carbon offsetting include questions about the ethics of paying others to compensate for your emissions, the technical challenges of accurate monitoring, the need for assurance that carbon reduction projects provide clear additional reductions in emissions, and the real sustainable development value of offsets. In response to criticisms the voluntary offset companies are working to establish high quality standards and certification for offsets and the UK government has issued some guidelines.

Offsetting provides the music industry with an option to compensate for its emissions, especially from transport, once it has made every effort to reduce energy use and emissions in its operations and value chain. Decisions about offsetting will need to balance issues of environmental impact, cost, development benefits, ethics and public attitudes, and take account of the emergence of standards and high quality projects in both the formal and voluntary offset market.

Section 2: Context – The UK Music Industry

2.1 Overview

The UK music industry is a key driver of the creative economy and for those unfamiliar with the industry this section provides a brief description of the structure and current dynamics of the industry as a context for understanding its greenhouse gas (GHG) emissions. It identifies some key trends and issues in each sector which help to understand the drivers determining the industry's current emissions and some of the factors that may influence future emissions.

Business activities in the music industry centre on recording and live performance and figure 2.1 provides an illustration of the main players and activities. In both areas there are a handful of large international companies and a large number of smaller independent companies. Ninety-seven per cent of businesses, almost 18,000, in the industry are micros and SMEs (Creative & Cultural Skills, 2007a).

UK music industry activities account for over 10% of global music sales; they have the third largest market share of global sales after the United States and Japan (BPI, 2007). The UK has the highest per capita music sales with approximately 134 million album and 86 million legally downloaded tracks were sold in 2006. In recent years live music performance has had a renaissance with increasing demand by consumers for experience culture: in 2006 direct ticket sales generated £743 million (Mintel, 2007).

2.2 Industry Transformation

Dynamism best describes the contemporary UK music industry, and such dynamism will certainly affect future GHG emissions profiles and carbon management. The traditional boundaries between industry players whose business lies in connecting the artist to the fan – be they managers, publishers, live promoters, or record labels – are shifting.

Moreover, digital technology is changing every aspect of how the music business operates from how talent is discovered and which industry actors have become involved (e.g. Apple, Amazon) to how music is produced, recorded, promoted and retailed. Further, there are approximately 100,000 people officially employed in the music industry and 30,000 people employed in music education (Creative & Cultural Skills, 2007b). These official estimates still do not capture well the temporary or part-time work generated by the industry.

2.3 Sector Trends and Issues

2.3.1 Artist management

Most professional artists employ managers to negotiate the best business opportunities on their behalf. Managers will receive a percentage of artist's income typically in the region of 20%.

2.3.2 Music promotion

Music promoters book acts, market and stage live music events and are typically hired on contract by venues based on an agreed-to fee or a royalty. There are a handful of large companies as well as many independent promoters though currently the trend for acquisitions is leading to a more consolidated industry.

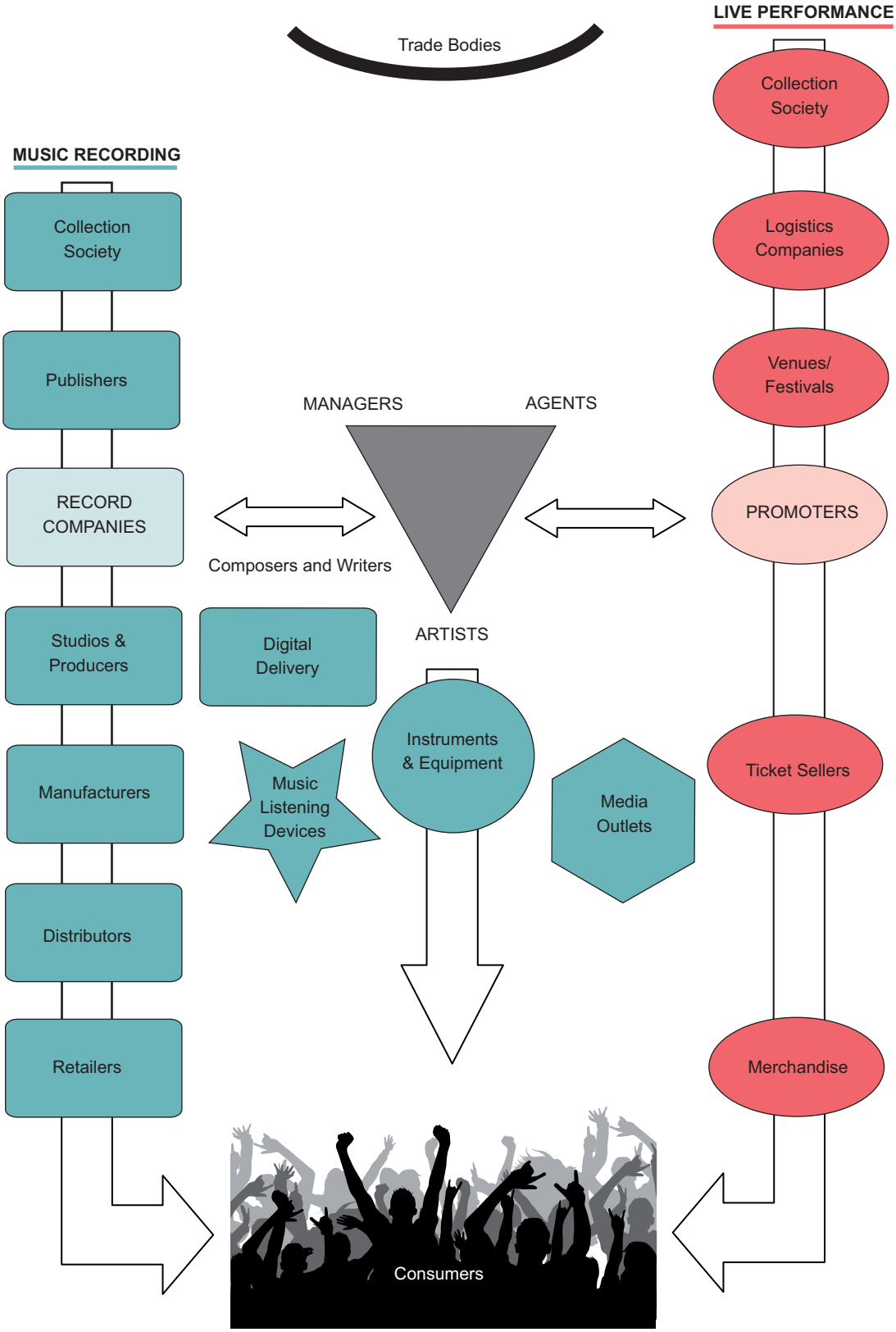
2.3.3 Agencies

Agents broker performance contracts between managers and promoters and are often regionally focused representing a number of artists.

2.3.4 Record companies

Record companies generally organise the production, manufacturing, distribution and marketing of recorded music products. The sector comprises four large international companies (the "majors") and a very large number of smaller independent companies. In 2007 the majors accounted for 78% of the total album units sold in the UK while the independent sector accounts for 22% (BPI 2007). In recent years, consolidation in the recording sector has intensified with a number of mergers and acquisitions.

Figure 2.1: The UK Music Industry



2.3.5 Recording studios

There are just a few large studios and a number of middle sized studios, but digital technology has stimulated a very significant number of mobile and small, often 'domestic' studios. Digital technology has resulted in ever increasing efficiencies although the quality of vintage sound equipment ensures that analogue techniques and gear remain in use.

2.3.6 Record manufacture

The manufacture of recordings has changed significantly within the last 10 years. Record companies traditionally owned their manufacturing operations but many of these have been sold off and are now made under contracts between record companies and specialist manufacturers. The physical CDs destined for the UK market are mostly manufactured in Europe, near to the market, whereas less time sensitive materials, such as CD casing is manufactured and shipped from Asian countries.

2.3.7 Distribution

Distributors oversee the transportation of music products and may offer ancillary services, such as stock control, returns, range management and marketing (Dane, 2007). Record companies have increasingly sold off their distribution operations and distributors are focusing on improved efficiency and flexibility.

2.3.8 Retail

In the last few years music has increasingly been sold through supermarkets, online retailers, and digital music delivery. Supermarkets account for approximately half of store sales. The average CD price has dropped over the last three years (in 2006 the market average price was just under £9: ERA, 2007), in part because supermarkets use CD sales as a loss leader. Furthermore, supermarkets generally stock only chart albums. With sales of CDs declining many specialist music stores are diversifying into other entertainment products, such as DVDs and games. Online music retailers account for just over 10% of the market share in music sales. iTunes is the market leader in services providing digital music delivery. Apple Computer Inc. has built an international business with $9 billion turnover based on iPod music players and the iTunes music services (Dane, 2007).

2.3.9 Composition and publishing

Music publishers deal in the marketing and commercial exploitation of song and music catalogues. In recent years consolidation and acquisition of publishing companies and catalogues by the major record companies has occurred along with the emergence of several new powerful independent companies (Dane, 2007).

2.3.10 Music instruments and equipment

A number of developments are determining the economics of the instrument and equipment sector including price deflation resulting from low-cost manufacturing in China and other developing economies; price competition between music shops and online retailers; and the use of computers and digital platforms in recording, sampling and synthesis (MIA, 2007). The popularity of different instruments and equipment is greatly influenced by the current music and fashion trends.

Sustainable sourcing of wood products for musical instruments has become an issue of increasing concern with the decreasing availability of traditional wood and deforestation. The music instrument sector of the music industry has a particular set of climate change responsibilities because timber needed to manufacture wooden instruments such as guitars, piano casing, and strings is sourced from forests that function as important 'sinks' to remove and store carbon dioxide from the atmosphere. Forests also function as significant regions for biodiversity and indigenous communities often vulnerable to the impacts of climate change. A new campaign by Greenpeace, Music Wood, is working with musical instrument manufacturers to grow and strengthen the market for wood from sustainable sources. The initiative already involves instrument manufacturers Gibson, Martin, Taylor, Fender, Guild, Yamaha, Walden, Luthiers Mercantile International, Pacific Rim Tonewoods, North American Wood Products, Allied Lutherie (www.musicwood.org).

2.3.11 Music listening devices

The market to innovate in new listening devices has been exceptionally buoyant over the last decade, and shows little sign of declining. MP3 players, computers and mobile phones have transformed the listening habits of the public. In the UK, music player (MP3) ownership was almost 14 million in 2006 up from 7.8 million in 2005. The retail value of the MP3 market was approximately £770m in 2006 (Dane, 2007).

The implications of GHG emissions related to this sector have not been studied in depth in this report, but the ubiquitous and dynamic nature of the product and its capacity to convey messages mean that understanding the emissions profile and building mitigation strategies should be a priority next step.

2.3.12 Music media

There are a dozen or so popular hard-copy music magazines for consumers and several industry publications. There is a trend towards music media developing online products and services for its readership.

2.4 Summary

In this section we have provided the context for the estimation of carbon emissions from the music industry and to identify opportunities for reducing those emissions.

The UK music industry is going through a period of significant transition in the delivery of recorded and live music through digital technology. There are associated changes in recording, manufacturing, distribution, retailing, and live performance.

Competing forces – such as consolidation in various sectors mixed with internationalization of supply chains and sub-contracts – present the industry with particular commercial forces that need to be examined in the context of climate change. For instance, the materials used for producing CDs, music devices, instruments, and staging equipment are increasingly sourced and even manufactured outside of the UK. These changes are presenting unprecedented challenges and opportunities for novel interventions to reduce GHG emissions in the UK music industry.

The industry's artistic reach and business activities are global and UK artists have entertained and influenced global culture for the past 50 years. While it is difficult to measure the emissions of the international dimensions of the music industry, the global reach dramatically extends the industry's capacity to contribute positively to reducing emissions and tackling climate change.

Section 3: Research Approach and Methodology

3.1 Overview

This research for the UK music industry has three primary objectives:

1) Scope quantitatively the greenhouse gas (GHG) emissions resulting from activities associated with the UK music industry.

2) Identify blockages and opportunities for the music industry to draw up proactive and effective plans for their role in preventing dangerous climate change.

3) Make initial recommendations for specific actions and priorities for the medium term.

This section explains the methods used to conservatively quantify the direct GHG emissions of the UK music industry. Data was gathered through 1) energy surveys of music companies and business activities; 2) interviews with Chief Executives and key informants; and 3) attitudinal surveys on climate change action. In addition to this primary data, company carbon audits and relevant literature was used when available. Case study company energy surveys and GHG emission audits were used to estimate the GHG emissions of each activity segment and for the industry as a whole. A technical note has been prepared explaining in more detail how information sources have been used to estimate the greenhouse gas emissions of the UK music industry.[2]

This study does not provide a full carbon audit of the UK music industry. It is intended as a first and limited assessment based on estimates, case studies and data provided by a subset of the music industry. A complete assessment would require a great deal of primary research into energy use and management within individual companies and across the industry. We hope that this study will provide the basis for further analysis even as it already identifies important areas for emission reductions across the industry.

3.2 GHG Protocol

As its frame of reference, our study uses the Greenhouse Gas (GHG) Protocol, an internationally recognised standard for accounting company emissions[3] (WRI and WBCSD, 2004). The Protocol is designed to guide companies in identifying, quantifying, and reducing GHG emissions from business operations. It focuses on the direct and indirect sources of GHG emissions from business operations. Direct sources are defined as fuel use and indirect sources as emissions associated with electricity, employee travel, third party suppliers, outsourced activities and waste.

In the case of a record company, for example, the GHG Protocol would recommend quantifying the annual emissions from office energy use, employee work travel, company owned vehicles, business operations in which the company has an equity share, and third party suppliers. However, the GHG Protocol is not designed for quantifying the emissions through the value chain of a product or service and therefore does not provide guidance on how to quantify the GHG emissions associated with the materials and use of a product or service. So, using the example of a record company, the GHG Protocol does not include quantifying the emissions from CD materials the company produces or those associated with the consumer listening to the CD or the disposal of that CD.

Our study of the music industry sought to be comprehensive and to look at emissions in value chains as well as companies themselves so it has gone beyond the GHG protocol. The research estimates both the primary emissions of the industry's business operations as well as the secondary emissions in the value chain, especially those that decision makers in the industry can influence. We identify audience travel to live performances as one of the most important secondary emissions sources.

[2] This is available online at Julie's Bicycle or Environmental Change Institute websites.

[3] The key procedural steps recommended by the Protocol are:
- Establishment of the GHG scoping boundaries (including the selection of: greenhouse gases, organisational and project boundaries as well as operational boundaries).
- Collection of companies' data.
- Calculation of emissions using appropriate conversion factors.
- Analysis of results.
- Determination of suitable recommendations based on the findings.

Box 3a Greenhouse Gas Audits

A GHG audit is a process by which the total amount of greenhouse gas emissions released into the atmosphere from a particular or set of activities for a defined period of time, usually one year, are inventoried. A GHG audit is not based on direct measurement of GHG emissions, but on direct measurement or estimates of the amount of fuel combusted, waste produced or chemical processed. Key considerations when undertaking a GHG audit are: 1) what are the relevant greenhouse gases for the business activities in question; 2) what are the organisational and operational emissions boundaries to be used; and 3) what time period the GHG audit reflects. Putting in place a regular auditing process will enable the company to implement and monitor strategies to reduce emissions. A GHG audit can include all six greenhouse gases covered by the Kyoto Protocol (see Chapter 1).

3.3 Setting the Study Boundaries

3.3.1 Greenhouse Gases Emission Boundaries – what gases do we include?

The music industry is an energy user rather than an energy producer and the most relevant GHGs to include are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), rather than 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 music industry with CH_4 and N_2O at much lower levels[4].

3.3.2 UK Music Industry Boundaries

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. The priority in this first phase of research has been to quantify and understand the GHG emissions from the two core business areas of the UK music industry: those of recording/publishing and live performance. In addition, an attempt has been made to give an indication of emissions from international travel and touring, as decision making in the UK can influence the associated GHG emissions. Table 3.1 outlines which music related activities have and have not been included in the study.

Setting the geographic boundary for scoping the GHG emissions was critical given the international nature of the industry. The study aimed to develop a comprehensive picture of the GHG emissions from recording/publishing and live performance. The research assessed the GHG emissions of these two core areas across the supply chain even when the companies providing products and services to the UK music market (e.g. the majority of CD manufacturing) are located outside the UK.

UK music is exported worldwide: artists sell and tour internationally. In recognition that international touring by UK artists is a major GHG emission source for the industry this research has attempted to provide an indication of its scale. Due to data and resource constraints it has not been possible to examine this in great detail, but many of the issues of international touring are commensurate with UK touring. For example, an artist management company and agency have some control over the itinerary of an international music tour, which will influence choices made on frequency, transportation, and style of air travel. The rationale for including international travel, if only in a limited way, was that decision-makers in the UK have influence in determining the emissions generated from international touring.

[4] All results in the report are presented in the tonnes of CO_2 equivalent. To convert energy use to emissions standard conversion factors were used. The emission factors used were taken from 'Guidelines to Defra's greenhouse gas conversion factors for company reporting' published by the UK government (Defra 2007) as well as the National Atmospheric Emissions Inventory and the Intergovernmental Panel on Climate Change (NAEI, 2008; IPCC-NGGIP, 2000) (see Appendix for details of the emission factors used in the calculations).

Table 3.1 Music activities included and excluded from analysis

Music Activities Included	Music Activities Excluded
Recorded Music - Record labels & companies - Recording studios - CD manufacturing - CD packaging - CD distribution - CD retail - Digital music delivery (limited)	International Recorded Music Sales
Music Publishing	Musical Instruments & Equipment
Management, Agent & Promotion	Music Listening Devices
UK Live Music Performance - Music venues - Music festivals - Tour routing - Audience travel	Non-Music Merchandise
International Promotion UK Music - Touring (Europe and America) - Air travel (artists and employees)	Music Education & Training
Collection Societies and Trade Bodies	Music Media (Print and Digital)
	Community Music Projects

3.3.3 Reasons for Exclusion of Activities

There were two main reasons for limiting our analysis:

1) There was not sufficient energy data available and/or it was not possible to collect the data within the time and resources of the study.

2) Some of these activities are best approached as the GHG emissions of other country's music industries.

3) Some of these activities are best approached using the GHG emission boundary of the relevant contributing industry (e.g. electronics, education and media) rather than including within the emission boundary of the music industry.[5]

3.3.4 Organisational Boundaries

The GHG Protocol recommends setting an organisational boundary consistent with the boundary companies use for financial reporting. The concepts of 'control' or 'equity share' need to be applied to determine how emissions are apportioned to a company if a company has ownership or shares in another company.

[5] Music listening devices, merchandising, and music instruments and equipment are highly complex areas and it is difficult to calculate the GHG emissions embodied in the products or services. To determine the emissions resulting from a music listening device a lifecycle assessment (LCA) would include materials sourcing, production, use and disposal. For example, a LCA of a tour T-shirt would consider the energy used: to grow, harvest and process the cotton; to design, dye and produce the cotton into a T-shirt; to distribute the T-shirt to the consumer; and then to wash the T-shirt through its use phase. A Lifecycle Assessment (LCA) of product or service requires good data and once the LCA has been completed the input variables need to be updated. This type of detailed GHG emission analysis was beyond the scope of the research, but future research of the emissions associated with the music industry might want to consider the embodied carbon emissions associated with its activities, such as those embodied in MP3 players.

3.3.5 **Music Project Boundaries**

Some of the Industry's business activities are best described not within an organisational boundary, but instead within a project boundary. The most obvious example is live music performance and artist touring because various organisations, facilities, infrastructure and people come together for the duration of the festival or tour. Some key organisations such as promotion companies are mainly concerned with putting together such music "projects".

3.3.6 **Operational Boundaries**

The study set the operational boundaries for quantifying the GHG emissions of the music industry as those business operations and associated activities using heating fuel (gas, and oil); electricity; trucking fuel (diesel); staff and artist air travel; and audience travel (car (petrol) and public transport). Table 3.2 outlines for each sector and activity type what GHG emissions were estimated. The GHG Protocol recommends including in a company audit the GHG emissions resulting from employee commuting, work related car and public transport use, hotel stays, and waste. However, this study did not include these GHG emissions as the data could not be easily obtained, was inaccurate and/or not likely to be a significant emissions source.

Table 3.2 The sector and activities for which the GHG emissions have been estimated

	Building		*On-Site*	*Transport*			*Materials*	*Process*
Company or Activity Type	Heating Fuel	Electricity	Generator Fuel	Trucking/Bus Fuel	Staff/Artist Air Travel	Audience Travel	CD Materials & Packaging	Equipment
Record Companies	Yes	Yes			Yes			
Publishing Companies	Yes	Yes			Yes			
Recording Studios		Yes						
CD Manufacturing	Yes	Yes					Yes	Yes
Music Distribution Centres	Yes	Yes						
CD Transport Distribution				Yes				
Server Storage of the Digital Download Master								Yes
Retailers		Yes						
Artists					Yes			
Management Companies	Yes	Yes			Yes			
Promotion Companies	Yes	Yes			Yes			
Agency Companies	Yes	Yes			Yes			
Collection Societies	Yes	Yes			Yes			
Trade Body Associations	Yes	Yes			Yes			
Touring Logistics				Yes	Yes			
Venues	Yes	Yes				Yes		
Festivals			Yes			Yes		

3.4 Data Sources

The study collected representative case study data from companies across the industry. The invitation to contribute to the research study was open to anyone but to ensure a representative cross-section of activities some specific organisations were encouraged to respond. Only companies with sufficiently complete data contributions were included in the analysis. The data gathered from music companies was from a recent 12-month period – mostly in 2006 and 2007.

Six types of primary data sources were employed in our study:

1) An online energy use survey designed for self-completion by a company representative;

2) Bespoke energy use surveys for particular activities and premises designed for self-completion by a company representative – i.e. festivals, music venues, studios and trucking;

3) Julie's Bicycle company carbon audit reports;

4) Independent carbon audit reports commissioned by companies from environmental consultancies;

5) Face-to-face and telephone interviews with Chief Executives and key informants;

6) An attitudinal survey completed by 50 people, mostly executives, about their opinions on their company's ability to reduce GHG emissions.[6]

Table 3.3 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**

[6] Data was secured from people within organisations with access to relevant information. Typically, the first point of contact was the Chief Executive; actual data collection was delegated to the most appropriate person within the organisation. All data has been treated as confidential unless expressed permission was given otherwise. In addition some key secondary information and statistical sources were used. These included: The Survey of Live Music in England and Wales 2007; PollstarPro; Music Week Festival map; MCPS-PRS Alliance; NAA Annual Report 2007; UK Record Industry Annual Survey 2007; BPI Statistical Yearbook 2007; ERA Annual Report 2007; Creative & Cultural Skills Sector Report 2007; and Music Week Industry Directory.

3.5 Data Assumptions and Quality

This is the first time the majority of companies have been asked to provide this sort of data on UK music industry GHG emissions. Many organisations had difficulty providing accurate data (such as kilowatt hours of building energy use and itineraries for business travel) because currently this information is not being systematically saved or filed. Our research team assisted companies as much as possible to help improve the quality of data contributed to the study and made suggestions for continued self-monitoring.

3.5.1 *CD Manufacturing and Distribution*

We collected case study data on record companies, recording studios, distribution centres and retail to build up a picture of the GHG emissions of CD production. In addition, we used two earlier studies on CD production done in the late 1990s. The first study was an assessment of the environmental impact of different CD materials and the second was a full lifecycle assessment of a CD from recording through distribution.

3.5.2 *Building Energy Use*

As much as possible the study sought information on the energy use of buildings occupied by the industry, but used proxies where this information was not available. The two main proxies for energy use were:

1) Typical practice energy benchmarks for buildings based on building type (Chartered Institute of Building Service Engineers Guidance) and floor area (CIBSE, 2004).

2) Average price per kilowatt hour of electricity and gas divided by annual energy expenditure.

In a number of cases music business activities will not be the sole occupier or user of the building. In these instances a proportion of the buildings' energy use was attributed to the industry. For example, 56% of the estimated annual energy used by arenas was attributed to the music industry because 56% of events at arenas are music events (NAA, 2007). This approach of apportioning a percentage of building energy use to the music industry was taken for other types of music venues as well as retail outlets.

Significant assumptions needed to be made about building energy use for music retail. We estimated the floor area retail space based on the type of store together with information from the ERA and BPI on number of retail outlets by type. The CIBSE building type energy benchmark used was a catalogue store, as this was the closest approximation for a music retail outlet (CIBSE, 2004). Many CDs are sold by supermarkets but a supermarket would not be an accurate benchmark because of the large energy demand for electricity for refrigeration, which CD displays clearly do not require.

3.5.3 *Music Venues*

There are two basic classifications of music venues – primary and secondary venues. Primary venues are those for which hosting live music is an important business activity. Secondary venues are those for which music is an ancillary revenue stream – for example, student unions, leisure centres, community and church halls, cafes, clubs, restaurants and hotels.

Information on music venues is highly fragmented in terms of the types of venues, audience capacity, and regularity of hosting music events. Because venues vary in the extent they are used for live music performance we developed a categorisation system for determining the percentage of venue emissions that should be attributed to the music industry. These venue numbers and types helped inform the estimation of audience numbers.

3.5.4 *Music Festivals*

Music festivals vary quite significantly in character from, for example, a 3-day music event on a Greenfield site (i.e. in the countryside) to a music series of live performances hosted in venues throughout a town or city. A music festival might also be a series of events hosted in particular outdoor spaces through the summer months, such as those at The Eden Project, Hampton Court Palace or English Heritage estates.

This diversity makes it very difficult to then analyse these events in terms of GHG emissions. The data on festivals is also fragmented and not easily obtainable. We used the Music Week Festival map together with 10 festival case studies conducted for this project to make estimates for the total number of festivals and their GHG emissions.

3.5.5 *Audience Travel*

Audience travel is influenced by the frequency of artist performances, the type and size of event (e.g. arena concert, music festival, local music venue) and the location of the music venue, especially in relation to public transport links. This study made a number of assumptions, informed by the case study data and industry sources, in order to provide

an indication of the GHG emissions arising from audience travel to live performances including:

- Number of artist tours per year;
- Audience size for each tour;
- Type of venue;
- Proportions of audience travel by major transport modes;
- Average distance travelled by mode;
- Vehicle fuel efficiency.

More detailed information would allow us to refine and increase the accuracy of the GHG emissions associated with audience travel.

3.5.6 *Business Travel*

There remains substantial scientific uncertainty on how to weight the emission impact of air travel. The approach taken for this study was to calculate business travel based on standard categories that include UK domestic flights (average <300 miles one-way), short haul (average 600 miles one-way), or long haul (> 4,000 miles one-way). We did not include the radiative forcing effects of air travel in terms of climate impact, as there is not yet scientific consensus on this issue. We do consider a scenario for weighting the GHG emissions of business as opposed to economy air travel (see Box 6.3). An argument can be made that business class passengers have a greater climate impact than economy passengers because they are allowed a heavier baggage limit, have larger seats and are provided additional services. These all add weight to the plane as well as reduce the overall occupancy capacity of the plane and might therefore generate higher per capita emissions.

3.6 Summary

The methodological approach taken by the study has been to:

- Examine the supply chain of the two core areas of the industry: music recording and live performance. The emphasis has been on estimating the emissions associated with the UK market, as this is the initial priority for industry climate change action;
- Use company case data from over 100 industry sources and interviews with over 30 Chief Executives and key informants in order to indicatively estimate the GHG emissions of the industry;
- Use the GHG Protocol as guidance for accounting the GHG emissions of music companies and activities;
- Go beyond the corporate boundary set in the GHG Protocol to include audience travel as these GHG emissions are significant, related to the industry and the industry has the ability to influence them;
- Include international touring as decision-makers in the UK can influence the GHG emissions.

The study has estimated the GHG emissions of the music industry from building energy use (offices, studios, venues, shops, warehouses); CD materials, manufacturing and distribution; servers storing the digital download master; staff and artists' international travel; tour trucks and buses; and audience travel.

At this first stage of research the study has not attempted to estimated the GHG emissions from: international recorded music sales; musical instruments & equipment; music listening devices; non-music merchandise; music education & training; music media (print and digital) or community music projects.

Section 4: Emissions from Music Recording and Publishing for the UK Market

4.1 Overview

The greenhouse gas (GHG) emissions of the music recording and publishing sectors of the industry have been estimated from the music company case studies provided to the project and from previous studies relevant to this research. The findings cover the GHG emissions through the supply chain from the creation to the sale of music. This includes record companies and labels, music publishing, recording studios, CD manufacturers, CD distribution centres, CD transportation, and retailers, as well as servers hosting the digital download master.[8] The results presented are based on the 2007 UK sales figure of 134 million albums, more than 90% of which were sold as a physical CD format.

The emissions of the business activities in the music recording and publishing sectors are estimated to be at least 138,000 t CO_2e per annum.

The GHG emissions of the music recording and publishing sector are the result of building energy use (offices, warehouses, retail stores); electrical equipment (studios); CD component materials and packaging; CD manufacturing processes; CD transport distribution (trucks); and music track storage on servers (digital music delivery).

Figure 4.1 is a simple illustration of the GHG emissions through the supply chain and those calculated in the scope of this research study. Figure 4.2 shows that there are three key areas where the cumulative GHG emissions are particularly significant – CD packaging, CD distribution logistics, and music retailing

The average CD album sold in the UK results in just over 1 Kg CO_2e being emitted into the atmosphere from activities that include recording, manufacturing, packaging, distribution, transport and promotion (Table 4.1 and Figure 4.2). There are three core components of a CD album – the CD material itself, the packaging (most commonly a plastic jewel case and insert tray) and a paper booklet (typically 12-pages). A 20th Century Fox Home Entertainment study assessed the GHG emissions lifecycle for DVDs sold in the US, which offers an interesting comparison with CDs (see Box 4a).

4.2 CD Packaging

The plastic jewel case, insert tray and booklet is one of the music industry's largest direct sources of GHG emissions. We estimate the CD material, packaging and booklet, to contribute almost half (~65,000 t CO_2e) of the recording and publishing sectors' emissions, and one-tenth of the estimated total emissions for the UK music market (~540,000 t CO2e). The over 120 million plastic jewel boxes and clear insert trays will have produced over 45,000 t CO_2e and the paper booklet a further 8,000 t CO_2e. There is potential to significantly reduce the GHG emissions from the CD packaging and booklet through re-designing and changing the materials used (see Box 4b). MusicWeek carried a feature outlining different options for low emission packaging of CDs (MusicWeek, 29.3.2008).

[7] CO_2 equivalence measures all GHGs and converts them to their equivalent global warming potential

[8] The research has considered the carbon management of the CD format and of digital music download master with the more accurate estimated for the GHG emissions from producing CDs. It has not been possible in the scope of this research to quantify fully the GHG emissions of digital music delivery.

Figure 4.1: GHG emissions per annum from the UK music recording and publishing sectors, by activity, t CO_2e
Total GHG emissions at least 138,000 t CO_2e per annum in the production and sale of music for the UK market

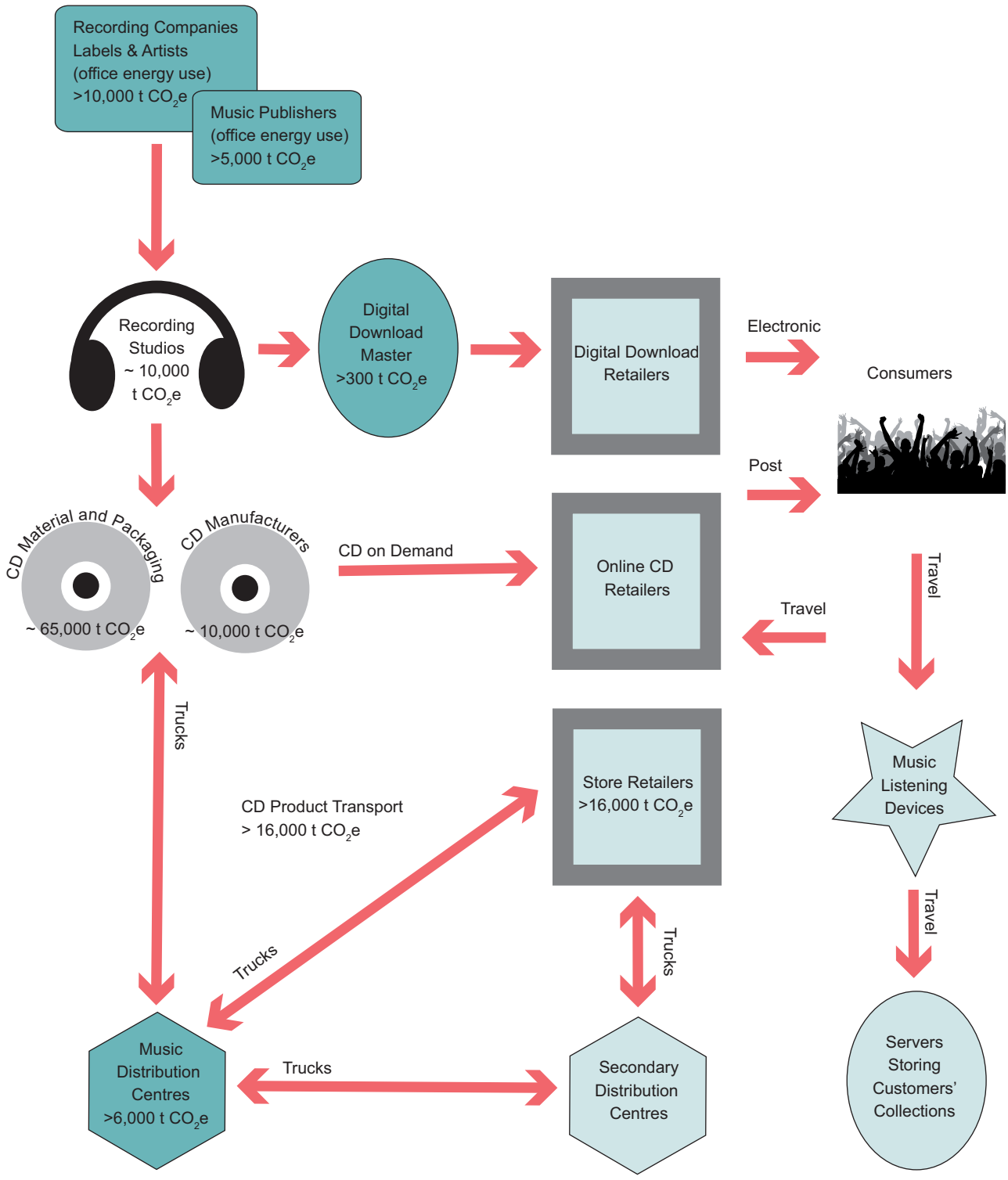


Table 4.1 GHG emissions in the lifecycle of a CD album

Stage of CD Lifecycle	g CO_2e / CD Album	Per cent of Total
Recording Studio		
Energy emissions	37	3%
Waste emissions	3	<1%
Manufacturing		
Energy emissions	100	9%
Materials lifecycle emissions (excl. CD packaging)	100	9%
Plastic jewel case & clear tray	376	34%
Paper booklet & insert card	64	6%
Waste emissions	6	1%
Marketing – office energy emissions	114	10%
Distribution		
Transport from factory 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%
Record Label		
Office energy emissions	2	<1%
Business office waste emissions	1	<1%
Promotion		
Business hotel emissions	7	1%
Business train & taxi travel emissions	2	<1%
Business air travel emissions	5	<1%
TOTAL	1,111 (= > 1 kg)	100%

Box 4a Lifecycle Analysis of DVD GHG Emissions

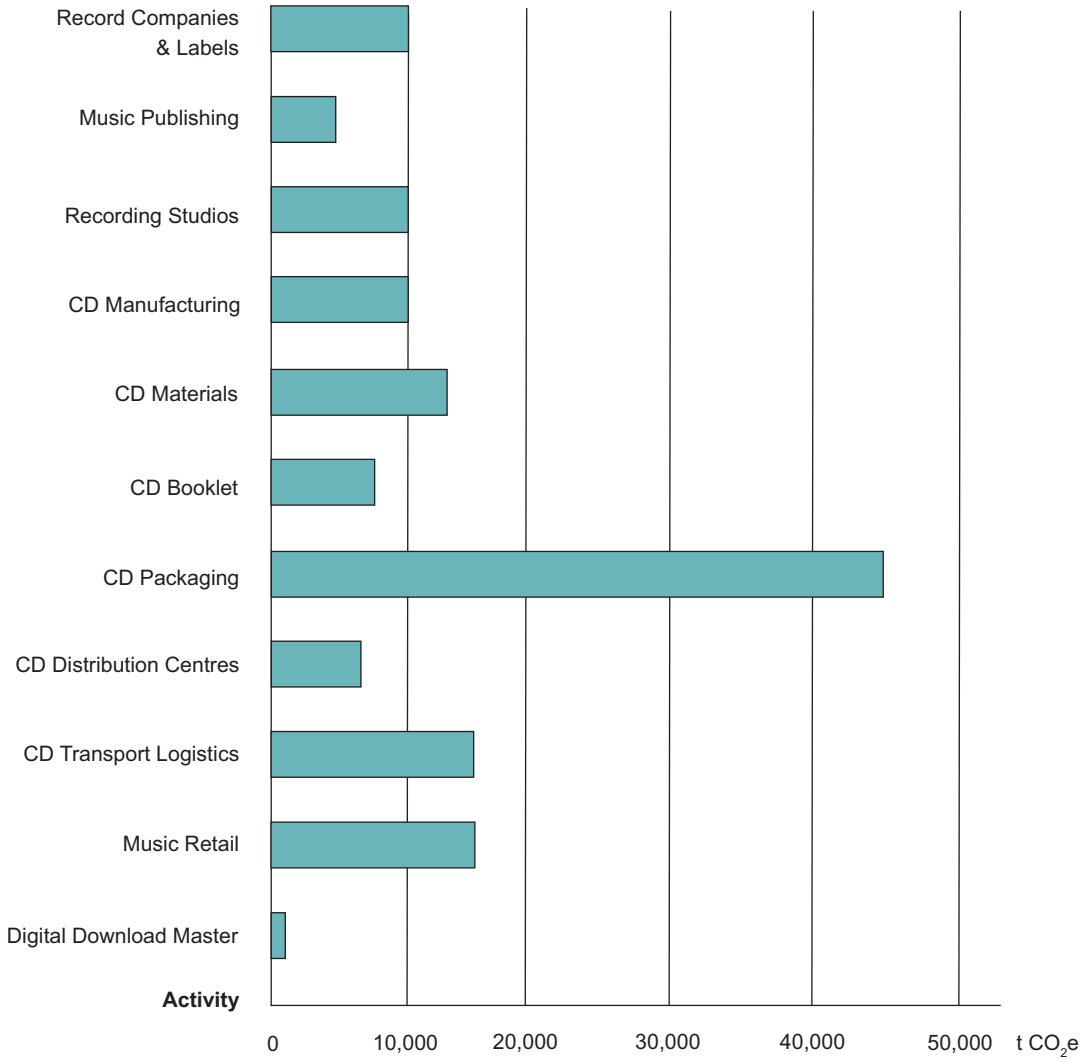
20th Century Fox Home Entertainment has done a GHG emissions lifecycle product of DVDs which provides a useful comparison to our analysis of CDs. The emission boundary set by the study was limited to the production, manufacturing and distribution of DVDs and the lifecycle analysis did not include movie filming and production nor retailing or customer watching of the DVD. The DVD analysis estimates the GHG emissions of a DVD at 340 g CO_2e including polycarbonate (69%); plastic casing (54 g CO_2e); and paper cover and insert (64 g CO_2e). This is about 1/3 of our estimate for the emissions of a CD album, partly because of differences in the product and geographic location. However, the lower emissions in the above listed areas of the DVD lifecycle could also result from:

1) The energy efficient electric moulding process is 30% more efficient that traditional hydraulic molding and is used in Fox DVD manufacturing (also see Box 4d).

2) A DVD does not usually have a paper booklet insert like a CD.

3) The difference in the methodology and emissions boundary setting between our study and their study.

Figure 4.2: GHG emissions from the music recording & publishing sectors, by activity, based on ~ 134 million UK album sales, t CO_2e



Box 4b Re-imagining the CD

The CD is an iconic product of the music industry. Some record labels and artists have produced albums using packaging from sustainable sources. But not enough companies are prepared to bear the financial risks in isolation so these innovations have made a negligible impact on emissions from CD production.

A re-imagining of the design and packaging materials of CDs to ensure it has low carbon emissions would demonstrate visible leadership and commitment to responding to climate change. The increasing consolidation within the recording sector means that a handful of companies could drive significant changes on the environmental impact of CDs.

Making low-carbon CD packaging the standard in the industry will require a collective effort. It will involve a co-ordinated reorganisation of the supply chain and involve the joint participation of record companies, distributors, retailers and suppliers to adopt a workable timeframe for the introduction of low carbon packaging solutions. A full lifecycle assessment of alternative packaging solutions will be necessary to ensure there are net GHG emission reductions from changing the design and packaging.

4.3 Studio Recording

Operating a studio can often use large amounts of electricity although this can vary tremendously depending on size, usage, equipment as well as energy conservation practices.

The electricity used by studios produces approximately 10,000 t CO_2e per annum.

There are several hundred music recording studio companies and an estimated 400 studio rooms in the UK. The majority of studio companies operate one or two studios, sometimes with additional rehearsal and programming space. The variation in emissions across the sector is illustrated by the case studies of studios in our scoping study. From the data provided it is estimated that the electricity used to run a studio ranges from 10,000 kWh to more than 80,000 kWh per year, which in GHG emissions translates to between 6 t CO_2e and 40 t CO_2e plus. A large studio will be contributing at least several hundred tonnes of GHG from electricity use each year.

There are potentially significant GHG emission savings to be had in the recording studio sector by implementing simple energy management practices. However, this will require a shift in culture in how equipment is used and designed: it is common, for instance, to leave equipment on between recording sessions so that it is convenient to pick up immediately from where things ended in the previous session. The board connecting all the equipment is not often designed to give the user control over which pieces of equipment are turned on or off during a recording session, which means everything is either on or off. This can be easily corrected with re-patching and labelling.

The shift to digital recording and the increasing use of small studios will mean a reduction in electricity demand and a consequent decrease in GHG emissions. However, traditional studios and those with vintage equipment continue to be the preferred choice by some artists. For some recording studios generating electricity from a renewable energy source and/or installing a building integrated technology such as photovoltaic panels could be a commercially viable option depending on the site and electricity demand (see Box 4c).

Box 4c Best Practice – The Premises, a Solar Powered Recording Studio

Studio A at The Premises, London, is a state of the art recording studio fully powered by electricity generated from photovoltaic (PV) panels, a renewable energy technology. When The Premises needed to move a few years ago into a new building, they took advantage of the building having a flat roof and being well orientated for installing solar panels. The entire PV system cost £20,000 – half of which was funded by a standard government grant.

To determine how many PV panels were needed to meet the electricity demand of the studio The Premises did an energy audit of the amount of electricity used in a typical year in their previous studio. The PV system was designed so that, over the course of a year the amount of electricity generated by the panels is equal to the amount used by the studio. The panels are easy to maintain as they are self-cleaning. In addition to the PV system, the studio uses low-energy supplies for the SSL mixing desk and air-conditioning and the high level of sound insulation means that there is no need for a heating system, even in the middle of winter.

The Premises will re-coup the cost of the PV panels over a 10-year period, so it is not necessarily a viable solution for all small businesses (Friends of the Earth, 2007). However, with more artists wanting to record albums with environmental integrity there is likely to be a growing demand for recording studios using renewable energy. *(pers. comm. Julia Craik and Viv Broughton, 2008).*

4.4 CD Manufacturing

The manufacturing of over 120 million CD albums in 2007 generated over 10,000 t CO_2e from the physical CD itself (excluding packaging) (see Box 4d and Box 4e). A total of 134 million albums were sold in the UK in 2007 mostly (121 million) as physical rather than digitally downloaded products.

Box 4d Equipment Shifts in CD Manufacturing

In CD manufacturing it is possible to achieve 30% energy efficiency improvements by using electrical moulding equipment instead of hydraulic processing. A number of CD manufacturers are shifting to electrical processing equipment (20th Century Home Entertainment, 2007).

Box 4e Best Practice – Arvato Digital Services Using CHP Technology

A few years ago, Arvato Digital Services (formerly SonoPress), a major CD manufacturer installed a combined heat and power (CHP) plant in their German-based factory. This on-site energy generation technology has enabled energy efficiency of 85% and carbon emissions to be reduced by 50 percent. CHP technology greatly improved energy efficiency by capturing and using the heat produced from electricity generation. *(pers. comm. Anthony Daly, 2008)*

4.5 CD Distribution

In terms of CD distribution our study has taken into account the emissions from music distribution centres and the transportation of CDs from the factory to the retail store.

The distribution centres include warehouses and facilities used as hubs for regional distribution for which we estimate the emissions at about 6,000 t CO_2e.

Because these centres are essentially warehouses the main source of emissions is from electricity use. A large distribution centre will be using over a million kilowatts of electricity, producing nearly 700 t CO_2e if generated by fossil fuels. As on-site energy generation and renewable technologies become ever more commercially viable these emissions could be nearly eliminated through the use of green electricity and improved efficiency.

The transportation of over 120 million CDs from the manufacturer to distribution centres and then onwards to retailers is estimated to result in 16,000 t CO_2e per annum.

The vast majority of CDs are distributed by truck from the CD factory to the point where a retailer sells them. We attempt to quantify the transport GHG emissions produced by trucking CDs from the factory to the music distribution centre and then onwards to a retail outlet.[9] The music industry has its greatest influence over GHG emissions from transport of CDs from the factory to the distribution centre because most companies sub-contract specialist logistics firms to do this.[10] The opportunities for GHG emission savings through improving logistics efficiency is possible through better co-ordination between the music company, and the logistics company including assessing the size of truck used and the frequency of pick-up.

Most CDs are transported from distribution centres to retailers along with many other products. Trucks travelling from a general distribution centre to the high street will in many cases be making that journey anyway so the music product in itself is not creating the journey. One of the reasons trucks deliver to the high street daily or several times a week is because most retailers do not have the space on-site to store extra stock, therefore they depend on a frequent system of delivery to re-stock shelves.

4.6 Music Retailers

Retailers sell the majority of CD products in about 6,600 retail outlets that range from dedicated music stores to supermarkets to garages.[11]

Music retail is estimated to result in emissions of more than 16,000 t CO_2e per annum.

The floor area for the sale of music products can vary from a few square metres in a supermarket to several thousand square metres in a flagship music store (see Table 4.2). Given the diversity of store types and variation in amount of dedicated floor space it is difficult to accurately estimate the GHG emissions produced from music retailing.

The GHG emissions from retail are mostly from electricity for heating, lighting and power. Ensuring energy conservation measures will be the main means of realising GHG emission savings. For example, open doors with adjacent heaters to entice customers are not consistent with emission reductions.

[9] It is very difficult to identify the GHG emissions created from transporting CDs more precisely because CD distribution involves a highly complex and disaggregated transportation network. The amount of GHG emissions produced from transporting CDs will be affected by the distances travelled, the vehicle efficiency as well as the efficiency of the transport network.

[10] This study has not been able to quantify the GHG emissions produced by the secondary distribution centres or for the online distribution centres, such as Amazon.

[11] A small percentage of CDs are sold via online retailers who then direct ship the produce to customers – our study has not quantified these emissions as the data is not available and they will account for only a small part of the retail emission footprint

A lot of retail space is leased rather than owned by the retailer therefore there are limited incentives for retailers to upgrade the building fabric or explore the feasibility of installing alternative or micro-generation technologies. The trend towards a greater proportion of music being sold in non-music specialist stores means the music industry has less influence on these retailers. However, the industry is still in a strong position to encourage retailers selling music to undertake carbon audits and implement energy management strategies.

Retailers could also be persuaded to support sustainable packaging for CDs; they are likely to take the pragmatic view that they will support anything that is attractive to the consumer. However a lot of work needs to be done to make environmental packaging more appealing to consumers as recent research suggests that they do not find it attractive[12]. Work needs to be done to provide a CD product that is both attractive and environmentally responsible which can be marketed to consumers and build confidence in retailers.

Table 4.2 Estimated GHG emissions produced by music retailing

Store Type	Number*	t CO_2e/store per annum**	Total t CO_2e per annum
Specialist Chains	662	8	5,500
Multiples	1,383	1	2,000
Independent Specialists	687	5	3,400
Supermarkets	3,680	1	5,100
Others, e.g. Garage	200	<1	70
Total	6,612		> 16,000

* Number of music outlets as listed in BPI 2007

** This is not the total emissions of the store but the estimated emissions attributable to the music industry.

4.7 Hidden GHG Emissions in the CD Supply Chain

One hidden area of GHG emissions are those emissions created from the over-ordering of CDs. The traditional sales model for CDs is for retailers to order the CD stock but only pay for what they sell. Unsold CDs will have to be transported back to the music distribution centre where they will be stored until a label might try a second sales campaign. These CDs are likely to find their way to a secondary lower-cost retailer but if they are still not sold they will be recycled or sent to landfill. Thus, over-ordering results in unnecessary carbon emissions from additional distribution and waste.

The declining importance of the charts in determining sales creates an opportunity for the industry to revisit this supply and demand model and investigate new business relationships between labels, manufacturers, distributors and retailers. One alternative is 'CD on Demand' in which manufacturers can produce one or a large number of standard CDs from a digital format as required. Manufacturers of 'CD on Demand' products are setting themselves up to take orders and ship directly to customers, thereby increasing the efficiency of the distribution chain.

[12] Surveys of ERA retailers revealed that consumers rate sustainable packaging as of lesser importance than many other aspects of a CD. ERA members believe that consistency of packaging is advantageous in marketing and anecdotal consumer research reveals that many find the current array of packaging types to be less practical. However high value collectible packaging is attractive on some products *(pers. comm. Kim Bayley)*. In a recent survey by Buckinghamshire New University music fans were asked "If given the choice between a CD packaged in a bio degradable card or a plastic case I would choose card even if it didn't look as nice" 48.5% agreed with this and a further 22% were unsure in results that must be of interest to labels. Only 27% didn't agree (Julie's Bicycle/AGreenerFestival.com, 2008).

4.8 Digital Music Downloads

Digital music downloading is still an emerging format in the sale and sharing of music content. Each year there is at least a doubling of track sales, available content, and number of retailers.[13] A study by Digital Europe: e-business and Sustainable Development (DEESD) (in cooperation with EMI) estimated digital distribution used only half the material resources consumed by online CD shopping or retail selling.[14]

It is beyond the scope of this report to examine in full detail the emissions of digital download especially the link between digital download and the emissions associated with the technologies (computers, digital music players, multifunction phones) used to play digitally downloaded music (see Box 4f for results from other studies). However, this report attempts to provide an indication of emissions associated with the creation of the "digital download master", of an album, including ongoing emissions from the storage and maintenance of such masters.

The production lifecycle in the creation of the "digital download master" to the point of distribution includes:

1) Creation of the audio master (emissions the same as for a CD)

2) Transport of the CD audio master to a digital to a digital service provider (DSP)

3) Linking and storage of the digital asset into online systems

4) Encoding of the asset into retail formats so the customer can purchase and download the track.

The CO_2 emissions produced by the energy consumption of the infrastructure outlined above are approximately 320 tonnes t CO_2e per annum. However, this figure will decrease over time as computing storage density increases and the overall energy-efficiency of computer processing is optimised.

The music industry has considerable influence on the digital service providers in terms of requiring maximum energy efficiency for the storage of the "digital download master", or using on-site generation technologies. In the United States, where electricity demand of servers is significant, there are moves to reduce emissions from central servers across a range of industries.

To provide a more detailed assessment of the emissions implications of digital download we would suggest several priority research areas:

1) *Setting the emissions boundaries of the digital world for music:* Defining what is a "retail" floor space of the digital world – for example iTunes has an 80% market share, but out-sources their music delivery infrastructure to Akamai, who run a global Content Delivery Network for many organisations. Others run download stores on small servers. Storage density doubles every 18–24 months due to hardware efficiency; as the available content increases so does the storage utilisation.

2) *Understanding consumers:* Research is needed on how consumers use digital technology for accessing music content. Very little is known about how consumers store and consume music content and the energy use of the device (computers, players, phones) that the music is played on.

3) *Examining the potentials for increasing energy efficiency:* Analysis is needed to understand how to increase efficiency in digital delivery from the studio to the digital service provider and in delivery from the digital service provider to the consumer.

4) Improved data on sales of digital music downloads and on the energy use associated with informal and illegal digital music.

[13] The estimated total available download tracks in 2007 are assumed to account for less than 10% of albums. The ongoing storage requirement for this volume of media in constantly available server arrays requires 500 servers. *(per. comm. Gavin Starks, 2008 – www.ci-info.com and AMEE, www.amee.cc)*

[14] The material intensity per CD album (or 12 tracks) was estimated to be 1.56 Kg for physical retail; 1.31 kg for online CD shopping; and 0.67 kg for digital distribution (DEESD, 2003).

BOX 4f Digital Media and Dematerialisation

Digital music delivery shifts the economic value of music content from a physical object (i.e. a CD) to a virtual object (i.e. a downloaded track). However, the shift to a digital economy does not necessary lead to a reduction in materials use or emissions because digital music requires materials and physical infrastructure of its own especially in terms of music devices and IT infrastructure (Berkhout and Hertin, 2004).

Recent research has considered the potential for dematerialisation, in music delivery. This work examines two scenarios for digital music delivery: 1) a music only audio device (i.e. MP3 player) and 2) a multifunctional portable device (i.e. a mobile and MP3 player). Because of fast changes in the development of digital music delivery and devices it is difficult to predict accurately which business model will result in the greatest dematerialisation. A multifunctional device has the potential to provide dematerialisation benefits however the process of miniaturisation and the rapid turnover and replacement rate can counteract these benefits. In addition, it is difficult to know whether it is the developments in digital music content or the music devices themselves driving market demand, but there is an inter-relationship between the two affecting material consumption (Hogg and Jackson, *in press*).

This research highlights several important issues for the music industry to consider in the development of digital business models that are environmentally and climate responsible. New business models for digital music content and devices need to explicitly address and minimise the environmental impacts associated with their services and products. This will require corporate partnerships between the music and electronics industry. Furthermore, these industries must work together to influence consumer preferences and behaviour to achieve dematerialisation and thus reduced GHG emissions.

4.9 Record Companies & Labels

The emissions from record companies & labels are mainly associated with energy use in offices.

The office energy use for the business operations of record company and labels is at least 10,000 t CO_2e per annum.

There are two major groups of record companies: the four record majors, EMI, Sony BMG, Universal and Warner, and more than 800 independent record labels. The four majors are spread across at least twenty buildings and usually occupy whole buildings, usually on long-term leases. In total the energy use in these office buildings will reult in approx. 6,000 t CO_2e per annum. The data provided by the majors indicates that the energy use of their offices is above typical benchmarks for energy performance and thus closer attention to energy management and energy efficiency investments would bring these offices in line with best practice benchmarks (see Box 4g, Box 4h and Box 4i).

Most of the independent record labels are run from small office operations, sometimes even from home. An independent record label will typically be employing a handful of people and may even be a sole trader who might not work full-time. The GHG emissions produced by these companies will probably range from a few t CO_2e to 20 t CO_2e per annum. If we assume the average independent label is using about 5 t CO_2e per annum then in total these labels are responsible for about 4,000 t CO_2e per annum. The GHG emissions saving opportunities for these smaller companies are mainly simple measures to conserve energy in the office and engaging these companies in an industry-wide climate strategy could greatly affect GHG emissions as the collective contribution is significant.

Record companies and labels could all consider using green lease rental agreements for their office space tenancy (see Box 4i). A green lease ensures the property owner invests in the building fabric and energy management of the building to realise energy savings. The implementation of the EU Energy Performance Buildings Directive (EPBD) requiring buildings to be rated for their energy performance will provide a regulatory driver for property owners and occupiers to reduce energy use.

Box 4g Best Practice – The Green Team at Universal Music UK

Universal Music has set up a 'Green Team' of staff across its business activities to strategically integrate sustainability into business activities. The team meets regularly to develop actions on a wide-range of sustainability topics, including: operations energy management, green product procurement, a hybrid low emissions taxi scheme, recycling, and staff engagement and awareness. *(pers. comm. Adrian Lee, 2007)*.

Box 4h Best Practice – NME, IPC Media and the Blue Fin Building

The offices of NME (New Musical Express) magazine are located in the Blue Fin Building, London, a high energy performance building purpose built by IPC Media to house many of its publications. The building has a number of features to minimise energy consumption:

- localised metering and monitoring of electricity use;
- a system to automatically turn off lights when light levels rise above 450 lux;
- presence detectors and computer controlled light management;
- external lights five times more efficient than standard external lighting;
- decorative lighting restricted to special occasions so that it accounts for less than 1% of overall light capacity of the building;
- walls are all painted white to maximise natural light;
- energy management software is used to regulate and control the heating boilers, hot water and chiller pumps.

IPC Media committed to the building as its new home before its construction and therefore was able to closely observe the development from the outset. For example, the company was able to oversee the demolition process to ensure it was energy efficient, that materials did not travel long distances and that waste was certified appropriately. During the construction phase close attention was paid to the types of building materials and waste management. The design of the building includes fins to shade the building and a naturally ventilated atrium. In addition, the fit-out continued the 'green' theme with all consultants being obliged to use natural materials from sustainable sources, resulting in the use of a significant amount of wood from sustainable sources in the furniture/fittings but little chrome, and the walls being painted white to maximise natural light.

IPC Media is conducting assessments to ensure that the building is performing to the design standard, as well as continuing to look at ways to further improve the environmental performance of the building *(pers. comm. Jenny Noon 2008)*.

Box 4i Green Leases

The short-term nature of tenancy agreements and the fact that energy costs are usually less than 5% of a building's operating costs means there is little incentive for tenants to invest capital in more energy efficient equipment. Furthermore, in multi-tenant buildings the landlord will typically have a service contract for provision of shared services. There is limited financial incentive for the landlord and tenant to reduce energy consumption. This is a common situation for music companies.

Because the built environment is a significant source of UK carbon emissions there is a real need to address the barriers for good energy management practices in buildings.

A green lease is one solution that promotes buildings being used and operated in an environmentally efficient way, especially in areas of energy use, water management and waste disposal. The green lease concept has been successfully developed and implemented in Australia. There is great potential for transferring this concept to the UK commercial buildings market.

There are three main ways in which a green lease can be designed to improve the environmental performance of a building:

1) Attaching a charter of voluntary commitments by the tenant and landlord;

2) Attaching a schedule of contractually binding measures and timetables for environmental improvements for both landlord and tenant. (The Australian approach);

3) Incorporating measures and timetables into the appropriate covenants of the lease.

Companies in the music industry could demonstrate leadership and good practice by proactively implementing green lease agreements in advance of probable government policy in this area.

A green lease model for the UK has been part of the Building Market Transformation programme research at ECI (see www.eci.ox.ac.uk) *(pers. comm. Mark Hinnells, 2008)*.

4.10 Music Publishing

The music publishing sector produces GHG emissions mainly from building energy use.

Publishing generates approximately 5,000 t CO_2e per annum.

Music publishing is mostly desk-based, and therefore most of the energy use is from the heating, cooling, lighting, and electrical equipment used in running office buildings. There are approx. 25 medium to large publishing companies. A large publishing company is likely to be producing in the scale of 150 t CO_2e per annum to run the office. Our data suggests that a medium publishing company, such as a strong independent publisher, will produce approximately half the emissions of a large company. Therefore in total the large and medium companies will create approx. 2,000 t CO_2e per annum from office energy use.

In the publishing sector there are hundreds of small publishing companies or sole trader publishers, for which publishing will be only one of their income sources. Many of these publishers may be working from home or be mobile. Based on estimates of over 3,000 active publishers and assuming that, on average, the business activities of these publishers results in 1 t CO_2e each then this category is responsible for approximately 3,000 t CO_2e per annum. There are potentially significant benefits in engaging small publishers in energy management strategies (see Box 4i).

4.11 Summary

Our research suggests four priority areas for the music recording and publishing sectors to begin to reduce GHG emissions:

1) CD packaging

Creatively re-imagining the CD is an opportunity both to cut emissions and to communicate a clear message about climate responsibility to consumers.

2) CD distribution logistics

There is a sophisticated international trucking network for distributing CDs to customers. There are few viable alternatives in the short-term to diesel trucking for the shipment of goods. Therefore, the industry needs to assess the supply chain to ensure it is functioning as efficiently as possible.

3) Building energy management

Energy use in buildings – whether they are offices, studios, retail stores or warehouses – is a significant proportion of the industry's GHG emissions. Our research found only a limited number of companies are undertaking building energy management. Starting to learn about the energy use of their buildings is an important first step for music businesses to combat climate change.

4) Digital music delivery and distribution

The industry needs to understand further the environmental implications of digital music and the technology devices that are tied to it.

Section 5: Carbon Emissions and the UK Music Industry – Emissions from UK-based Live Performance

5.1 Overview

Live music performance is acknowledged as a major source of greenhouse gas (GHG) emissions, but until now there has been no attempt to put even a rough figure on what might be the music industry's major contribution to climate change. This study is the first to bring together data from across the live performance sector to give an empirical estimate of GHG emissions from live performances at venues and festivals. Table 5.1 outlines what GHG emission sources were included and excluded from the analysis in this research based on data availability. The gaps clearly indicate areas for further research.

Table 5.1 UK live music performance – boundaries for the emission analysis

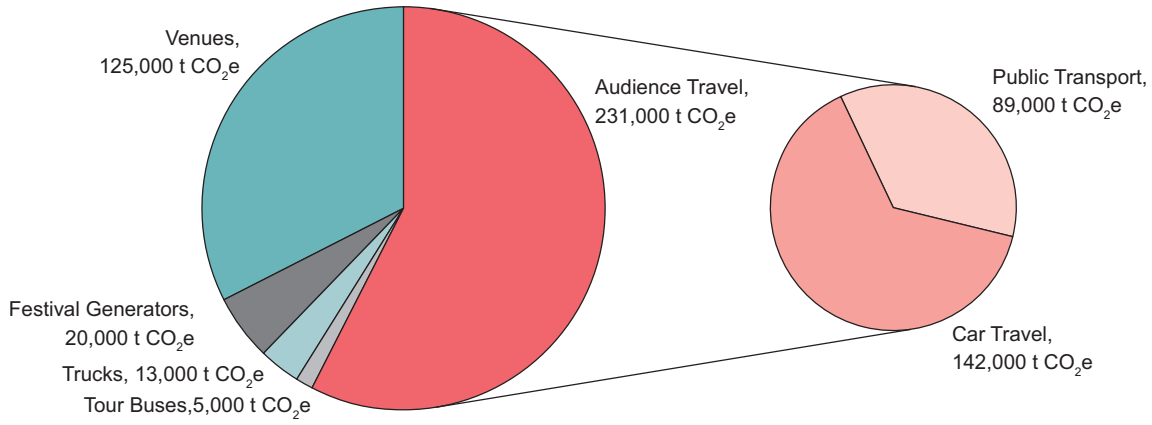
Included	Excluded
Venue building energy use	Waste
On-site energy generators (festivals only)	Food and drink
Equipment trucking	Artist and crew hotel stays
Artist tour bus travel	Merchandise
Audience travel	Air travel of international artists and crew to the UK

The total GHG Emissions from live music events in venues and at festivals are likely to create at least 400,000 t CO_2e per annum including audience travel.

Our study estimates some 75 million tickets are sold for live music performances at more than 40,000 events in the UK each year ranging from a gig attended by a few hundred people to a concert at an arena with an audience of over 10,000 people. There are more than 2,200 music venues and 500 music festivals each year, not including the hundreds of music performances in bars, hotels and restaurants.

The GHG emissions from the 2,200 music venues and festivals come to at least 400,000 t CO_2e per annum (Figure 4.3). Most of these emissions (58%) are produced by members of the public travelling to watch the performances, mainly by car. About a third (31%) are associated with energy used at the venues and generated at festival sites with the remaining emissions from transport of equipment and performers. In the following section we provide more detail and recommendations based on our analysis.

Figure 5.1: GHG emissions per annum from live music performance, by activity, t CO_2e
Total GHG emissions = ~394,000 t CO_2e



Venues: Overall the 2,200 licensed music venues produce in order of 125,000 t CO_2e per annum.

This study focuses on the GHG emissions produced by the approximate 2,200 licensed music venues regularly hosting music.[15] Table 5.2 summarises the categories of music venues; the approximate number in each category; and the average capacity by venue type. Because venues hosting live music events often hold other sorts of entertainment such as comedy, dance, and drama, we have only attributed a proportion of the building energy use to the music industry.

Table 5.2 Total GHG emissions from venues & those attributable to the music industry

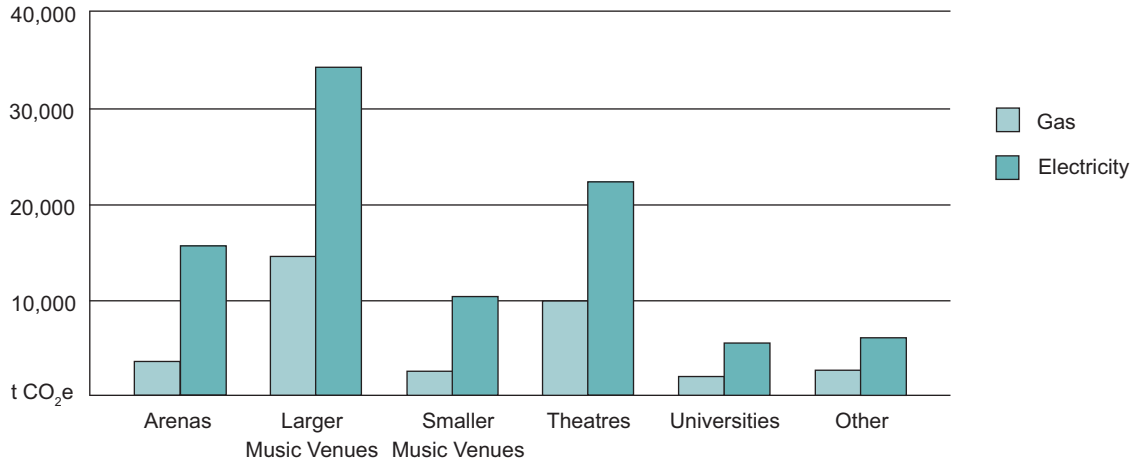
Type of Venue	Number Venues	Average capacity, people	Attributed to the Music Industry %	Attributed to the Music Industry t CO_2e	Venue Total Emissions t CO_2e
Arenas	17	6,300*	56%	19,000	34,000
Large Music Venues	150	2,000	75%	48,000	65,000
Small Music Venues	100	300	75%	8,000	11,000
Theatres	750	2,000	10%	32,000	323,000
Universities	550	300	10%	8,000	77,000
Other	700	300	10%	10,000	98,000
Total	**2,267**			**125,000**	**608,000**

* (NAA, 2007)

Our study estimates that the emissions attributable to the music industry from venues account for a fifth of the total emissions. The larger venues combine to produce the greatest GHG emissions in the 17 arenas and 150 large music venues, totalling almost 70,000 t CO_2e. The 750 theatres hosting live performance add a further 32,000 t CO_2e. Electricity is the greatest energy demand of music venues and therefore the most significant source of GHG emissions (see Figure 5.2). General venue areas and stage lighting creates a major demand for electricity, which are commonly not using energy efficient lighting technology. Adoption of energy efficient lighting solutions in venues would reduce electricity demand and therefore emissions (see Box 5b). The industry as an important customer for venues could help drive changes in building energy management and adoption of low emissions technology across venues. This would result in carbon savings greater than those emissions directly attributable to the music industry from venue use.

[15] There are a further 22,500 small venues such as restaurants, hotels and pubs that may host music events occasionally (Hanson et al, 2007). The building energy use and audience travel of these venues has not been included in this study.

Figure 5.2: GHG emissions per annum from venue energy use, allocated to the music industry, by gas and electricity, t CO_2e



5.2 Music Venues

5.2.1 Arenas

Arenas account for almost 20,000 t CO_2e per annum of music industry venue energy use.

The annual energy demand of an average arena is more than 1 million kilowatt hours of gas use and over 3 million kWh of electricity. This comes to almost 1,800 t CO_2e in total, of which ~200 t CO_2e is from gas use and ~1,600 t CO_2e from electricity use. In a study of three different arena concerts over a 24-hour period the electricity use ranged from 11,700 kWh to 19,400 kWh (6 t CO_2e to 10 t CO_2e). If the largest of these held a concert every night the total emissions would add up to 3,650 t CO2e in a year. A number of arenas are starting to improve energy management and adopt low carbon technology (see box 5a and Box 5b)

Box 5a Best Practice – Arena and Convention Centre (ACC) Liverpool

The newly opened ACC Liverpool is a demonstration of low carbon technology and energy management system in practice to reduce emissions. The arena has been designed to produce half the CO_2 emissions it would without taking into account environmental impacts and using 20% less electricity. The design of the building, along with its insulation and air control system is inherently efficient. High energy efficient lighting solutions are installed. There are five 20m low-noise wind turbines that will generate approximately 10% of the ACC Liverpool's electricity. Furthermore, all electricity is purchased from the 'green portfolio' of an energy supplier. (ACC Liverpool, 2008).

5.2.2 Dedicated Music Venues

The 250 dedicated large and small music venues produce 56,000 t CO_2e per annum.

The capacity of music venues ranges from around 50 to over 3,000 people. A larger music venue with a capacity of 1,500 to 2,500 will produce approximately 430 t CO_2e annually from using 630,000 kWh of gas and 570,000 kWh of electricity, which converted to GHG emissions is 130 t CO_2e and 300 t CO_2e respectively.

A smaller music venue with a capacity of less than 1,000 people is estimated to produce approximately 110 t CO_2e per annum or 145,000 kWh gas (or 30 t CO_2e) and 390,000 kWh electricity (or 80 t CO_2e).[16]

[16] These numbers are only indicative of venue energy use because there will be variation in the amount of energy used to heat, power and light a music venue. This depends on a number of facts including: the building fabric, the floor, the type of shows, and lighting efficiency. Many music venues are older, converted, buildings (often former theatres) and would require new capital investment to significantly improve the energy performance of the building fabric.

Box 5b Application of Next Generation Lighting Technology in Venues

Stage, ambient and aesthetic lighting creates a significant electricity demand in venues hosting live music performances. The incandescent lighting technology commonly used in such venues is not energy efficient and therefore results in unnecessary GHG emissions. There has been considerable progress in the development in next generation lighting technology, namely LED (light emitting diode) technology. It is a transformative technology enabling illumination in a range of colours, which is highly energy efficient, long-lasting, and controllable.

LED lighting solutions are being adopted in a number of cultural venues. For example, The National Theatre in partnership with Philips Electronics UK Ltd is replacing and enhancing the Theatre's external and internal lighting system. The iconic Thames-side building will be illuminated with a LED lighting solution, which will deliver a 70% reduction in energy. The public areas of the interior will be fitted with LED technology and the corridors, workshops and rehearsal rooms are being fitted with high energy efficient lighting fittings *(pers. comm. Rowena Preiss, 2008)*.

A number of music venues, such as the O2 Arena, the Wembley Arena and some of the Academy Music Group venues, are implementing LED lighting solutions.

The installation of next generation lighting solutions at venues provides a high profile demonstration to audiences of low carbon technology in practice. In addition, these lighting solutions reduce electricity demand and therefore the energy expenditure of venues. The music industry has a role in being an early adopter of LED technology to help this technology improve and transform the lighting market.

5.3 Audience Travel

This report identifies audience travel to live music performance as a major source of GHG emissions. Although there is little data available on audience travel patterns our study developed travel scenarios for different types of live music performances from which to estimate the magnitude of audience travel GHG emissions.

We estimated the total audience for music venues at 70 million annually.[17] Of this, almost 6 million went to arenas, 40 million went to large music venues and 6 million went to small music venues with the rest travelling to a combination of universities, theatres and other locations.

The travel scenario used to estimate the GHG emissions of audience travel to different music venues is summarised in table 5.3. The main modes of transport for travelling to music events are car, train, bus and coach, choice dependent on convenience and cost. For car travel, we have assumed two people in a petrol vehicle with average fuel efficiency.

Arenas will attract the highest number of people travelling by car and covering the greatest distances. Arenas are usually located on the outskirts of major cities and are more accessible by car. Less people will use cars to get to large venues and the distances travelled will be shorter because most of these are located in city centres and the artists will visit a greater number of cities across the country when touring. For performances in small venues it is assumed most people will travel by public transport.

[17] To estimate the total audience numbers the study used a combination of data and information, including: NAA Annual Report 2007; MCPS-PRS Alliance, the extrapolated touring figures and an average audience size by venue type.

Table 5.3 The travel scenarios used to estimate GHG emissions of audience travel

Venue Categories	Total Estimated audience Size	% Travelling by public transport	Average return distance travelled	% Travelling by Car	Average return distance travelled
Arenas	~ 6 million	40%	30 miles	60%	75% = 50 miles 25% = 100 miles
Large Music Venue	~ 40 million	70%	20 miles	30%	75% = 20 miles 25% = 40 miles
Small Music Venue	6 million	80%	10 miles	20%	100% = 10 miles
Theatres & University	7 million	80%	10 miles	20%	100% = 10 miles
Other	10 million	70%	10 miles	30%	100% = 10 miles
Total	**~ 70 million**				

We estimate that audience travel to music events at venues totals 175,000 t CO_2e per annum of which car travel is estimated to be over half (58%) of the GHG emissions.

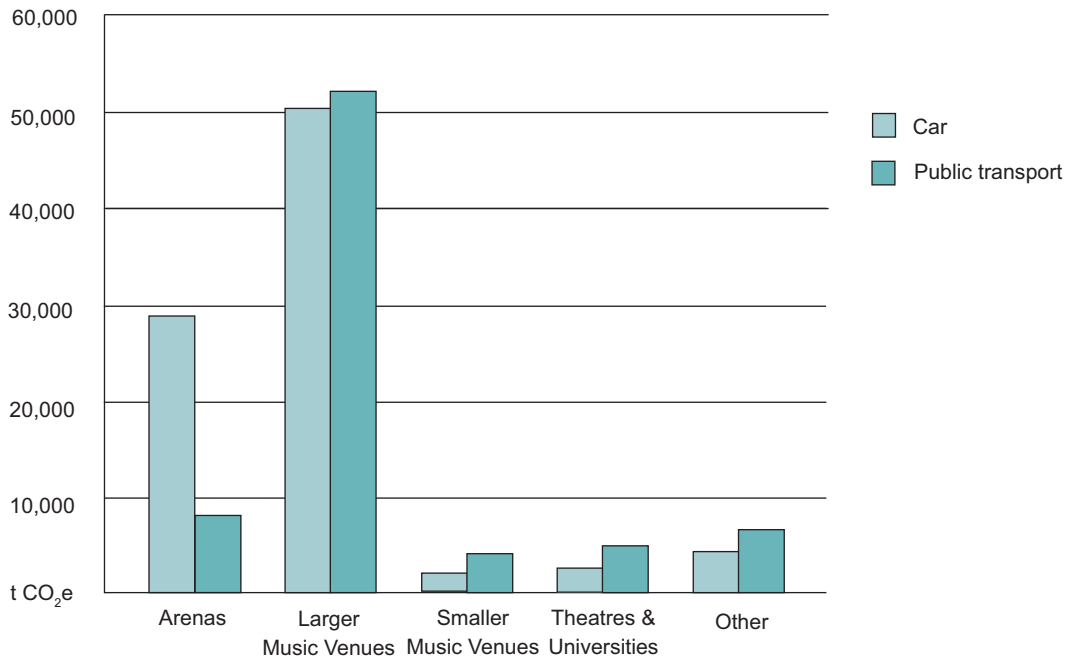
Although most people travel to live music events by public transport (48 million people), more than half the emissions generated by audience travel are produced by people travelling in cars (21 million people) (Figure 5.3 and Table 5.4). Most of these emissions come from travel to arenas and large venues. For example, typically 60% of the audience at arena concerts will have come by car.

Table 5.4 Total GHG emissions from audience travel (scenario A)

Types of Music Venues	People by Car	t CO_2e	People by Public Transport	t CO_2e
Arenas	3.5 million	37,000	2.3 million	7,000
Large Music Venues	12 million	51,000	28 million	54,000
Small Music Venues	1.2 million	2,000	5.8 million	5,000
Theatres & Universities	1.4 million	2,000	5.6 million	5,000
Other	3 million	5,000	7 million	7,000
Total	**21.1 million**	**97,000**	**48 million**	**78,000**

Cutting car travel to music events at arenas and large venues by half would reduce GHG emissions from 88,000 t CO_2e to 43,000 t CO_2e. If the people who drove switched to travelling on trains and buses this would increase public transport emissions from only 60,000 t CO_2e to 90,000 t CO_2e. This would result in a net saving of emissions of 15,000 t CO_2e and reduce 10 % of the current emissions for audience travel to arenas and large venues.

Figure 5.3: Per annum GHG emissions resulting from audience travel to music venues, by car and public transport, t CO_2e



5.4 Tour Logistics

Touring trucks and buses produce about 10,000 t CO2e per annum in supporting the estimated 3,000 plus artist tours. Two-thirds of this is associated with trucking of equipment and one-third is from artist tour buses.

A tour can often follow a circuitous route. If a venue is not available at a certain place in the itinerary it is not unknown for equipment to be transported from, say, the UK to Germany and then back within a few days. In addition, larger tours will typically travel with all the equipment rather than source it locally because of unique staging sets and perceived unreliability of local supply. Equipment is often air freighted instead of trucked to destinations, and this adds to GHG emissions.

A music tour typically involves complicated logistics to move equipment and people from one venue to the next and energy use and carbon emissions are not currently a priority in planning a majority of tours. The main factors affecting decisions tend to be cost, time, and practicalities around the availabilities of venues, artists, and crew. Clearly, tours organised to minimise transport emissions could contribute to a lower carbon footprint for the music industry.

This study assumed that there are about 70 arenas, 1,000 large music venues and theatres, and 2,000 small venues involved in tours each year. There is currently no centralised data on artist touring, so these estimates are based on an examination of typical venue line-ups, artist itineraries, and information from ticketing and artist/venue booking sites. The most difficult area to capture are tours by less commercial artists that are not performing in major music venues and logistics for artists that tour the UK more than once a year. This study did not attempt to estimate the number of single tours, but instead estimated the total number of tours by venue size.

An average arena tour will use two articulated trucks and a large music venue tour will use one articulated truck to transport equipment (see table 5.5). It is assumed that for both tours each truck will cover a distance of 2,000 miles each during the tour. The more elaborate the music concert the more trucks are likely to be required to transport the equipment between arenas. For an arena tour typically two touring buses will be used to transport artists and their entourage and for a large music venue tour just one touring bus will be used. Artists doing a small venue tour will typically not require a truck, and will use a small van to transport themselves and equipment.

Table 5.5 Estimated number of trucks & tour buses used to support UK touring

Tour Type	Estimated UK Tours/Year	Shows per Tour	Distance in miles	Number of trucks	Number of Tour Buses
Arena	70	10	2,000	2 articulated trucks	2 buses
Large Music Venue	1,000	17	2,000	1 articulated truck	1 bus
Small Music Venue	2,000	12	1,000	1 van	0

Table 5.6 GHG emissions from trucks and tour buses used for UK touring

Tour Type	Trucks, t CO_2e / tour	Total, t CO_2e	Bus, t CO_2e / tour	Total, t CO_2e
Arena	11	746	4	307
Large Music Venue	4	5,332	2	2,190
Small Music Venue	0.4	808	0	0
Total		**6,887**		**2,497**

The GHG emissions from equipment trucking for live performances are conservatively estimated to be about 7,000 t CO_2e (Table 5.6). This works out at approximately 11 t CO_2e per arena tour, 4 t CO_2e per large music venue tour and less than 0.5 t CO_2e for a small music venue tour. Tours based at large music venues account for almost 77% of emissions and arenas account for 11% of the GHG emissions produced by trucks used in tours.

The GHG emissions from the tour buses are estimated at 2,500 t CO_2e with large venue music tours comprising almost 90% of these emissions. In many cases there are additional GHG emissions from tour buses, which are kept running even when stationary at arena events for air conditioning or heating.

A small venue tour will have significantly less crew and equipment accompanying the artists and are likely to tour with just one vehicle, probably a van or small truck. The distances travelled per tour are likely to be less than an arena or large venue tour as the tours are often more regionally based. The study assumes a small venue tour will cover about 1,000 miles. Based on our assumptions about the vehicle type and distance travelled, the GHG emissions of a small venue tour will result in less than 0.4 t CO_2e. Therefore, the total GHG emissions generated from small venue touring are probably in the range of ~800 t CO_2e.

Our estimates are based on a very limited range of data and more research and self monitoring by the music industry could provide much more accurate emissions data.

Touring is heavily reliant on trucks and buses which use diesel fuel and at present there are limited alternatives to diesel for these vehicles. Biodiesel is one alternative, but there are concerns about the proportion of agriculture that is rapidly converting to biofuel crops at the expense of cereal crops and other foods, and about the high emissions associated with the production of biofuels themselves (see Chapter 1).

Other alternatives for powering buses include LPG (Liquefied Petroleum Gas) and hydrogen fuel cells. The former is a fossil fuel, but much less carbon intensive than diesel. The latter is an advanced technology, which has the potential to create low carbon, but the technology is only available in limited demonstration cases. The availability of alternative fuels is a major constraint on reducing emissions from trucks and buses used by the music industry.

A quick win for energy and carbon saving, which is often undervalued in transport, is to adopt an eco-driving style. Most bus and truck drivers driving for music tours will not have received any specific eco-driving training. Basic training could help correct driving techniques and energy wasting practices, such as running a stationary truck for hours on end (see Box 5c).

Box 5c Best Practice – Rules for Eco-Driving

Shift up as soon as possible
Maintain a steady speed
High gear and low engine RPM
Anticipate traffic flow
Decelerate smoothly
Switch off when you stop
Check tyre pressures
Minimise air conditioning

(from www.ecodriving.org)

5.5 Music Festivals

Music festivals are a significant part of the music industry's activities in live performance. Key GHG emissions associated with festivals are:

1) On-site generators

2) Trucking

3) Tour buses

4) Audience travel within UK (international not estimated in this study)

As with other areas of live music performance there is no centrally pooled data for creating an accurate picture of the scale of activity in the sector. We have used the Music Week Festival Map 2007 for guidance on audience numbers and locations, and data from MCPS-PRS Alliance. Most importantly we were able to use data from 10 festival case studies.[18]

Each festival on the Music Week Map was categorised as either:

- **Large**, audience numbers of greater than 40,000 people

- **Medium**, audience numbers of between 10,000 and 40,000 people

- **Small**, audience numbers of less than 10,000 people

This report compiled a list of 79 festivals as a core for the analysis:

- 10 large festivals;

- 40 medium festivals;

- 29 small festivals.

The total audience size for these 79 festivals is estimated at approximately 2 million people.[19] This analysis was used to extrapolate a GHG emissions total for the approximate 500 festivals taking place annually. We estimated in total over 5 million people attend festivals.

Several festival organisers provided information that allowed us to estimate:

- The amount of diesel used in generators over the course of the festival;

- The number of artist tour buses;

- The number of trucks for assembling and dissembling the site;

- Total audience numbers and proportion of the audience travelling by public transportation.

[18] There are just under 500 festivals licensed each year and the Music Week Map covers approximately a fifth of these festivals. A number of the events excluded from the present analysis include music event series (e.g. Hampton Court Palace concerts) or city-wide venue-based festivals such as The Great Escape, T on the Fringe or Evolution.

[19] It has been assumed that most of the other 421 festivals for which there is little or no available data were either small or medium sized festivals.

5.5.1 Festival Audience Travel Scenarios

Our estimate of GHG emissions for audience travel to festivals used a similar method to that for venues above and the scenarios are summarised in Table 5.7. Part A presents the proportional allocations between different transport modes by festival location. Part B outlines the travel distance assumptions for each transport mode assumed for different sized festivals.[20]

Table 5.7 Festival audience travel scenario

PART A – Transport Mode Split

Festival Location	Car	Train	Coach
London Festivals	20%	70%	10%
Urban Festivals	40%	50%	10%
Greenfield Festivals	70%	15%	15%

The table outlines what assumptions the study has used for how the audiences travelled to a festival depending on location. For example, it is assumed for a London based festival that 20%, 70%, and 10% of the audience will have travelled by car, train and coach respectively.

PART B – Return Distance Travelled

Festival Location	% Car (Rtn) and Train (Rtn) split 50:50*	Coach (Rtn)
London/Urban	100 miles : 50 miles	100 miles
Large Greenfield	300 miles : 150 miles	300 miles
Medium Greenfield	200 miles : 100 miles	200 miles
Small Greenfield	100 miles : 50 miles	100 miles

*The table outlines what assumptions the study has used for the distance travelled by audiences for each transport mode depending on the location of the festival. For example, for a London based festival it is assumed 20% of people will travel by car and of those 50% will travel 100 miles round trip and 50% will travel 50 miles round trip.

5.5.2 Emissions of Festivals

The 500 festivals this report analysed in this scenario produce about 84,000 t CO_2e per year.

We find that audience travel is the most significant emission source for all festival categories producing at least two-thirds (57,000 t CO_2e) of CO_2e emissions.

The largest onsite (i.e. non travel related) source of GHG emissions produced by festivals is from diesel fuel used in power generators (Figure 5.5). The total GHG emissions from the diesel generators used for powering the 500 festivals is estimated at nearly 20,000 t CO_2e.

[20] An average mileage for each transport mode was decided based on whether the festival was in London, and whether it was large, medium or small. It was assumed that the audience is more likely to travel by car for a festival on a Greenfield site because there are fewer public transport links and it is relatively easy to park at the site. In terms of the distance travelled it is assumed the audience will come from further away for large festivals and are more likely to be local for small festivals.

Figure 5.4: Total GHG emissions from festivals per annum by activity source, t CO_2e

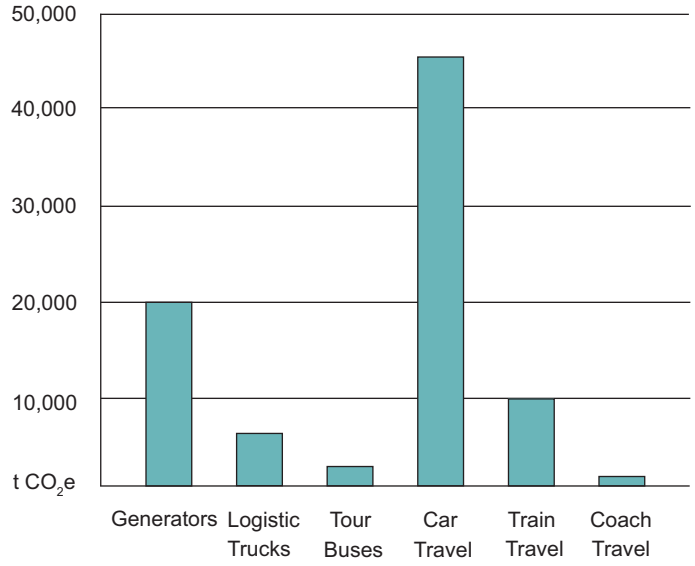


Figure 5.5: Average GHG emissions per festival size, by percentage splits between activity, t CO_2e

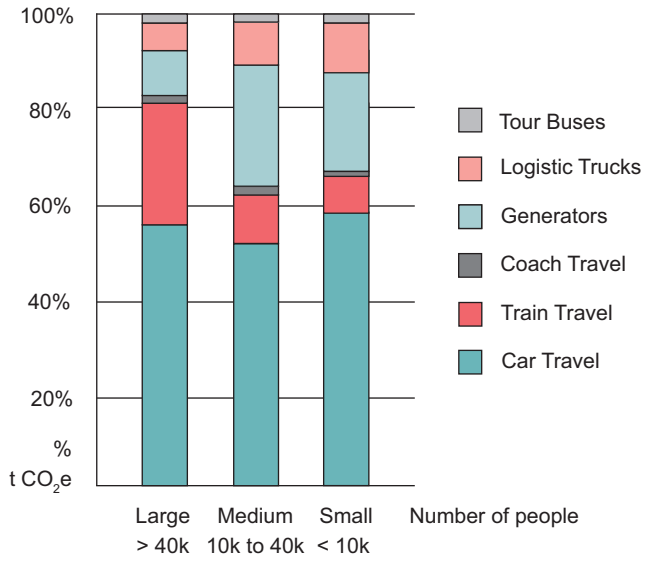


Figure 5.5 illustrates the average emission profile for different sized festivals. On average a large festival will result in about 2,000 t CO_2e from audience travel, power generation, tour buses and logistics trucking. This report estimates that medium and small festivals create on average over 500 t CO_2e and 100 t CO_2e respectively (see table 5.8).

Table 5.8 The average emissions by festival size

	Average CO_2e / Festival Size		
Activity	**Large**	**Medium**	**Small**
Car Travel	1,080	287	51
Train Travel	382	75	6
Coach Travel	40	15	2
Generators	210	132	18
Logistic Trucks	80	43	7
Tour Buses	38	11	2
Total Emissions	**1,731**	**563**	**86**

Even large festivals in more remote locations could have relatively low emissions if efforts are made to ensure the availability of attractive low-carbon transport options and if festivals' generators are well-maintained and suitably sized, transport logistics are efficient and materials used on-site are sustainably sourced. Emissions can also be reduced if energy saving equipment, such as LED lighting technology on campsites and staging is used; and if there is every effort to communicate to artists and audiences how they can play their part in reducing the environmental impact of the event. There are several best practice examples that can provide models for others (see Boxes 5d to 5f).

Box 5d Best Practice – The Festival Pioneers

There have been a number of innovative efforts made in the festival sector to reduce GHG emissions and other environmental impacts and these efforts are starting to gain a critical mass. Examples of initiatives include:

- Glastonbury's combined coach & festival ticket which encouraged 20% of the audience to travel by coach in 2007;
- the use of sustainably sourced biodiesel;
- the use of reclaimed materials at the Latitude festival site;
- T in the Park festival has been measuring their GHG emissions, and investing in high quality emission reduction offset projects (e.g. a methane capture project from a closed coal mine);
- Wychwood Festival has a number of green policies such as using low energy light bulbs and sourcing local food (Owen, 2008; Hasted, 2008).

A number of festivals are providing coaches or encouraging car share by offering incentives such as a combined coach and festival ticket or reduced parking rates for full cars. A survey by Buckinghamshire New University on behalf of AGreenerFestival.com found people (74%) would be more willing to travel by public transport if the cost was included in their festival ticket. (AGreenerFestival.com, 2008).

Box 5e Best Practice – 'AGreenerFestival.com' Awards Scheme

The Award Scheme run by non-profit organisation, AGreenerFestival.com, is a voluntary accreditation scheme to celebrate and recognise festivals working to minimise their environmental impact. To earn the award festivals must get a score of at least 53 points from a self assessment questionnaire. The questionnaire covers topics such as waste & recycling, transport options, catering, materials and generators. In 2007, the winners included: The Big Session Festival, Latitude, Glastonbury, Sunrise Celebration, The Glade, The Waveform Project, The Big Chill, Big Green Gathering, Summer Sundae Weekender and the Edinburgh International Film Festival. In addition, Download Festival was awarded a 'most improved' award. The Awards Scheme is now developing three categories of award – improving, greener and excellent – for outstanding festivals. This is to encourage festivals to continually improve their environmental performance.

Box 5f Best Practice – Futuresonic Festival Carbon Audit

In 2007, Futuresonic, an annual 3-day international of electronic music and media arts in Manchester which attracts 10,000 people, did a pilot audit of the festival's carbon emissions. The festival is spread across 20 different venues together with some outdoor events. Part of the festival is a conference attracting 250 people from all over the world as well as almost 50 international artists. The audit included the air travel of the conference delegates and artists. The carbon audit estimated the festival emissions at 297 tonnes of CO_2, without the possible additional climate impacts of flying (Upham et al., 2007; Upham et al., 2008). When air travel emissions were included they dominated the overall impact of this festival (at least 80% of the estimated carbon emissions). The audit noted that the festival has important cultural benefits that must be traded against the environmental costs of hosting such international music and media festivals.

5.6 Management of Live Music Performance

A comprehensive assessment of emissions from the live music sector would also include the emissions associated with the management of live events including emissions from the offices of managers, agents and promoters.

The office energy use of managers, agents and promoters of live events is estimated to total approximately 7,000 t CO_2e per annum.

Table 5.9 Office GHG emissions of management, agency, promotion and collection societies

Office Energy Use	t CO_2e
Management Companies	1,700
Agency Companies	630
Promotion Companies	2,600
Collection Societies & Trade Bodies	2,225
Total	**7,155**

The report used a figure of 800 active managers/management companies based on the listings in the Music Week Directory. A management company can either be a sole trader or company with typically from 2 to 10 staff.[21] Therefore, we have assumed there are about 700 small management companies having an average office space of 30m^2 and 20 larger management companies having an average office space of 150 m^2. To provide heating, power, lighting and possibly cooling for these sized office spaces results in 2 t CO_2e and 12 t CO_2e per annum respectively. In total we estimate the office energy use of management companies to result in 1,500 t CO_2e per annum.

The amount of office space required by agency companies is the smallest in this sector (Table 5.9) as there are just a handful of major agents, who employ between 12 and 24 staff, with most being smaller agency companies or sole traders. We used a figure of 140 agency companies based on the listings in the Music Week Directory. We assumed the major agents each occupied an office space of 300 m^2 and the smaller agency companies occupied 30 m^2. In total office based GHG emissions of agency companies are assumed to be upwards of 500 t CO_2e per annum.

Promotion companies have the largest GHG emissions in this segment. It is estimated that the total office emissions are in the order of 2,600 t CO_2e per year. Calculations are based on there being just over 100 promotion companies. We assumed there are just a couple of large international promotion companies (several hundred employees) with an office space of 3,000 m^2 each resulting in just over 500 t CO_2e per company. The approximately 10 mid-size promotion companies with 20 to 30 employees with an average office space of 1,000m^2 results in about 100 t CO2e each. The remaining 100 promotion companies, which employ just a handful of people or are sole traders, create 6 t CO_2e per annum each from office energy use.

[21] Music managers may not be working full-time as a manager. In addition, they may work from home so like other parts of the industry it is difficult to precisely assign average GHG emissions to this sector of the industry.

Collection Societies and Trade Body Associations are organisations involved in office-based activities, which result in 2,225 t CO_2e per annum. The two collection societies have a staff of approximately 1,000 people.[22] The study has found that the office building energy use of these two organisations results in 2,000 t CO_2e per year. The music industry has a number of trade body associations, which mostly employ just a few people and occupy an office space of less than 100 m^2. However, there are several larger trade bodies, which require a larger office space. The office energy use of trade associations is estimated to be 225 t CO_2e per annum.

5.7 Summary

If the GHG emissions of a music event are distributed on a single ticket basis a rough estimate of average emissions embodied in an event ticket is:

- 5 kg CO_2e for a music venue
- 18 kg CO_2e for an arena
- 25 kg CO_2e for a festival

This report's analysis suggests four priorities for reducing GHG emissions in the live performance sector:

1) ***Audience travel plans:*** Changing the way in which audiences travel to arenas and festivals in locations where a large number of people travel by car could have a major impact on reducing emissions. Audiences need incentives not to travel by car at all or to car share to events. The industry should identify creative ways to encourage mode switching that are commercially viable.

2) ***Music venue energy management and installation of highly energy efficient lighting (i.e. LEDs) could produce significant emission reductions.*** A useful starting point would be with the venues such as arenas and large music venues for which live music is a core business activity. Secondly, LED lighting in venues is a highly visible way to demonstrate action to save energy and reduce GHG emissions as well as reducing electricity expenditure over the longer term.

3) ***Artist and tour production managers could contribute to emission reductions*** by integrating carbon management from the outset of planning a tour and to seek guidance on how they can best work with suppliers and venues to reduce the GHG emissions when on tour.

4) ***The whole industry could contribute to better data on energy use, travel and associated emissions.*** The data for GHG emissions management in the live performance sector is either not collected or highly fragmented. For the industry to make strong progress in reducing emissions in this area there needs to be systematic data collection and availability of this data.

[22] Most of the trade bodies in the music industry are small with typically less than six staff. There are some trade bodies such as BPI which have larger staffing. There are approximately 20 trade body type associations in the industry. Mostly trade bodies occupy a small area of office space and make less than five flights per year. Together these organisations probably produce about 225 t CO_2e per year from office energy.

Section 6 Carbon Emissions and the UK Music Industry – Emissions from International Travel and Touring

6.1 Overview

This study indicates that the grenhouse gas (GHG) emissions of the UK music industry from international touring and industry travel are at least 416,000 t CO_2e.

International travel is a major part of the UK music industry's business activities. As a result, it has been a focus of attention regarding the environmental sustainability of the music industry. Many UK artists have significant music sales overseas and therefore frequently tour internationally. However, data from which to estimate emissions from the UK music industry's international activities are limited. Nonetheless, we have undertaken preliminary analyses of the GHG emissions of various international travel and touring activities. This section provides results on emissions associated with:

1) International Touring
   a. Arena/Amphitheatres
   b. Large Music Venues

2) Air Travel
   a. The staff of record companies & labels
   b. Managers and agents
   c. Artists
   d. Orchestras

All GHG emission results for air travel are presented assuming an equal allocation of GHG emissions per passenger.[23]

6.2 International Touring by UK Artists

International touring is an important part of the music business and therefore a major activity of the UK music industry. Europe, the USA, Australia and Japan comprise the principle markets for UK music promotion. Some artists will be touring heavily in these regions, doing more than 100 live performances a year. Typically, a tour leg for a region will be between 15 to 35 performances. Figure 6.1 outlines some examples of how many live performances some popular artists are doing in a year. There were 79 UK artists receiving BPI album sales awards in 2007. Two-thirds of these artists toured internationally with almost 50 touring the US, 29 touring Europe and 23 touring Australia.

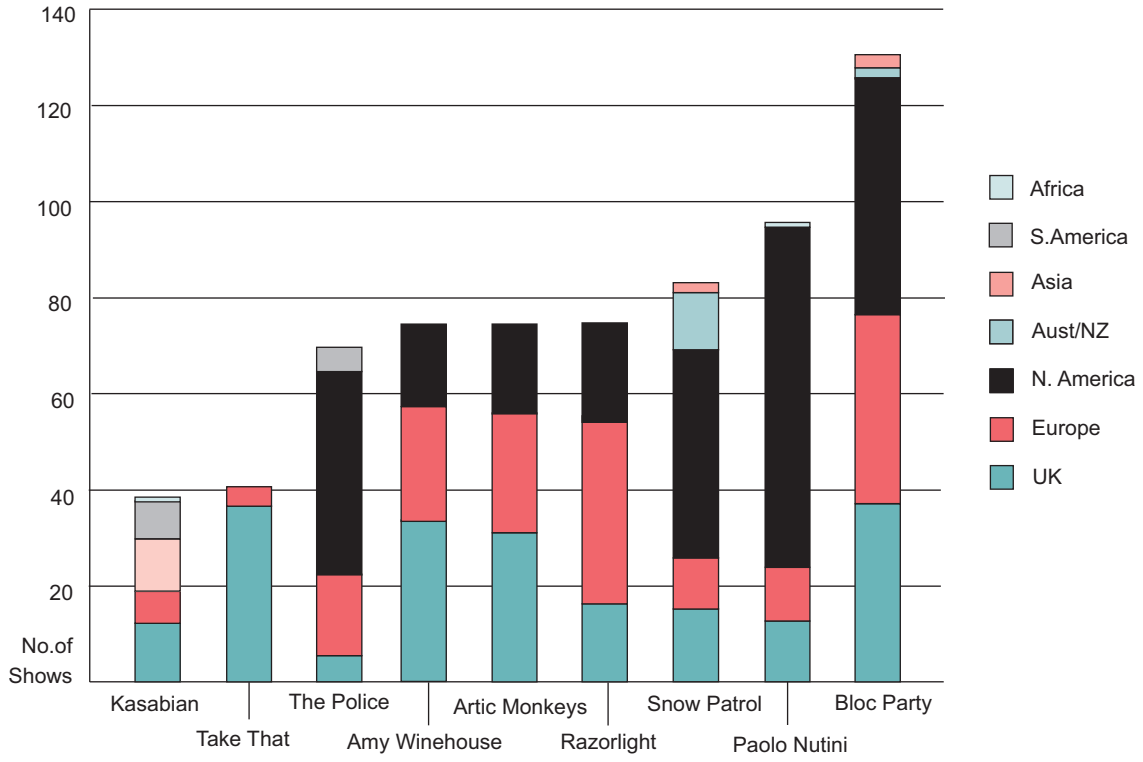
The study conservatively estimates the GHG emissions from UK artists international touring to Europe and the United States to be at least 400,000 t CO_2e per annum based on an estimated 240 tours.

Most international touring done by UK artists will be theatre and/or club tours. A relatively small number of artists do arena and stadium-sized tours.

There is very little data on GHG emissions associated with touring and only a small number of artists have audited their tours. At this time, our study has only focused on UK artist tours in Europe and the United States.

[23] A significant proportion of air travellers in the music industry fly business or premier travel classes as well as use private and corporate jets. These classes of travel result in more service, more transport weight and therefore more fuel use and GHG emissions.

Figure 6.1: The number of live shows, by world region, played by a sample of UK artists, with at least UK gold album sales, 2007



To assess the scale of GHG emissions from UK artists touring internationally, the study used:

1) Estimations of tour numbers from online resource PollstarPro.

2) The published Radiohead carbon audit of their last two US tours (an amphitheatre and a theatre tour) (see Box 6a).

3) A GHG emission scenario for an arena and theatre-based European tour (using similar assumptions to the UK assessment of these types of tours, but with additional estimates for crew and logistics travel).

This study has created an additional tour size category – amphitheatre – as some of UK artists touring internationally, such as The Police, Radiohead, Rolling Stones, will be touring in venues with a capacity of 20,000 people. Furthermore, the carbon audit of Radiohead enabled us to estimate the total emissions of these large scale tours in the United States.

We have estimated the GHG emissions from international touring by using a kg CO_2e per ticket figure for each international tour type, and the average audience size per tour (see Table 6.1). Ticket figures we based on adapting the UK tour/live performance scenarios and incorporating estimates for the additional artists, crew and logistics travel involved in international touring. Audience travel scenarios were used for European arena and theatre tours, but the Radiohead estimates were used for the United States tours[24].

In 2007 we estimate, based on assessed data, that there were at least 240 pop and rock tours taking place in Europe and the United States.[25] In total these tours in Europe and the United States will have generated at least 400,000 t CO_2e (see table 6.1). A third of these GHG emissions will be from arena and amphitheatre tours and therefore two-thirds of emissions will be from theatre tours.

[24] We assumed for the United States the kg CO_2e / ticket to be the same for amphitheatre and arena sized shows as the audience travel is thought to have a similar profile.

[25] From examination of the artist line-ups at music venues (theatre sized) in twenty-five major US cities we estimate there to be at least 100 pop and rock tours.

Box 6a Carbon Auditing International Touring – Radiohead Case Study

The Radiohead audit estimated the carbon dioxide emissions from 2 US tours, one of amphitheatres and one of US theatre venues. They found emissions of 9,073 t CO_2e for the amphitheatre tour and 2,295 t CO_2e for the US theatre venue tour.

Best Foot Forward on behalf of Radiohead produced some of the most comprehensive information on the carbon footprint of an international tour. They measured emissions on their theatre and amphitheatre tours to the US in 2003 and 2006. Each audit calculated the carbon dioxide emissions from pre-tour production; artist and crew travel and accommodation; equipment transportation; power generation; audience travel; merchandising; and food and catering.

The theatre tour had 19 shows across the US and a total audience of approximately 70,000 people. The carbon audit estimates the theatre tour produced in the order of 2,295 t CO_2, which translates to about 33 kg CO_2 per ticket. Audience travel comprised by far the greatest proportion of emissions – 86%.

The amphitheatre tours had 12 shows across the US and a total audience of approximately 240,000 people. The audit estimates the amphitheatre tour resulted in 9,073 t CO_2, which translates to about 38 kg CO_2 per ticket. Audience travel is estimated to be 97% of the total emissions (Stentiford, 2007).

Table 6.1 Illustrative estimates of UK tours in Europe and the United States, per annum

International Tour Type	No. Pop, Rock Tours	No. Shows/Tour	Audience/ Show	kg CO_2e / Ticket	Emissions/ tour, t CO_2e	Total Emissions, t CO_2e
USA Amphitheatre	10	10	20,000	38	7,600	76,000
USA Arena	10	10	10,000	38	3,800	38,000
USA Theatre	100	20	3,500	33	2,310	231,000
European Arena	20	10	10,000	14	1,367	27,000
European Theatre	100	20	2,000	7	283	28,000
Total	**240**					**400,000**

These 240 tours will have entertained over 15 million people with 25% having gone to an amphitheatre show or arena show and 75% having gone to a theatre show. As is the case with live performance, audience travel will be the dominant GHG emissions source, especially in countries such as the US, where there is greater reliance on the automobile and average driving distances are longer. The significance of audience travel means that one way to reduce emissions from international tours is by artists playing in multiple locations instead of just a few, and thereby reducing the distance the audience travels.

There will be tremendous variation in the direct GHG emissions of a tour, such as the travel of the artists and tour. A large scale world-wide tour will have a crew of over 300 people and at least a third of the crew will be travelling with the tour. Flying a 100 tour crew on one return flight to the US would result in 60 t CO_2e (without added flights) as part of a tour.

International pop and rock touring is likely to be proportionally the largest generator of GHG emissions, but other genres will also have notable GHG emissions. In particular, the six big UK orchestras each do some international touring.[26] Each of these orchestras may do from two to six tours each year. An orchestra tour will typically charter a plane for the artists and truck the instruments (for a European tour). A full orchestra tour will involve more than 100 artists travelling. A return short-flight (i.e. UK to Europe return) for 100 hundred people will result in approximately 20 t CO_2e. One orchestra is looking at how to be a low carbon emissions orchestra, including linking with orchestras in other countries to share personnel, thereby reducing the need to travel.

[26] Orchestral performances in the UK will have been captured in the results through our estimates on venues and audiences.

6.3 Air Travel of Record Companies & Labels

The study estimates that international air travel from record company staff contributes around 13,000 t CO_2e per annum.

The extent of company air travel clearly depends on the artists represented and target markets. Some companies travel mainly in Europe; others focus more on the United States, South America and Asia. Our study collected data on the amount of staff air travel for a 12-month period from the four major international record companies. From this, we calculated emissions and assumed that the independent record companies contribute an additional 10 per cent.[27] Therefore, we estimate the total air travel of record company staff (excluding artists) is approximately 13,000 t CO_2e per annum (13 million kg CO_2e).

A quick opportunity to save GHG emissions is to rationalise air travel: better planning could allow switching from planes to inter-city trains.[28] Rationalising air travel is important given the growth of this transport mode and climate impact (see box 6b). In addition, a substantial amount of travel in the music industry is business class. It can be argued that a business class passenger consumes proportionally more resources than an economy passenger and therefore these passengers should have a greater carbon weighting (see Box 6c).

6.4 Air Travel of Management, Agency and Promotion Companies

The study estimates that the combined air travel of management, agency and promotion companies is responsible for at least 3,000 t CO_2e per annum.

In this sector, air travel is the most significant source of GHG emissions. In a given year the amount of air travel undertaken will depend on two chief factors: touring schedules of the artists they represent and their international markets. Below are initial estimates of travel by managers, agents and promoters.

6.4.1 Managers

The air travel of managers is about 2,150 t CO_2e per annum.

The extent a manager travels is greatly determined by whether the artist they represent is either touring or giving promotional performances. A manager's travel ranges from single flights, to accompanying an artist on multiple legs of a world tour. Our data showed that the GHG emissions for the travel itineraries by managers can range from just 200 kg CO_2e (0.2 t CO_2e) to more than 17,000 t CO_2e (17 t CO_2e) in a year (see table 6.2).

Table 6.2 Examples of managers' air travel in 2007

Managers' Air Travel	Destination	Total kg CO_2e
Manager 1	Germany (return)	200 kg
Manager 2	Ireland & France (return)	400 kg
Manager 3	USA (return)	1,400 kg
Manager 4	USA & Australia tour	5,000 kg
Manager 5	USA, Australia & Japan tour	17,000 kg

Our interviews suggest that about a third (250) of the estimated 800 active managers regularly travel internationally. Of this third we have determined that at least 100 managers are travelling extensively with and on behalf of their artists (e.g. Manager 5 from Table 6.1), thereby contributing at least 17 t CO_2e per manager per annum from their air travel. There are likely to be another 150 managers undertaking moderate amounts of travel (mostly to Europe with some US trips), thus contributing at least 3 t CO_2e per individual per annum. The remaining 650 managers are unlikely to be promoting artists internationally, and are therefore generating in the region of 2,150 t CO_2e per annum from their air travel.

[27] This is because we assumed that although independent record companies account for 22 per cent of the music recording market, many of these companies are small and do not travel as much internationally.

[28] In fact, an increasing number of companies are making it company policy not to take domestic flights or to minimise these flights.

6.4.2 Agents

Agents will produce 530 t CO_2e from air travel per annum.

Three quarters of the staff working in a typical agency are back office support and will not need to fly; the agents themselves do the bulk of travel. A key agent in one of the big companies can fly 60 to 100 or more times a year, mostly to European destinations. Therefore we estimate the emissions of these key agents range from 14 t CO_2e (14,000 kg CO_2e) to 24 t CO_2e (24,000 kg CO_2e) per annum.[29] We estimate that there are approximately 160 agents. The majority are assumed to be creating in the order of 2 t CO_2e per annum from their air travel.

6.4.3 Promoters

Promoters are least likely to do extensive travel in comparison to managers and agents, apart from promoters who work for international music promotion companies.

This is because the great majority of their business activities are centred on organising live music events in the UK. Exceptions are those working for international companies, such as Live Nation and AEG. Data on the amount of air travel done by promoters was not sufficiently available to estimate indicatively GHG emissions for the all promoters. However, data provided by some of the mid-sized promotion companies found that their air travel emissions ranged from 33 t CO_2e to 62 t CO_2e per annum.

6.4.4 Artists

There is tremendous variation in artist travel. The GHG emissions of artist air travel will range from 0 to more than 17 t CO_2e (17,000 kg CO_2e) per annum.

At this early stage of investigation, it is not possible to provide an accurate estimate of the total amount of air travel done by UK artists. However, air travel itineraries of a handful of artists in 2007 were provided for this scoping study. These itineraries made it possible to estimate the GHG emissions attributable to sample artists.

Of the artist case studies, the number of flight legs ranged from 9 to 40 and the respective GHG emissions ranged from 5 t CO_2e to 17 t CO_2e (5,000 to 17,000 kg CO_2e) (see table 6.3). Typically artists do not take return journeys but move from city to city on a tour. They often travel with several support staff and carry equipment and instruments (in addition to their standard luggage allowance). An artist travels most when promoting a new album.

Table 6.3 **Examples of different artist's air travel in 2007.**

Artist Travel Case Studies	Destinations	Total # Flights	Total kg CO_2e
Artist 1	Europe, USA, Australia & Japan	40	17,000
Artist 2	USA, Europe	26	10,000
Artist 3	USA, Europe	24	11,000
Artist 4	USA, Europe	9	5,000

These are for one artist. If this artist is a member of a band with an entourage these numbers can quickly scale up.

6.5 Summary

There are four recommendations for cutting emissions in international touring and industry air travel:

1) *Collection of data on international touring and travel by the industry*

a. There is almost no data available on international touring. Emissions can be assessed and reduced more effectively if good information is at hand.

b. Some artists are conducting carbon audits of their tours, but this needs to become standard practice. It would be useful to devise a touring template to make it easier to track data.

c. Companies need to systematically collect information on business travel and then reduce the number of trips.

[29] The study has used the case study industry sources to indicatively estimate the total GHG emissions attributable to agents. The research estimates the annual average for an agent working in one of the main agency companies will produce over 10 t CO_2e; in a small agency that average will be 5 t CO_2e; and for a sole trader that average will be 2 t CO_2e.

2) *Reassuring the supply chain to improve environmental performance of touring is the area where the UK music industry has the greatest leverage to influence carbon management internationally*

a. Artists could insist on green commitments in performance contracts with promoters and venues.

b. UK artists touring internationally to common venues should work together to persuade service suppliers to reduce carbon emissions, especially in the area of audience travel.

3) *Shared intelligence of carbon management approaches*

a. Production managers, agents and artists can share ideas to fast track best carbon management practices

b. Sharing intelligence can serve as a guide for other regions and sectors, especially other creative and cultural sectors where there are common issues.

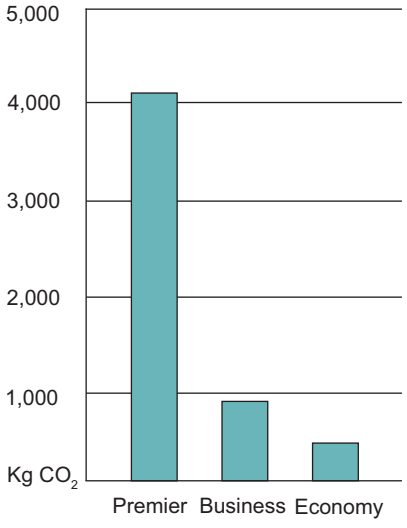
Box 6b The Climate Impact of Air Travel

Globally the fast-growing sector of aviation has increasingly contributed to GHG emissions. In the UK, aviation emissions have doubled since 1990 and are now responsible for 5.5% of national emissions (DfT, 2004). Moreover, the release of GHG emissions – carbon dioxide (CO_2) nitrogen oxides (N_2O) water vapour (H_2O_v) and particulates – have from 2–4 times greater climate change impacts than those released at ground level (IPCC, 1999). Nonetheless, these sources have not yet been incorporated into international or national climate change policies. But, extensive scientific and policy research is underway to grapple with the challenge of deciding how best to quantify aviation emissions and impacts. Two further factors contribute to a slow market transformation of the sector: 1) at present there are not immediate alternatives fuels or technologies available; and 2) vessel turnover is slow as each plane can remain in operation for decades. Despite these challenges, what is clear is that aviation will necessarily and eventually be incorporated into policy. In the meantime, the music industry should reduce air travel demand, as feasible.

Box 6c Air Travel Emissions by Travel Class

An airplane passenger travelling business class will use greater resources than an economy passenger, because they have a larger luggage allowance, more seating space and onboard services. Therefore, one way to determine the emissions per passenger travelling on a plane is to allocate them based on the seat class the passenger is travelling rather than on an equal per capita basis. The emissions per pound are calculated for a flight and then multiplied by the average cost of a ticket per seating class. Based on this approach Figure 6.2 illustrates what the emissions allocation per passenger by seat class will be for a return flight from London to New York City in a 747-400 plane with 416 passengers. The business class passenger's emissions are double that of an economy class passenger and premier class passenger would be 10 times the economy class passenger. Considered another way, the premier class passengers are responsible for 22% of the flight's emissions, but only 3% of the passengers while economy class accounts for 65% of the emissions but 85% of the passengers. Of course, music industry air travel habits do not determine the seating configurations on aircrafts. However, reducing the demand for premier and business class travel (as well as less air travel by corporate and private jets) would contribute to GHG emissions reductions within the UK music industry.

Figure 6.2: GHG emissions per passenger return flight from London to New York City, weighted by travel class, Kg CO_2



Section 7 Issues, Observations & Recommendations

7.1 The GHG Emissions of the UK Music Industry

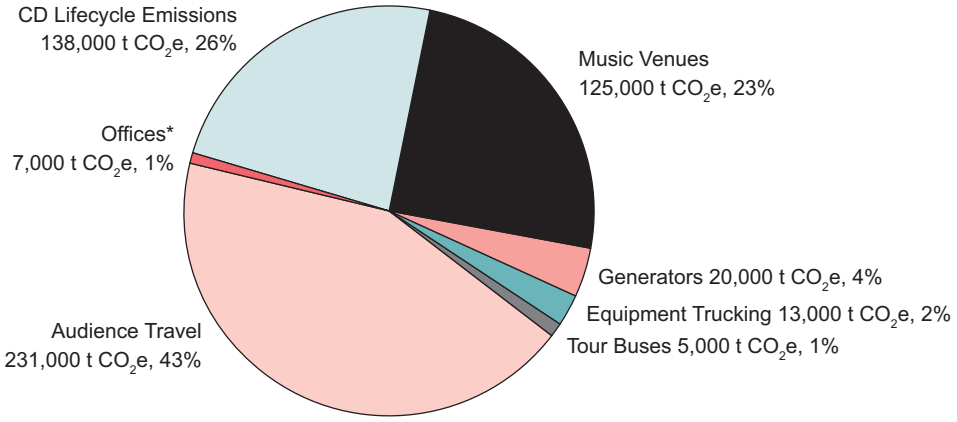
In this study, we have focused on the quantification of the greenhouse gas (GHG) emissions associated with the UK music market through the sale of music products and live performances; it also offers, however, an initial indication of the scale of GHG emissions produced from international touring by UK artists and industry air travel. While it is necessarily indicative and not a formal audit of the industry's carbon footprint, it is judged sufficiently accurate to allow the industry to prioritise its actions in the short and medium term.

Our results indicate that the total emissions resulting from products and services for the UK music market produces at least approximately 540,000 tonnes of CO_2 equivalent[7] per annum. Our results show the UK music industry is responsible for at least an additional 416,000 tonnes CO_2e from international touring and industry air travel. For the UK music market the major contributions are from audience travel (43%), live venue music events (25%), and music recording (26%), with smaller contributions from music festivals (5% excluding audience travel) and music organisations (1%) (see table 7.1 and Figure 7.1).

Table 7.1 GHG emissions of the UK music industry per annum, by activity

Music Industry Sector/Activity	GHG Emissions, t CO_2e
Recording & Publishing Sectors	
Record Companies & Labels (offices)	10,000
Publishing (offices)	5,000
Recording Studios	10,000
CD Manufacturing	10,000
CD Materials & Packaging	65,000
Music Distribution Centres	6,000
CD Transportation Logistics	16,000
Physical Music Retailing	16,000
Digital Download Master	300
SUB-TOTAL	138,300
Live Music Performance Sectors	
Venues	125,000
Festival Generators	20,000
Equipment Trucking	13,000
Tour Buses	5,000
Audience Travel	231,000
Management, Agency, Promotion, Collection Societies (offices)	7,000
SUB-TOTAL	401,000
International Travel & Touring	
International Touring (USA & Europe)	400,000
Air Travel: Record Companies & Labels (staff travel)	13,000
Air Travel: Management, Agents & Promotion (staff travel)	3,000
SUB-TOTAL	416,000
Total	**955,300**

Figure 7.1: GHG emissions per annum from the UK Music Market: Recorded and Live
Total GHG emissions = ~ 540,000 t CO_2e



**Emissions from managers, agents, promoters, collection societies and trade body offices.*

7.2 The GHG Emissions of the UK Music Industry in Context

The music business is classified as a low carbon industry and has a much lower direct climate impact than high carbon industries such as oil/gas production and power generation. It is important to note, however, that the 60–80% reduction in emissions required by mid-century assumes that all parts of the economy take equal responsibilty to lessen their emissions to this order of magnitude. The music industry's relatively low direct emissions must be counter-balanced by an arguably greater obligation on account of its greater societal influence and its higher public profile.

To put the industry's carbon footprint in perspective, figure 7.2 illustrates the annual global GHG emissions of a selection of non-energy intensive FTSE 500 companies in the service sector. These companies report their emissions as part of the Carbon Disclosure Project[30]. The annual carbon footprint of these companies' global business operations range from over 6 million t CO_2e to less than half a million t CO_2e (CDP, 2007).

7.3 Key Issues and Constraints

Issue 1: The indicative estimates of GHG emissions come with a health warning.

The estimates are based on the data currently available from music companies and do not represent a formal audit on the industry's carbon footprint. While many companies were willing to input information to this study, they often had insufficient energy data available to quantify GHG emissions accurately. The music industry is at the beginning of the learning process in energy and carbon management. Indeed, most companies are not yet systematically collecting and analysing the information needed to accurately quantify and monitor – let alone manage – the GHG emissions produced from their business activities. Energy measurement is absolutely critical and a first order priority in order to take concrete long-term actions on reducing GHG emissions.

Issue 2: The fragmented nature of the industry presents problems in data collection and coordination of an industry wide response.

At one end of the business spectrum the industry is highly consolidated (e.g. recording, publishing, promotion and agency), but with the majority of products and services (e.g. CD manufacturing and trucking logistics) being sub-contracted. At the other end the industry is characterised by thousands of small-to-medium enterprises (SMEs) and sole traders. Individually, these companies have small emissions profiles, but collectively their emissions become significant.

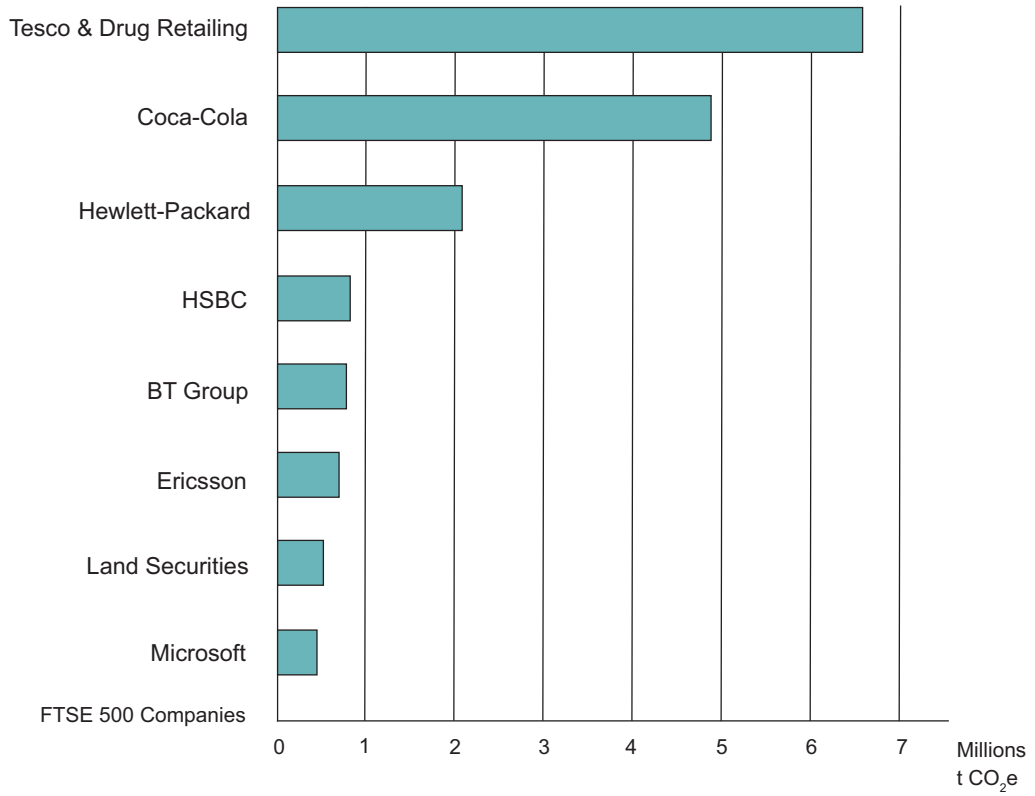
Issue 3: The emissions boundaries set for this study does not include the industry's full global impacts.

As a service sector the music industry's GHG emissions result from using mixed forms of fossil fuel energy sources extending the length of its global supply chain.

The most effective approach to carbon reduction will be to integrate programmes through the industry's whole supply chain. The nature and structure of the music industry calls for its suppliers to adopt carbon reduction strategies across their total product and/or service base, not merely those directly related to the music industries.

[30] The Carbon Disclosure Project annual survey asks firms to assess the risks – and opportunities – presented by global warming, and to describe strategies being used to reduce GHG emissions. The survey, signed by more than 300 institutional investors managing some US$41 trillion in assets, found that 76% of respondents reported implementation of a programme to reduce greenhouse gas emissions compared with 48% a year ago (Tollefson, 2007).

Figure 7.2: GHG emissions from selected non-energy intensive FTSE 500 companies* in 2007, t CO_2e



*These companies follow the GHG Protocol for emissions accounting.

Source: Carbon Disclosure Project, 2007

Issue 4: The shift to digital will significantly alter the industry's lifecycle GHG emissions profile over the coming years.

The industry is undergoing radical change which will result in a greater proportion of GHG emissions coming from indirect sources. These will include the energy used by servers hosting digital music; the embodied carbon in the materials of music listening devices, and audience travel to and from live music performances. An industry-wide climate strategy needs to recognise, anticipate and respond to the changing shape of its emission profile. The industry will need to work with other sectors (e.g. manufacturers of music listening devices) and interface with consumers to ensure that the extended carbon footprint is measured and managed.

Issue 5: The music industry is exposed to a high level of media scrutiny, which can discourage public statements on climate change action.

The issue of climate change is complex with scientific and technological responses constantly evolving. The industry needs reliable, up-to-the-minute and authoritative advice on measures to tackle change so it does not fall behind the latest best practice and end up being pilloried for bad choices. In addition, the public communication campaigns run by artists and the industry on climate change action can be perceived as token efforts with inconsistent and confusing messaging to their audiences.

Issue 6: There are already a number of exemplary and innovative practices taking place within the industry, but these are generally small in scale and at the single company level.

As the case study boxes throughout this report illustrate, there is widespread evidence in the industry of exemplary and innovative environmental/energy management. These case studies include: auditing energy use and carbon emissions; carbon disclosure; purchasing renewable electricity; photovoltaic powered recording studios; biodegradable CD packaging; a green festival awards scheme; combined coach and festival tickets; biodiesel powered generators; LED stage lighting; staff green teams; hybrid/low emissions cars and taxis; rationalised travel (including flights) and energy efficient venues and office buildings. Furthermore, a number of companies have appointed dedicated staff with responsibilities for developing and coordinating carbon reduction and energy saving strategies. The research emphasised that senior management leadership, staffing and financial resources are all critical for effective energy saving and carbon reduction management.

It is important to note, however, that many of these initiatives are still small in scale and almost always limited to a single company. The need – and the opportunity – is to scale up for greater impact through critical mass and mainstreaming. An industry-wide strategy should enable these and additional initiatives to gain greater traction across the industry.

7.4 Concluding Observations

While much of the report directly concerns the analysis of actual energy data from the industry, complimenting this were in depth interviews and an attitudinal survey which captured attitudes, motivations and ideas for company and industry responses to climate change. The research study concludes with the following observations.

Observation 1: The UK music industry is not carbon intensive but still will find reducing GHG emissions by 60–80% a challenge. It is not well prepared to deliver this level of climate responsibility. There is a growing understanding in the industry that it faces both commercial and moral imperatives to act on climate change.

Observation 2: The business case for action is rooted in the inevitability of costs which will attach to GHG emissions as carbon regulation, taxes and trading progressively penalise carbon emissions; equally there will be positive savings and intangible benefits to businesses which reduce their carbon footprint. Furthermore, climate responsible companies find competitive advantage with their stakeholders (especially consumers and their own staff).

Observation 3: The moral case reflects the power this particular industry has to influence society more generally through its cultural leadership and role modelling. With this power comes the opportunity – and arguably the responsibility – to set an example by mitigating its own emissions and encouraging climate responsibility among its global audiences.

Observation 4: The industry is made up of many small companies and sectors. The sum total creates a latent mass of interconnected power. There are several factors which inhibit the exercising of that power to tackle climate change, the most significant being that no single company or sector can afford to over expose itself to financial or branding risks. If the industry acts together within and across sectors the risk will be minimised and the effect will be greater. In addition support needs to be given to industry champions so they are not acting in isolation.

Observation 5: Energy management is the first step towards carbon disclosure, whereby companies produce an annual statement of their carbon emissions with forward-looking reduction targets. Few music companies are currently reporting carbon emissions across their supply chain. However, this is becoming standard practice for corporate accountability. The music industry could take a lead by being prepared and willing to participate, pre-regulation, in this transparency process.

7.5 Recommendations

Recommendation 1: On the basis of this study, it is clear that there is widespread support for coordinated industry actions on climate.

As a first step towards climate leadership, it is recommended that the industry agrees and adopts both short and medium term goals.

Recommendation 2: In the short term, it is proposed that reducing the industry's own carbon footprint should be the clear priority.

This should include:

• Undertaking regular GHG emissions audits of business activities.

• Managing building energy use, especially of music venues and offices to target energy savings and low carbon technology investments by developing GHG/energy accounting systems similar to financial accounting systems.

• Switching to green (i.e. low carbon emissions) electricity tariff, or better still a 100% renewable energy source. (see Box 7a)

• Improving the availability and quality of data, especially in the area of live music performance (in the UK and internationally).

• Creating a variety of travel schemes, and working with local authorities and events organisers to reduce audience transport emissions.

• Moving to low emissions CD packaging.

• Identifying and investing in low carbon business opportunities.

• Organising regular training, knowledge sharing and advice on environmentally responsible choices (best practice, procurement, innovative business models) between companies, artists and staff across the industry.

• Requesting information on environmental performance from suppliers.

• Developing strategic partnerships for joint action – e.g. Greater London Authority Climate Change Action Plan.

Recommendation 3: Within these programmes it is recommended that 'beacon' commitments should be made to demonstrate real commitment and achievable quick wins.

Initial proposals include:

1) Switching to green (i.e. low carbon emissions) electricity tariff, or better still, a 100% renewable energy sourcing.

2) Exploring an industry-wide initiative on low emission CD packaging.

3) Installing low carbon lighting (e.g. LED) in live music venues.

4) Identifying, and highlighting all options for beacon travel plans for event goers, especially those already operating, and transferring taxi contracts to 'green' suppliers.

Recommendation 4: In the medium term, the industry should identify its 'levers of influence' and use these to affect policy interventions and public education on climate.

It will be essential for the music industry to establish credibility by delivering a serious and visible set of programmes to reduce its own carbon footprint. Leadership through practical demonstration of actions to reduce GHG emissions will be more lasting and meaningful than just artist led campaigns.

Recommendation 5: The music industry is centrally influential in lifestyle choices, and therefore has an opportunity to be an important leader in the transformation to a low carbon economy, as emissions are closely tied to decisions on lifestyle.

The UK music industry could and should be an exemplar in demonstrating how business works in partnership with its sub-contractors and customers to transform its products and services; in minimising the emissions generated; and in bringing an amplified voice to changes in energy infrastructure and in the drive towards a low carbon economy.

Recommendation 6: It is important that the industry is conscious of how celebrity actions and messages are positioned and construed in response to climate change. Celebrities have influenced discussions and actions on climate change in recent years more than ever, shaping how the public understands and engages with climate science and policies. Their audiences can perceive celebrities as 'experts' or 'authorised' speakers. The celebrity's motivations, understanding and role on this issue all have a bearing on encouraging climate action.[31]

7.6 Taking the Research Forward

This scoping study is the first phase of research to assist the industry to understand and manage its GHG emissions. There are a number of areas where it would be beneficial to undertake further research as the industry develops its climate strategy. It is recommended that the industry prioritise research in the following areas:

7.6.1 Audience Travel to Live Music Performances

There is limited knowledge on audience travel, yet this is a significant source of GHG emissions. A travel survey and analysis is needed of audience travel to festivals, arenas and large music venues. This would provide a more accurate quantification of the GHG emissions. It should examine the potential for changing audience travel modes; incentive options for motivating this change; and the cost for improving public transport schemes to live music performances.

7.6.2 Low Emissions CD packaging

The mainstreaming of a low emissions CD packaging solution would demonstrate leadership on climate change. It has, however, been over ten years since a major record company assessed the environmental impact of different packaging materials. That assessment needs to be updated to ensure that any new CD packaging solution chosen by the music industry is scientifically proven to be environmentally beneficial – especially in terms of GHG emissions savings.

7.6.3 International Touring

There is very little information on international touring by UK artists. The GHG emissions resulting from this are not, of course, produced by UK music consumers and could be considered the responsibility of other music markets. If the UK music industry is committed to be a leader on climate change, however, it needs to take appropriate responsibility for its global GHG emissions. This will require a better understanding of the GHG emissions produced through international touring and the identification of what UK artists should be doing to reduce these emissions.

[31] For example, celebrities taking up the issue as the "heroic individual" seeking "conspicuous redemption" may place greater emphasis on climate change action through the individual rather than a requisite collective (Boykoff and Goodman, 2008).

7.6.4 Digital Music Delivery

Digital music delivery is progressively accounting for a greater proportion of music access and listening. The industry's climate strategy needs to understand and plan for the changing emissions profile this will cause. The GHG emissions of digital music delivery are completely different to those associated with a physical music product.

7.6.5 Carbon Financing for the UK Music Industry

A strong commercial case can already be made for the industry to reduce its GHG emissions. There are some solutions, especially related to low carbon infrastructure and technology solutions, however, which will require additional financing to justify investments. The music industry would benefit from investigating the options for creating a music industry carbon fund that could support research, development and demonstration of innovative low carbon investments relevant to the UK music industry.

7.6.6 Communicating Climate Responsibility

The music industry collectively – and artists individually – are frequently used as a vehicle to communicate social, environmental and political issues to mobilise individuals and governments. These communication efforts have had varying degrees of success. There is a growing body of research examining the effectiveness of climate change communication campaigns. The music industry and artists should be aware of the learning gained from these campaigns. The industry should rigorously assess their own communication on climate change to ensure they are wielding their influence successfully.

Box 7a Green Electricity

In the UK liberalised energy market there are many green electricity products available to consumers. However, these products vary significantly in their green credentials; indeed, the current UK renewable policy landscape allows electricity suppliers to claim the product they offer is green when this may not be the case. Furthermore, there is not a Code of Practice or an Accreditation Scheme for green electricity, which would ensure consumers are given transparent information on which product to choose.

The three key policies that issue certificates alongside the generated electricity are: Renewables Obligation (RO), the Climate Change Levy (CCL), and Renewable Energy Guarantees of Origin (REGOs). However, each policy has different definitions of what counts as green electricity. REGOs determine the source of electricity, but many green electricity products are sold based on other environmental features, such as green funds or retiring renewable obligation certificates. A green fund will set aside money into a fund, which is then used to install new generating capacity, fund R&D or other environmental projects. Some electricity suppliers also retire RO certificates, which have the effect of using consumer demand for green electricity to adjust government renewable electricity targets upwards (Boardman et al., 2006).

Given the difficulty of discerning a green electricity product, a good way for a music company to determine the environmental credibility of their energy supplier is by looking at their carbon disclosure information. Each electricity supplier has to make available information to consumers about the fuel mix and carbon content of the electricity they generate. Despite some of the challenges for consumers in purchasing green electricity, it is still a positive step for consumers to drive market demand for low carbon energy sources.

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Appendix

GHG Emissions Conversion Factors

	CO_2	CH_4	N_2O
Building	kg CO_2/kWh	g CH_4/kWh	g N_20/kWh
Electricity	0.523	0.008	0.007
Gas	0.206	0.004	0.008
Transport	kg CO_2/mile	g CH_4/mile	g N_2O/mile
Car – petrol	0.337	0.003	0.056
Coach/Tour Bus	1.079	0.077	0.048
Train	0.096	-	-
Light Goods Vehicle	0.396	0.008	0.027
Articulated Truck	2.65	0.077	0.048
Domestic Flight	0.253	0.001	0.004
Short-haul Flight	0.209	0.001	0.004
Long-haul Flight	0.169	0.001	0.004
Generators	kg CO_2/litre		
Diesel	2.630	-	-
Global Warming Potential	1	23	296

Sources: Barlow et al. 2001; Defra 2007d; EEA 2000; IPCC-NGGIP 2003; Netcen 2003.

A technical report with the details of how this study estimated the GHG emissions of the UK music industry is available on www.juliesbicycle.com or www.eci.ox.ac.uk

Key

1000 g = 1 kg

1,000 kg = 1 metric tonne

t = tonne

~ = approximately

GHG = greenhouse gas

CO_2e = carbon dioxide equivalent

CO_2 = carbon dioxide

CH_4 = methane

N_20 = nitrous oxide

Figures, Tables and Information Boxes

Figures

Figure 1.1: Past and future CO2 atmospheric concentrations

Figure 1.2: Probable impacts from climate change

Figure 1.3: UK energy demand by energy user

Figure 2.1: The UK music industry

Figure 4.1: GHG emissions per annum from the UK music recording and publishing sectors

Figure 4.2: GHG emissions from the music recording & publishing sectors

Figure 5.1: GHG emissions per annum from live music performance

Figure 5.2: GHG emissions per annum from venue energy use

Figure 5.3: Per annum GHG emissions resulting from audience travel to music venues

Figure 5.4: Total GHG emissions from festivals per annum

Figure 5.5: Average GHG emissions per festival size

Figure 6.1: The number of live shows, by world region, played by a sample of UK artists

Figure 6.2: GHG emissions per passenger return flight from London to New York City

Fig 7.1: GHG emissions per annum from the UK Music Market: Recorded and Live

Figure 7. 2: GHG emissions from selected non-energy intensive FTSE 500 companies

Tables

Table 3.1: Music activities included and excluded from the analysis

Table 3.2: The sectors and activities for which the GHG emissions have been estimated

Table 3.3: Data collected from industry sources

Table 4.1: GHG emissions in the lifecycle of a CD album

Table 4.2: Estimated GHG emissions produced by CD music retailing

Table 5.1 UK live music performance – boundaries for the emission analysis

Table 5.2: Total GHG emissions from venues & those attributable to the music industry

Table 5.3: The travel scenarios used to estimate GHG emissions of audience travel

Table 5.4: Total GHG emissions from audience travel (scenario A)

Table 5.5: Estimated number of trucks & tour buses used to support UK touring

Table 5.6: GHG emissions from trucks and tour buses used for UK tour

Table 5.7: Festival audience travel scenario

Table 5.8: Average emissions by festival size

Table 5.9: Office GHG emissions of management, agency, promotion and collection societies

Table 6.1: Illustrative estimates of UK tours in Europe and the United States, per annum

Table 6.2: E.g. of managers' air travel in 2007

Table 6.3: Examples of different artist's air travel in 2007

Table 7.1: GHG emissions of the UK music industry per annum, by activity

Information boxes

Box 1a: What is Human Induced Climate Change?

Box 1b: Reducing Greenhouse Gas Concentrations

Box 1c: The Emerging Policies and Regulatory Frameworks to Combat Climate Change

Box 3a: Greenhouse Gas Audits

Box 4a: Lifecycle Analysis of DVD GHG Emissions

Box 4b: Re-imagining the CD

Box 4c: Best Practices – The Premises, a Solar Powered Recording Studio

Box 4d: Equipment Shifts in CD Manufacturing

Box 4e: Best Practices – Arvato Digital Services using CHP technology

Box 4f: Digital Media and Dematerialisation

Box 4g: Best Practices – The Green Team at Universal Music UK

Box 4h: Best Practices – NME, IPC Media and the Blue Fin Building

Box 4i: Green Leases

Box 5a: Best Practice – Arena and Convention Centre (ACC) Liverpool

Box 5b: Application of Next Generation Lighting Technology in Venues

Box 5c: Best Practices – Rules for Eco-Driving

Box 5d: Best Practices – The Festival Pioneers

Box 5e: Best Practices – 'A Greener Festival' Awards Scheme

Box 5f: Best Practices – Futuresonic Festival Carbon Audit

Box 6a: Carbon Auditing International Touring – Radiohead Case Study

Box 6b: The Climate Impact of Air Travel

Box 6c: Air Travel Emissions by Travel Class

Box 7a: Green Electricity

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