Car Use, Carbon and Festivals

Client:	ACT 1.5
Document Reference:	MA22
Version:	FINAL
Type:	Briefing Note
Date:	February 2023
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Please Cite as: Jones, C., Pennington, L., and McLachlan, C., (2023), Car Use, Carbon and Festivals, Tyndall Centre for Climate Change Research, University of Manchester

Car Use, Carbon and Festivals

- Information on car use at festivals is not required for granting a licence, the lack of data on carbon emissions from festival audience travel is currently a blind spot in local authority climate responses.
- Reducing car parking by just 20% could lower festival travel emissions (excluding flights) by 10%. Festivals could set targets to incrementally reducing car parking use and facilitate alternatives to provide climate benefits in the next few years.
- Urban festivals tend to offer a more sustainable option for audience travel. These sites have existing infrastructure advantages therefore more remote sites need to offer more car-free alternatives to lower their audience travel emissions.
- Incentives for car free travel to festivals have been increasing since 2018 and given the industry's stated commitments to reducing its environmental impact, there is a clear opportunity to scale these measures rapidly to combat the climate crisis.

1. INTRODUCTION

Audience travel is widely acknowledged as a major component of the overall contribution live music makes to climate change [1]. The scale of car travel to festivals, how this has changed over time and the decarbonisation potential of reducing car use for festivals is at present unclear. This work seeks to better understand car travel to festivals, alternative travel modes and the carbon saving potential of reducing audience use of personal vehicles to get to and from these events.

Data on car use at UK festivals is not publicly available. Local authorities that licence live music events are not compelled to require licensees to include this information in the terms of licence applications [2]. Music industry reports have used surveys of a sample of festival attendees to estimate emissions associated with audience travel to music events, such as [1], [3] and [4], as have research studies -other large events [5]. These studies provide useful insights on the contribution of audience travel to overall festival emission. This report aims to add to the discussion on audience travel through a novel assessment of potential audience car use based on space dedicated to car parking at festivals and, use this to estimate potential carbon savings through reducing the number of cars coming to site.

Tackling car use at festivals is an important step towards reducing the environmental impact of events and making them suitable for a low carbon future. There are also other socio-economic factors that make alternative audience travel to festivals in the

UK relevant at this time. The general trend is for lower car use by people in the 17-29 years old demographic block. In the latest comprehensive study of driving trends (in 2018) only 29% of 17-20 year olds and 63% of 21-29 year olds held driving licenses, down from 48% and 75% respectively for these age groups in the 1990s [6]. The benefits of embracing new models of audience access to live music may therefore extend beyond climate change and air quality.

This report looks at eight of the UK's largest live music festivals – Glastonbury, Reading, Download, Leeds, Boomtown, TRNSMT, Latitude and Bestival (Dorset). The festival sizes range from 30,000 to 200,000 in terms of attendance and cover examples of urban festivals and greenfield festival locations. Assessments of space dedicated to car parking at these festivals is used to provide an indicative estimate of audience travel emissions. Section 3 presents the estimated carbon savings achievable if audience members travel by alternative means. These results are subject to limitations set out in Section 2.2.

The reasons for car use at festivals cover a broader range of considerations beyond greenhouse gas emissions, including the size and weight of materials festival goers bring with them, the cost of travel convenience and existing habits. Examples of creative solutions to increase the non-car travel offer for festivals are reviewed in Section 4 of this report. These show the potential for transforming audience travel in future years. The results in this report can help to inform festival stakeholders of the potential carbon savings from shifting travel from cars to coach, train, walking and cycling as quickly as possible.

2. RESEARCH DESIGN

In the initial phase of the research, relevant local authority licencing teams for festival sites were contacted for information held about car parking and traffic associated with the eight festival sites. In all cases, license officers did not hold information about the number of vehicles expected onsite during festivals. Government guidance for the Licencing Act 2003 does not specify that such data is required for a licence to hold a live music festival to be granted [2]. Event management plans (EMP) are typically submitted to local authorities to support the application for an event license. The key mandatory aspects of the license are on public safety, preventing crime and disorder, public nuisance and child protection [2]. The EMP may entail an appendix traffic management plan, however these are primarily to satisfy aspects on public safety and preventing public nuisance and crime such as road closures, staffing and suitable lighting. Publicly available recent EMPs for Glastonbury Festival, Leeds Festival and the Isle of Wight Festival that include traffic management did not provide information on the number of vehicles expected. One exception was the Leeds Festival EMP for 2011 (See [7]) where an estimation of the number of cars expected at the festival was made. This was not repeated in subsequent EMPs for Leeds found in the public domain.

In the absence of publicly available data or data held by local authorities on car use at festivals, an alternative approach based on available parking areas was used to estimate the number of cars at the festivals and the proportion of the audience travelling by this mode.

The eight festivals selected had sufficiently detailed site maps that would allow parking areas to be identified on Google Maps. Geographic features including roads, place names, permanent buildings, field boundaries, bridges and rivers that were used to identify parking areas. In several cases visible markings on the ground in fields (lines/depressions in grass) showed where they had been used for parking (see examples in Appendix 1). Car parking areas on festival sites were measured and totalled to give a km^2 value for estimated car parking areas. In the case of TRNSMT Festival, which has no designated parking, total public car parking spaces in the locality (primarily three NCP car parks) were used for the parking available value.

To estimate the number of cars within car parking areas assumptions on the space required per car and the proportion of a parking area occupied by parked cars were used. Information from the AA on car parking spaces ([8]) was used to inform these assumptions. Cars are assumed to occupy 35% of the car parking area once space for access is considered. The standard parking bay area per car used in the analysis is 12 m^2 per car. In this assessment therefore a 1 km^2 car parking area would contain up to 29,167 cars.

This approach can therefore provide an estimate of the likely maximum number of cars parking at a festival site. This estimate is limited in that it assumes all potential car parking spaces are used. The estimate is also only for cars that park at the festival and therefore does not extend to car drop-offs or campervans that have their own designated areas. Despite these limitations the analysis should give new insights into the potential demand car parking demand at festivals and therefore a useful indication of how prevalent this form of transport is in accessing festivals. Given the costs of using land, staffing, fencing and lighting car parking areas it is assumed that these areas reflect a consistent demand for this level of parking.

The next stage of this analysis was to estimate the proportion of the audience that might currently be arriving by car. A car occupancy rate of 2.5 people per car was used as a baseline assumption for how many audience members arrive per car based on previous studies of live event attendances in [9] and [5]. Sensitivity analysis on this value (2 and 3 people per car) was carried out.

Accurate data on the mean average return distance for members of the audience to festivals was not in the public domain. A baseline assumption of 300km is used here reflecting return distance assumptions used in reports on festival environmental impacts and surveys of attendees [1, 4].

The analysis also considers the potential greenhouse gas emissions from audience travel to festivals. Standard emissions factors for UK travel are used for all modes taken from the BEIS and DEFRA Greenhouse Gas Emissions Conversions Factors 2022 dataset. An average petrol car is used and standard values for UK rail and coaches are applied. The figure below shows the emissions per person per km travelled for each mode of travel. For cars a per-vehicle value is given in the emissions factor database and the per-person value depends on car occupancy.

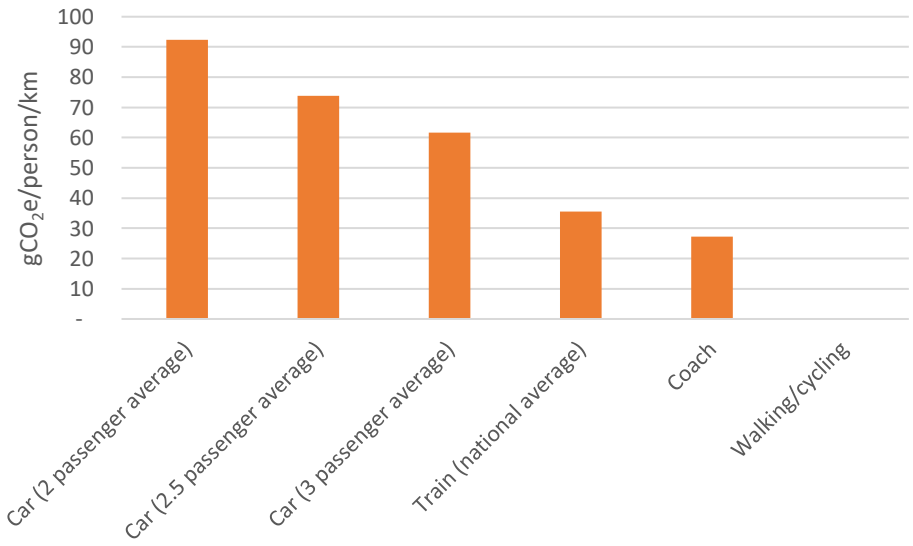

Figure 1: GHG emissions for audience travel per km by mode of travel. Based on UK Government GHG Conversion Factors for Company Reporting, (BEIS and DEFRA 2022)

For the eight festivals in this review, the number of audience members travelling by car is calculated by multiplying the car occupancy rate by the estimated number of cars, based on the audience car parking area. The remaining number of audience members once car travellers are deducted is used to estimate the number of audience members travelling by alternatives. Three illustrative alternative scenarios for replacing car use were examined –

- all car trips switched to train and shuttle bus (distance between nearest main rail station and site used for shuttle bus distance),
- all car trips switched to coaches,
- car trips switched to a combination of train, coach and active travel (walking and cycling)

2.2 Limitations

This analysis aims to represent audience travel GHG emissions as accurately as possible with the best data available. The lack of measured data on car numbers, car occupancy and distances travelled in the public domain means that a proxy value – car parking area – is used. The analysis uses standard car park area configurations to estimate car numbers for a given area and does assume that all available car parking is used. Estimates for car occupancy and distance travelled are based on existing literature and sensitivity analysis is applied to determine the reliance of results on particular assumptions.

The study focuses on surface travel to festivals and does not include flights. Flights can allow for greater distances to be travelled within time constraints and with a higher overall global warming impact per km travelled than other modes (148 to 591 gCO_2e/p.km depending on the flight, compared with 4 to 35 gCO_2e/p.km for trains). Air travel is an important area in its own right and therefore these results should not be considered a complete accounting of audience travel.

This assessment also does not account for 'drop-offs' by car that would increase audience emissions per festival. Switching to electric vehicles (EVs) were also not considered in this study. EVs are growing – in 2021 around 11% of new car sales[1] – but in the next few years they will remain a low proportion of cars on the road and this report focuses on carbon savings in the near term. The same travel distance is applied across each mode, however it might be that distances are shorter or longer to some extent if switching between road and rail networks. Additionally, the majority of UK music festival are mostly or entirely powered by diesel electric generators and EVs charged at these festivals would have reduced environmental benefits compared to petrol and diesel vehicles. A longer term increase in EVs and more grid connected or renewable electricity powered festivals should make them an important consideration.

[1] See https://www.gov.uk/government/statistics/vehicle-licensing-statistics-2021

3. RESULTS

Following the method set out in the research design, car use and GHG emissions for audience travel was estimated for eight of the UK's largest live music festivals. Table one presents the results from calculating available car parking space and the implied proportion of the audience travelling by car if all parking spaces are used under different car occupancy rates.

	Attendance*	Car Parking Area (km2)	Parking per Audience (m2)	% by Car (2 p/car)	% by Car (2.5 p/car)	% by Car (3 p/car)
Glastonbury	200,000	2.21	11.05	64%	81%	97%
Reading	105,000	0.43	4.09	24%	30%	36%
Download	85,000	0.93	10.96	64%	80%	96%
Leeds	75,000	0.48	6.35	37%	46%	56%
Boomtown	58,000	0.62	10.69	62%	78%	94%
TRNSMT	50,000	0.00	0.00	5%	7%	8%
Latitude	40,000	0.46	11.50	67%	84%	101%**
Bestival	30,000	0.40	13.30	78%	97%	116%**

*Table 1: Estimated % of audience travelling by car based on car parking available if all spaces used - varied by average car occupancy rate. * Based on 2021 capacities. **Bestival and Latitude values for higher car occupancy exceed maximum value due to large parking areas available relative to audience capacity. TRNSMT has no formal parking – for car use local city centre parking is used for assessment.*

The approach used here can only be an estimate of potential car use at festivals rather than a precise measure of the number of cars used. The analysis here for example estimates that 81% of the Glastonbury audience arrives by car on baseline car occupancy (2.5 p/car). The festival itself however reports that "nearly a third of all ticket holders now come to the site on coaches, trains and other forms of public transport"[2] suggesting a lower percentage arrive by car. This could be due to less utilisation of the car parking available, or due to lower utilisation of cars – a 2.1 person per car occupancy rate would also result in round two thirds of the audience travelling by car in the model estimate. For the 2022 Glastonbury festival 22,000 'coach + entry' tickets were available[3] – indicating at least 11% of attendees travelled by coach. Information on current use of shuttle buses from Bristol Temple Mead or Castle Cary station and by bicycle are not publicly available but could account for the method of travel for the remaining 8% to 19% of the audience in this example.

Estimating the potential GHG emissions associated with audience travel to and from the festivals is based on the assumptions set out in the Research Design section. The analysis considers three key variables in determining audience travel emissions – distance travelled, mode of travel and car occupancy. Figure 2 below shows how these variables combine to give a range of GHG emissions values. Here the average distance travelled is varied between 200 km to 400 km, three scenarios for non-car travel are used (See Research Design) and car occupancy varies from 2 to 3 people

[2] See https://www.glastonburyfestivals.co.uk/information/getting-here/ (accessed 29/01/2023)
[3] See https://www.glastonburyfestivals.co.uk/information/getting-here/by-coach/ (accessed 11/12/2022)

per car average. Highest, lowest and mean GHG emissions values normalised to audience capacity are shown:

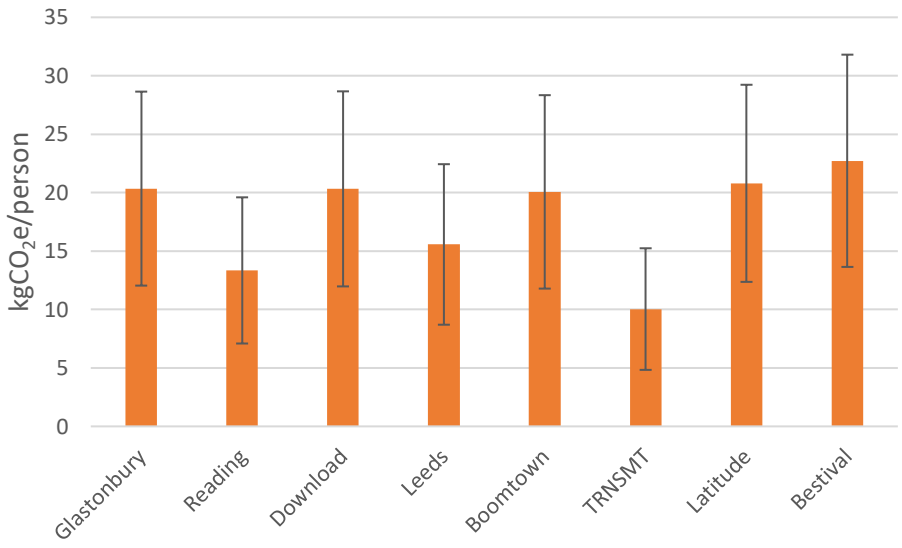

Figure 2: Estimates of high, low and mean GHG emissions per audience member from varying average return travel distance, mode of travel and car occupancy rate assumptions.

Due to a lack of measured data, the results in Figure 2 cannot be validated. They are presented here as indicative of the potential baseline for audience travel across the festivals to guide analysis of potential carbon savings from reducing car use at festivals. The range in values shows the importance of data collection on audience travel to understand current levels of climate impact and reduction benefits. However, even without precise data the results show that city-based festivals like Reading or TRNSMT would be expected to have lower travel emissions based on having less dedicated parking provision. Out-of-town festivals with parking capacity for ~80% of attendees are expected to have higher emissions per ticket holder. As this analysis applies travel variables equally across the festivals it is important to keep in mind contextual differences between the festivals. Reading and TRNSMT are located where walking and cycling is an easier option for attendance and more audience members might travel shorter distances to get there so it is more likely their per-person emissions are at the lower end of the ranges presented.

Table 2 shows the potential GHG (CO_2e) saving if car park availability (with 2.5 people/car) is reduced from the current baseline estimate. Reduced audience travel by car is substituted by travel via train and shuttle bus. The proportion of the journey is by train and by bus varies based on the distance of the festival from a mainline station. Based on BEIS/Defra national average emission values, train and shuttle bus is the higher GHG alternative compared with coach travel and a more varied scenario with car use replaced by a combination of walking, cycling, train and coach. The table below is therefore a conservative estimate of potential carbon savings. Festivals which already have lower levels of car use, such as Reading and TRNSMT, see a lower potential for carbon savings from reducing audience travel by car.

Potential change in audience travel GHGs when replacing car use further by train and shuttle bus

	10%	20%	30%	40%	50%	60%	70%
Glastonbury	-5%	-10%	-15%	-20%	-25%	-30%	-35%
Reading	-2%	-5%	-7%	-10%	-12%	-15%	-17%
Download	-5%	-9%	-14%	-19%	-24%	-28%	-33%
Leeds	-3%	-7%	-10%	-14%	-17%	-21%	-24%
Boomtown	-5%	-9%	-14%	-18%	-23%	-28%	-32%
TRNSMT	-1%	-1%	-2%	-3%	-3%	-4%	-5%
Latitude	-5%	-10%	-15%	-20%	-25%	-30%	-35%
Bestival	-5%	-10%	-16%	-21%	-26%	-31%	-36%

Table 2: Potential carbon saving from audience travel when parking reduced further at 10% increments and replaced with combination of train and shuttle bus.

Table 3 shows the same analysis but with car use replaced with an even split of train, coach and active travel (walking and cycling):

Potential audience travel carbon saving when replacing car use further by an even split of train, coach and active travel

	10%	20%	30%	40%	50%	60%	70%
Glastonbury	-7%	-13%	-20%	-27%	-34%	-40%	-47%
Reading	-4%	-9%	-13%	-17%	-21%	-26%	-30%
Download	-7%	-13%	-20%	-27%	-33%	-40%	-47%
Leeds	-5%	-11%	-16%	-22%	-27%	-32%	-38%
Boomtown	-7%	-13%	-20%	-27%	-33%	-40%	-46%
TRNSMT	-1%	-3%	-4%	-6%	-7%	-9%	-10%
Latitude	-7%	-14%	-20%	-27%	-34%	-41%	-48%
Bestival	-7%	-14%	-21%	-28%	-36%	-43%	-50%

Table 3: Potential carbon saving from audience travel when parking reduced further at 10% increments and replaced with combination of train, coach and active travel

Based on this analysis and the assumptions used, we estimate that reducing car use for Glastonbury by 20% could save around 400 tonnes of CO_2e if reduced car use is replaced by train and shuttle bus arrival. Even a smaller festival like Bestival would reduce its emissions by around 65 tCO_2e through moving 20% of car spaces to train + shuttle. The emissions saving is even greater if car use is replaced by active travel as well as train and coach use (a third of people per mode in the scenario used for Table 3). While 150km each way is the central average travel distance each way (300km round trip) for practical purposes active travel would be most likely from attendees travelling shorter distances and therefore more applicable to venues with population centres within active travel range. In this model cutting car parking for festivals that currently have large car parking by 70% would cut surface travel GHG emissions by around half. Getting active travel to increase significantly in these cases would be challenging however given the distances from population centres, but coach and train shuttle bus access will also deliver significant savings.

As would be expected, increasing average car occupancy rates also improves per-person emissions from audience travel. Just increasing average car occupancy rates

from 2.5 to 3 people per car reduces GHG emissions by 8% in the model for the more car dependent festivals like Glastonbury, Download and Bestival. Reading offer perks for car sharing with 100 free spaces for car share in 2021, while in 2019 Boomtown had a policy for >3 occupants per car being able to arrive early for the festival. Download are expected to offer free access to priority parking for car sharing. Otherwise the festivals reviewed only go as far as recommending car sharing and there is room for more incentives to boost car utilisation.

4. Reducing Car Use at festivals

The analysis in Section 3 highlights the potential for reducing car use at festivals to cut their climate impact. Doing so is a challenge given how common car use appears to be for most large UK festivals. Creative solutions from the sector will be needed to make carbon savings in the near term and overcome inertia in dealing with the problem.

Recent years have seen an increase in the sustainable travel offer from UK festivals [1]. Most of the festivals reviewed here offer coach travel with tickets and travel perks for audience members arriving by bike or car sharing (3+ people per car). The table below gives an overview of sustainable travel practices offered by the festivals included in this study for the 2022 event cycle. This also includes removing incentives for car use such as including parking in the ticket price or making car parking cheaper per person than taking the train station shuttle bus.

Festival	Capacity	Separate Car Parking Fee	Coach Ticket Partnership	Free/cheap Shuttle Bus from Train Station	Perks for Sustainable Travellers	Cycling Infrastructure (storage)	Reference to Low Carbon Travel on Travel Info	Promote Car Sharing
Glastonbury	200,000	✓	✓	✓	✓	✓	✓	✓
Download	110,000	✓	✓	✗	✓	✗	✗	✗
Reading	105,000	✓	✓	✓	✓	✗	✓	✓
Leeds	75,000	✗	✓	✗	✗	✗	✗	✗
Boomtown	58,000	✓	✓	✗	✓	✓	✓	✓
Latitude	40,000	✗	✓	✗	✓	✓	✓	✓
Camp Bestival (Dorset)	30,000	✓	✓	✗	✗	✗	✗	✗

Table 4 - Note: Table shows where there is evidence of measures to reduce car use in place at festivals in 2022. The green tickets highlight an example of good practice and the red crosses show examples that favour high carbon travel. The '?' show where it is unclear exactly what the policy is or whether it still applies to the 2022 event. 'Cheap' tickets for shuttle-bus to the festival is relative to cost of parking. For example Reading Festival charge £1 for the shuttle, whereas Download charge £12/person and a parking pass is £22 so for two people attending together the parking pass works out cheaper. The assessment is made based on information available to ticket purchasers on websites to inform travel planning of audience members.

Table 4 shows that there is good practice being applied to support car sharing and coach travel particularly. In some cases however these measures are still at an early stage and limited in impact – Reading's priority car share area in 2021 allowed for only 100 cars for example. Discussions are happening in the sector on how to move things forward. Corner, Latter and Badiali (2022) ran roundtables on sustainable festivals including audience travel. They highlight the importance of collaboration between venues and public transport providers to match provision with audience needs to achieve a greater uptake of alternative travel modes [10]. They also suggest an emphasis on facilitating collective action by audience members on travel, through information sharing and building agency, and ensuring fairness through safety and accessibility considerations in transport offerings [10]. However going into the 2023 festival cycle there is not a clear industry-wide strategy to transform festival audience travel.

Spatial analysis of the festival sites (Table 5) shows the opportunities and challenges for car-alternatives. Glastonbury and Latitude are the furthest from a main line train station (~25 miles), but the other sites have a main line station within 11 miles. Download, Boomtown and Bestival offer large parking areas despite having access to train stations nearby.

	Parking Area per person (m2)	Local Train Stations
Glastonbury	11.1	• Castle Cary Station (secondary line) – 8 miles • Bristol Temple Meads (main line) – 24 miles
Reading	4.1	• Reading West (secondary line) - < 1 mile • Reading Station (main line) – 1 mile (serves Elizabeth Line)
Download	11.0	• Long Eaton Station (secondary line) – 6 miles • Attenborough Station (secondary line) – 9 miles • Spondon Station (secondary line) – 12 miles • Beeston Station (secondary line) – 15 miles • East Midlands Parkway (main line) – 7 miles • Derby Station (main line) – 12 miles • Nottingham Station (main line) – 15 miles
Leeds	6.3	• Micklefield (secondary line) – 8 miles • Garforth (secondary line) – 9 miles • Ulleskelf (secondary line) – 9 miles • Leeds (main line) – 11 miles • York (main line) – 17 miles • Bradford Interchange/Forster Square (main line) – 30 miles
Boomtown	10.7	• Winchester (main line) – 4 miles • Southampton (main line) – 16 miles • Portsmouth (main line) – 25 miles
TRNSMT	0.0	• Glasgow Queen St. (main line) – 1.6 miles • Glasgow Central (main line) – 1.3 miles
Latitude	11.5	• Halesworth Station (secondary line) – 6 miles • Darsham Station (secondary line) – 6 miles • Diss (main line) – 26 miles • Norwich (main line) – 30 miles • Ipswich (main line) – 33 miles
Bestival	13.3	• Wool (main line) – 6 miles • Wareham (main line) - 7 miles • Moreton (main line) – 11 miles • Hamworthy (main line) – 13 miles • Poole (main line) – 16 miles • Dorchester South (main line) – 16 miles

Table 5: Spatial analysis of festival sites relative to train stations and car parking offered per person (based on audience capacity. Note TRNSMT do not offer parking.

6. CONCLUSIONS

The purpose of this study is to explore the potential greenhouse gas (GHG) emissions savings from reducing car use at major UK live music festivals. In the absence of data on car use at festivals in the public domain, car parking areas offered at festival sites is used as a proxy to estimate potential car use and provide an indicative assessment of current audience travel GHG emissions and the implications of reducing car parking on these emissions. As set out in Section 2 of the report the analysis is subject to limitations around the method and assumptions used. However a picture does emerge about the scale of car parking associated with festivals and that there are opportunities for the live music sector to pivot further towards coach, train and active travel while boosting car occupancy levels.

The lack of data on car use at festivals is in itself an important point. Without good baseline data it is more difficult to direct action on reducing emissions. Local authorities in much of the UK have declared climate emergencies, but the lack of data collection means this is a blind spot for authorities to manage CO2 emissions in their localities. Similarly, impacts on local air quality are also tied to car use and congestion around festival site access.

Although this study uses proxy values and scenarios on travel modes the following findings are considered useful for the decarbonisation of live music:

- Local authorities should require a carbon impact assessment from audience travel as part of the licencing process for large festivals
- Reducing car parking by 20% could lower festival travel emissions (excluding flights) by 10%. Festivals could set targets to incrementally reducing car parking use and facilitate alternatives to provide climate benefits in the next few years.
- Urban festivals tend to offer a more sustainable option for audience travel. These sites have existing infrastructure advantages therefore more remote sites need to offer more car-free alternatives to lower their audience travel emissions.
- Incentives for car free travel to festivals have been increasing since 2018 and given the industry's stated commitments to reducing its environmental impact, there is a clear opportunity to scale these measures rapidly to combat the climate crisis.

This study is focused on surface travel in the UK. Flights taken to get to festivals are a separate issue. Return short haul flights between European cities can easily add half a tonne of CO_2e to each audience member's emissions and therefore understanding the scale of this practice and alternative modes for travel in this case are also significant for addressing emissions related to festival audience travel in the next few years.

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Appendix 1

Example car park mapping – Leeds Festival East Car Park 2 & 3