CLASSICAL MUSIC FUTURES
PRACTICES OF INNOVATION

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11. The Environmental Sustainability of Symphony Orchestras: Challenges and Potential Solutions

Stine Skovbon

Defining Sustainability

Sustainability has become a much-debated topic, both within academic research, where the number of papers on the issue keeps growing, and in society at large. Nations and organisations worldwide are making efforts to become more sustainable and there is a general willingness to act in line with the UN Sustainable Development Goals (SDGs). The SDGs are a part of the 2030 Agenda for Sustainable Development and serve as guidelines for the UN member states, setting out seventeen priority areas for a more sustainable future.

The implementation of this widely recognised paradigm, consisting of financial, social and environmental sustainability respectively,[1] has tended to focus on a limited range of goals.[2] In the classical music sector, for instance, attention has focused on financial and social sustainability. The former is frequently addressed in discussions of orchestra's dependence on subsidies,[3] while social sustainability is often concerned

1 Ben Purvis, Yong Mao, and Darren Robinson, 'Three pillars of sustainability: in search of conceptual origins', *Sustainability Science* 14:3 (2019), 681-95.

2 Joshua Long, 'Constructing the narrative of the sustainability fix: sustainability, social justice and representation in Austin, TX', *Urban Studies* 53:1 (2016), 149-172. Kate Power, 'Sustainability and the performing arts: discourse analytic evidence from Australia', *Poetics* 89 (2021), https://doi.org/10.1016/j.poetic.2021.101580

3 Robert J. Flanagan, *The Perilous Life of Symphony Orchestras* (Yale: Yale University Press, 2012).

 https://doi.org/10.11647/OBP.0353.11

with audience development,[4] as well as various aspects of pursuing a career as a professional classical musician.[5] In contrast to these relatively well-documented topics, the environmental sustainability of orchestras as organisations is an under-researched domain, with few exceptions such as the roundtable focusing on the impact of climate change on symphonic practices facilitated by Maastricht Centre for Innovation of Classical Music in 2021, and recent pioneering work conducted by Prado-Guerra et al.[6]

Indeed, symphony orchestras have a role to play in the ongoing transition to more sustainable development and in the endeavours to reduce the environmental footprint of nations. They can do this by supporting, for example, the twelfth and thirteenth SDGs: to 'Ensure sustainable consumption and production patterns' and to 'Take urgent action to combat climate change and its impact' respectively. Factors such as CO_2 emissions due to travel, inefficient use of electricity, or use of materials such as paper for the printing of scores, are being recognised as environmental challenges faced by the music industry more widely. In spite of this fact, environmental considerations have not yet been mainstreamed in the sector. Studies on the environmental impact of popular music indicate that various activities are creating negative impacts. To date, the study by Prado-Guerra et al. is seemingly the only existing work conducted on the environmental impact of orchestral activities; nonetheless, many findings related to popular music are relevant to classical orchestras.

The aim of this chapter, therefore, is firstly to draw attention to some of the main areas of interest when considering the environmental sustainability of symphony orchestras and, secondly, to explore whether prioritising sustainability has the potential to positively influence the future of these orchestras. Hence, one result of this focus is that limited

4 Claire D. Nicholls, Clare Hall and Rachel Forgasz, 'Charting the past to understand the cultural inheritance of concert hall listening and audience development practices', *Paedagogica Historica* 54:4 (2018), 502-516.

5 Warren Brodsky, 'In the wings of British orchestras: a multi-episode interview study among symphony players', *Journal of Occupational and Organizational Psychology* 79:4 (2006), 673-690.

6 Alba Prado-Guerra, Sergio Paniague Bermejo, Luis Fernando Calvo Prieto, and Monica Santamarta Llorente, 'Environmental impact study of symphony orchestras and preparation of a classification guide', *The International Journal of Environmental Studies* 77:6 (2020), 1044-1059.

attention is given to the intersection of the various artistic goals of orchestras and environmental, financial and social sustainability. Consequently, it is beyond the scope of this chapter to thoroughly discuss the dilemmas orchestras face when prioritising sustainability, such as that increasing sustainability within one area can cause decreased sustainability within another.

To examine the above-mentioned aims, the following questions will be addressed:

- What are the main environmental sustainability challenges symphony orchestras face, as identified in existing academic research?
- Which opportunities exist for symphony orchestras to reduce their environmental impact?

In order to answer these questions, this chapter provides a review of existing literature on some of the activities related to classical orchestras that cause adverse environmental impacts, followed by some recommendations on how to reduce this impact drawn from organisations such as the culture and climate non-profit Julie's Bicycle. The chapter concludes with examples of how The Royal Liverpool Philharmonic Orchestra and The Flanders Symphony Orchestra are implementing strategies to become more sustainable.

Exploring the Causes of the Environmental Impact of Symphony Orchestras

CO_2 (carbon dioxide) is a type of greenhouse gas, increasing concentrations of which in the atmosphere – for instance through industrial activities or energy combustion – are viewed as one of the main causes of climate change. Reducing greenhouse gas emissions is a key cornerstone of efforts to address climate risk.[7] As a result, CO_2 emissions have been given a lot of attention, and an effort to reduce them is essential in the endeavour to limit global warming and work towards

7 *Climate Change 2022. Impacts, Adaptation and Vulnerability. Summary for Policymakers*, IPCC Working Group II contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2022), WMO and UNEP.

the SDGs. So, in the case of symphony orchestras, what type of activities pose CO_2 emission challenges? Touring and audience travel, printing of scores, music dissemination methods, and electricity use in venues are activities that result in varying degrees of environmental impact in the form of CO_2 emissions. The following is an elaboration on the impact of these activities, as well as the different factors that might exacerbate or mitigate it.

CO_2 Emissions, Touring, and Audience Travel

Reducing the amount of CO_2 emissions resulting from the travel activities of musicians and audiences has a significant role to play in mitigating the environmental impact of the music industry[8], with symphony orchestras being no exception. Of the various activities orchestras are involved in, touring-related travelling has the largest environmental impact. Comparing different types of impact (not including audience travel), Prado-Guerra et al. draw this conclusion on the basis of their analysis of the travelling activities of five orchestras. By calculating the amount of CO_2 emissions caused by each of the musician's travel on a tour, and by knowing the distance the orchestras travelled for touring each year, the authors were able to measure the overall emissions caused by the orchestras annually. Aside from the large number of people involved, one reason for the high amount of CO_2 emissions is that it is not always possible for orchestras to make use of the most efficient route when touring. This is the case when agreements on exclusion zones have been made to ensure that the venues where the orchestras are performing are located far enough from each other in order to optimise audience attendance.[9] Such agreements are usually made between orchestras and venues, and there are seemingly no fixed standards for where the lines for these exclusion zones are drawn. This would suggest that if financial considerations are given more weight than the environmental

8 Catherine Bottrill, Diana Liverman, and Max Boykoff, 'Carbon soundings: greenhouse gas emissions of the UK music industry', *Environmental Research Letters* 5:1 (2010), 014019; F. Berry, L. E. Wynne, and C. Riedy, *Changing Our Tune: Scoping the Potential of the Australian Music Industry to Address Climate Change* (Ultimo: Institute for Sustainable Futures, Report 2014), pp. 1-57.

9 *Julie's Bicycle Practical Guide: Touring (2015)*, https://juliesbicycle.com/wp-content/uploads/2019/10/Touring_guide_2015.pdf

impact when the tours are planned, it could lead to increased travelling activities and higher amounts of CO_2 emissions.

The amount of travelling orchestras engage in can depend on many factors. Prado-Guerra et al. (2020) found a significant difference in the distance travelled during a season by the five orchestras included in the study. For example, while the Euskadi Symphony orchestra travelled 6,084 kilometres, the Symphony Orchestra of Madrid travelled only 144.6 kilometres. While some of the examined orchestras are serving a city, others are serving regions, resulting in more travelling activities for those serving the largest areas. Prado-Guerra et al. were able to estimate the sustainability of the travel activity of the orchestras by having access to information on the means of transport used by the musicians throughout a season (including train, bus and car), the distance travelled, and by drawing on calculations of the amount of CO_2 emissions per passenger from various means of transport. Contrary to Hill and colleagues,[10] who calculated the emission of a car containing only one person, Prado-Guerra et al. concluded that there is a significantly lower environmental impact when more people share a car compared to other forms of transport. This means that cars should not be entirely dismissed as an unsustainable type of transport for orchestras if the sharing of vehicles is prioritised.

Shifting the focus from musicians to audiences, research on Polish concertgoers shows that even in cases where concert venues were located close to public transport and the majority of the audience members were living in the city where the concerts took place, more than seventy-five percent of the concertgoers came by car.[11] However, the implications of this finding are contradicted by studies showing that there is a willingness amongst audiences to make use of public transport to go to one-day events when connections are good.[12] Nevertheless, such

10 N. Hill, H. Venfield, C. Dun, and K. James, *Government GHG Conversion Factors for Company Reporting: Methodology Paper for Emission Factors*, (London: Department of Energy and Climate Change (DECC) and Department for Environment, Food and Rural Affairs (Defra), 2013).

11 Lukasz Wróblewski, and Zdzislawa Dacko-Bikiewicz, 'Sustainable consumer behavior in the market of cultural services in Central European countries: the example of Poland', *Sustainability* 10:11 (2018), 38-56.

12 Francesca Pagliara, Luigi Biggiero, and Ilaria Henke, 'The Environmental Impacts Connected with to events: The Case Study of the City of Naples in Italy', *2019 IEEE International Conference on Environment and Electrical Engineering and 2019 IEEE*

conditions are not always present, as venues potentially can be difficult to access by public transport.[13] Significant factors influencing the choice of means of transport by arts audiences are age-related constraints in physical health and mobility, which can be a reason for travelling by car instead of public transport, as well as routine and habit.[14] Since classical music audiences often are older than popular music audiences,[15] it seems likely that both routine and habit – which potentially become more fixed the older people get – and age-related constraints in physical health have a role to play in their choice of transport.

Thus, more factors influence the degree of the environmental impact of both the touring of orchestras and audience travel. The location of the orchestras and the community the orchestras have to serve seem to be crucial for the distances travelled, and hence also for the amount of CO_2 emissions linked to touring. Regional orchestras have travelling built into their concert practices in order to serve their region. Therefore, orchestras serving a city will most likely be involved in a lower degree of touring than the regional ones, and will thus also have lower CO_2 emissions. Orchestras fixed in one place might, however, not contribute as much to equal access for audiences as the regional orchestras, and hence a dilemma of environmental sustainability in the form of fewer emissions comes into play. Avoiding exclusion zones to make touring routes more efficient would further contribute to reducing emissions of touring orchestras, unless it results in performances in even more venues and thus increases rather than decreases travelling activities. Lastly, and most obviously, using the means of transport with the lowest CO_2

Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe, 2019), 1-66. C. Bottrill, and S. Papageorgiou, *Jam Packed Part 1: Audience Travel to UK Festivals (2009)*, Julie's Bicycle and Environmental Change Institute (2009).

13 Betty Farrell, 'Changing Culture and Practices Inside Organizations', in *Entering Cultural Communities: Diversity and Change in the Nonprofit Arts*, ed. by Diane Grams and Betty Farrell (New Brunstwick: Rutgers University Press, 2008), pp. 38-63.

14 Andrea Collins, and Dimitris Potoglou, 'Factors influencing visitor travel to festivals: challenges in encouraging sustainable travel', *Journal of Sustainable Tourism* 27:5 (2019), 668-688.

15 Victor Fernandez-Blanco, Maria J. Perez-Villadoniga, and Juan Prieto-Rodriguez, 'Looking into the profile of music audiences', in *Enhancing Participation in the Arts in the EU*, ed. by Victoria M. Ateca-Amestoy, Victor Ginsburgh, Isidoro Mazza, John O'Hagan, and Juan Prieto-Rodriguez (Springer, Cham. 2017), pp. 141-154. Semi Purhonen, Jukka Gronow, and Keijo Rahkonen, 'Highbrow culture in Finland: knowledge, taste and participation', *Acta Sociologica*,54:4, (2011), 385-402.

emissions is a way of minimising adverse impacts. The main conclusion that can be drawn about audience travel is that access to good public transport connections within a short distance from the venue seems essential to increase sustainability. Easily accessible transport options would not only benefit those who already indicate a willingness to use public transport, but also, to a considerable degree, audiences with mobility issues. Thus, orchestras must work together with local partners and transport providers to learn to meet the individual needs of their audiences and break the habits that are driving up emissions.

CO_2 Emissions and Sheet Music

Travel is not the only activity with emission implications. During performances, musicians have traditionally used paper sheet music. Paper manufacturing is an energy-consuming process in terms of both electricity use and CO_2 emissions. Therefore, it is a domain in which efforts to reduce energy consumption are viewed as necessary. Having access to a programme covering the works performed by an orchestra within a year, enables Prado-Guerra et al. to determine the paper used for the printing of scores by each of the musicians. Subsequently, the annual impact was found by comparing the weight of the printed scores to known data on the energy consumed when manufacturing one ton of paper. It was found that the consumption of paper varies depending on the different instrument groups, and that string players used the highest number of scores, 631 per player yearly, while brass used the lowest with 299 scores. Moreover, the energy consumption varies depending on whether new or recycled paper is used, and on the printing methods, with eco-print being mentioned as energy efficient. While this example provides a useful way of measuring an orchestra's paper consumption when it comes to sheets that have not been printed before, it would appear that Prado-Guerra et al. do not account for the fact that existing sheets might be available from orchestral libraries, which means that printing often is not necessary.[16] Prado-Guerra et al. conclude that printing of scores is an activity that constitutes a significant environmental impact.

16 Matthew Naughtin, 'It's all online: Creating digital study resources for orchestral musicians', in *Future Directions in Digital Information*, ed. by David Baker and Lucy Ellis (Cambridge, MA: Chandos Publishing, 2021), pp. 209-216.

Yet the question is: what are the alternatives and how do they fare in terms of emissions?

An alternative to printed scores is digital scores. In 2012, the Brussels Philharmonic performed a concert solely using this format as an experiment, finding that the performance was not negatively impacted by this change.[17] This proved that using digital sheet music is an option for orchestras, and different digital sheet music readers and formats have been developed to facilitate such a digitalization and make it as convenient as possible for the musicians.[18] However, more factors influence the choice of paper versus digital parts. Musicians might have reasons for preferring paper sheet music, such as the cost of devices and notation-reading software, the possible lack of software compatibility with file formats, the amount of time needed to learn to use the software, and the fact that screens are more tiring to look at for longer periods than paper. Furthermore, an electronic device can constitute an 'extra cognitive step' compared to paper when musicians are annotating the scores, which can have a negative influence on creative processes.[19]

Prado-Guerra and colleagues have compared the annual orchestral energy consumption of printing scores and accessing them on electronic devices respectively, and concluded that due to the low energy usage, the most environmentally friendly way of reading scores is on an eBook device. However, objections can be raised about the sustainability of the digital format. Indeed, digital scores are accessible through libraries, professional organisations, or via either commercial or private individuals' websites.[20] This means that the energy usage of the centres storing the data that constitutes the scores needs to be accounted for, as well as the energy use and waste resulting from the production, the

17 Anneleen van Boxstael, 'The dawn of digital sheet music: a look at neoscores', *Fontes Artis Musicae* 61:3 (2014), 284-289.

18 Javier Merchán Sánchez-Jara, 'Digital schola: music readers as learning/teaching tools', in *Proceedings of the Second International Conference on Technological Ecosystems for Enhancing Multiculturality,* ed. by Francisco José Garcia-Penalvo (New York: Association for Computing Machinery, 2014), pp. 547-553.
Van Boxsteal, 2014. P. Bellini, I. Bruno, and P. Nesi, 'Automatic formatting of music sheets through MILLA rule-based language and engine', *Journal of New Music Research* 34:3 (2005), 237-257.

19 Karen Lin and Tim Bell, 'Integrating paper and digital music information systems', *ISMIR* 1 (2000), 23-25.

20 Ana Dubnjakovic, 'Navigating digital sheet music on the web: challenges and opportunities', *Music Reference Services Quarterly* 12:1-2 (2009), 3-15.

usage and the afterlife of the electronic devices necessary for reading them. When comparing the sustainability of printed and digital scores, additional factors also play a role, such as whether recycled paper is used for the printing, and whether the printed scores are being used multiple times. As yet, no comparative studies exist within this specific area, and future research measuring the relative impact of data storage and electronic waste is thus necessary in order to establish the potential positive impact of digital scores compared to the various types of printed scores.

While it might be difficult to draw conclusions on whether digital or printed scores are the most sustainable, it is safe to say that environmental impacts are linked to both formats, and that the individual choices within the orchestras regarding this matter can have an influence on the degree of this impact at an organisational level.

CO_2 Emissions and Music Dissemination

In addition to live performances, music can be enjoyed either as physical albums on vinyl records, and CDs, or digitalized as mp3 files or via streaming services. Research indicates that classical music listeners to some degree have been hesitant to include streaming services in their listening practices. A survey conducted by Alessandri and colleagues amongst 1,200 listeners of the genre from multiple countries showed that music very frequently or frequently was accessed by more than half of the respondents on YouTube (fifty-six percent), as digital files (fifty-six percent), on CD (fifty-four percent), via Spotify (twenty-eight percent), and via iTunes (twenty-two percent). Even though the usage of the two latter options is relatively limited, this does not mean that these listeners are not acquainted with various ways of accessing music, as more than fifty percent indicate that they rarely use six to seven different formats or platforms on average.[21] As mentioned above, classical music listeners are often relatively old,[22] and age seems to

21 Elena Alessandri, Dawn Rose, Olivier Senn, Katrin Szamatulski, Antionio Baldassarre, and Victoria J. Williamson, 'Consumers on critique: a survey of classical music listeners' engagement with professional music reviews', *Music & Science* 3 (2020) 1-19.

22 Henk Roose, Koen van Eijck & John Lievens, 'Culture of distinction or culture of openness? Using a social space approach to analyze the social structuring

have a determining influence on choices of formats for music listening. Regardless of genre preferences, Lepa and Hoklas (2015) find that older cohorts are inclined to use CDs, while younger ones rely more on digital media and streaming services.[23] Classical music listeners mention familiarity, usability and selection of music as reasons for their choice of media format.[24] The importance of familiarity might explain the high preference for CDs amongst these older listeners, since this format is older than the digital media formats. Another reason for the limited use of different streaming services mentioned above might relate to the varied quality of selection and visibility of classical music tracks provided by these services.[25] However, streaming platforms dedicated solely to classical music have recently started to emerge. Classical music listeners, like everybody else, have been forced to temporarily 'attend' performances online via live streaming due to the COVID-19 pandemic that began in 2020,[26] and many orchestras have broadcasted concerts via websites and streaming. While audiences are certainly eager to return to the concert halls for live performances, it will be interesting to see whether the usage of streaming services during the pandemic will make classical music listeners more inclined to use such services in the future.

Though there are complexities around the consumption of the genre, it is clear that streaming and CDs still play a major role. Thus, it is relevant to look at the environmental impact connected to both CDs and digital formats.

Music dissemination methods refer to the various ways music is made accessible to consumers and, in the case of both physical formats and

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of lifestyles', *Poetics* 40:6 (2012), 491-513. Gerbert Kraaykamp and Koen van Eijck, 'Personality, media preferences, and cultural participation', *Personality and Individual Differences* 38:7 (2005), 1675-1688.

23 Steffen Lepa and Anne-Kathrin Hoklas, 'How do people really listen to music today? Conventionalities and major turnovers in German audio repertoires', *Information, Communication & Society* 18:10 (2015), 1253-1268.

24 Alessandri et al., 2020.

25 Godefroy Dang Nguyen, Sylvain Dejean, and François Moreau, 'On the complementarity between online and offline music consumption: the case of free streaming', *Journal of Cultural Economics* 38:4 (2014), 315-330.
Clayton E. Crenshaw, 'Availability of New Releases in Streaming Audio Databases', in *Music Library Association, 2018 Annual Meeting*.

26 Åsa Bergman, ''Wherever you are whenever you want': captivating and encouraging music experiences when symphony orchestra performances are provided online', *Open Library of Humanities* 7(2):6 (2021), 1-23.

streaming, these methods are another energy-consuming activity. When it became clear that the digital consumption of music was becoming a fundamental part of music consumption, it was debated how this change would influence the environmental impact of the record industry as a whole. It is a question that is still discussed today.

Different activities causing CO_2 emissions are linked to the various means of dissemination: activities we as consumers seldom are aware of. In the case of CDs, emissions are caused by packaging as well as transportation to distribution centres, record stores and customers. When music is downloaded as digital albums, the energy usage of the data centres where the data is stored creates CO_2 emissions.[27] Additionally, the energy used by streaming devices also needs to be accounted for. When it comes to CDs, Weber et al. compare the amount of CO_2 emissions in these different methods, concluding that buying a CD in a record store involves the largest amount of emissions. Fewer emissions are caused by buying CDs online since many customers need transport to get to their nearest record store. Downloading and privately burning digital music on a CD creates an even smaller amount of emissions as transportation is completely avoided, while the authors find that downloading and solely consuming music digitally creates the least emissions. Moreover, other studies show that the environmental impact of CD packaging is substantial and should not be underestimated.[28] Weber et al. (2010) suggest that the digitalization of music has the potential to significantly reduce the CO_2 emissions caused by music delivery methods, a conclusion shared by Cameron, who found that: 'Digital distribution has tremendous environmental benefits'.[29]

However, this conclusion is contested. Firstly, in the era of transportable mp3 players, it was argued that the production and waste

27 Christopher L. Weber, Jonathan G. Koomey, and H. Scott Matthews, 'The energy and climate change implications of different music delivery methods', *Journal of Industrial Ecology* 14:5 (2010), 754-769.

28 Samuel Cameron, 'Past, present and future: music economics at the crossroads', *Journal of Cultural Economics* 40:1 (2016), 1-12. F. Berry, L.E. Wynne, and C. Riedy, Changing Our Tune: Scoping the Potential of the Australian Music Industry to Address Climate Change (Ultimo: Institute for Sustainable Futures, Report 2014), pp. 1-57. Arup, Environmental Change Institute and Purchasing for Profit, *Impacts and Opportunities: Reducing Emissions of CD Packaging* (London: Julie's Bicycle and Environmental Change Institute, 2009).

29 Weber et al, , 'The energy and climate change implications of different music delivery methods', p. 9.

related to that kind of hardware potentially could result in a considerable material impact that would be a counterweight to the digitalization and dematerialization of music.[30] Later, when live streaming became possible, the conclusion drawn by Weber et al. that the amount of energy use related to the packaging and transportation of CDs was higher than the energy usage of data centres was questioned. Bach suggests that streaming an album twenty-seven times potentially leads to a higher amount of energy consumption than manufacturing a CD.[31] Comparing the amount of greenhouse gas emissions involved in the process of making vinyl records, cassettes, CDs, and using streaming services, Brennan and Devine similarly suggest that streaming is an activity with considerable adverse environmental impacts due to its greenhouse gas emissions.[32] Thus, music dissemination methods are a contested domain, and – as Brennan and Devine state – even though streaming apparently is not as environmentally friendly as earlier research suggested, it is not possible to go back to the old CD and vinyl formats; formats of which the manufacturing and afterlife as waste entail other problematic aspects, such as bad working conditions for those involved in the production.

The above indicates that both CDs and streaming create an adverse environmental impact, but following the suggestions by Weber et al (2010), a way of minimising impacts would be to refrain from buying new CDs to avoid the impact of transportation. Similarly, the findings by the authors suggest that using digital files (that are not stored in data centres) is the most environmentally friendly option. However, while these ways of consumption might be the most sustainable in terms of environmental impact, the decreased revenues for musicians might impede the already perilous financial sustainability of the classical music sector. This is a prime example of the complexities of balancing the various types of sustainability.

30 Nick Hogg and Tim Jackson, 'Digital media and dematerialization: an exploration of the potential for reduced material intensity in music delivery', *Journal of Industrial Ecology* 13:1 (2009), 127-146.

31 Dagfinn Bach, *The Dark Side of the Tune: The Hidden Energy Cost of Digital Music Consumption* (London: Music Tank, University of Westminster, 2012).

32 Matt Brennan and Kyle Devine, 'The cost of music', *Popular Music* 39:1, (2020), 43-65.

CO_2 Emission, Electricity Use, and Venues

Symphony orchestras perform and rehearse in large concert venues, and these buildings, like other similar venues, have an environmental impact in the form of both CO_2 emissions and energy use. The necessity of making efforts to reduce this impact is widely recognised. For example, the Event Industry Council, a global organisation with over thirty member organisations, is working on enabling the event industry worldwide to implement sustainable practices. The negative environmental impact of such events is well documented in academic literature, which provides recommendations on how to improve event management and the sustainability of venues.[33] Kellison and McCullough identify four indicators promoting sustainable practices within venues for the entertainment and sport industries, including concert venues: growing public concern for the environment; a more comprehensive understanding of costs and benefits; the formation of cross-functional and cross-sector teams; and greater emphasis on developing specialists and research agendas.[34] Despite such recommendations, reducing the impact of events is rarely given a lot of attention by associations of event managers, and this pattern is often replicated within the organisations hosting the events.[35] The indicators can be viewed as a sign of the great importance for organisations of prioritising sustainability in order to continuously receive support from consumers and the wider society. Since symphony orchestras usually perform in the same concert hall season after season, opportunities exist for orchestra managers to have an impact on the daily management of the venues and to support the prioritising of sustainability.

33 Andrea Collins, Calvin Jones, and Max Munday, 'Assessing the environmental impacts of mega sporting events: two options?', *Tourism Management* 30:6 (2009), 828-837. Walker J. Ross & Haylee Uecker Mercado, 'Barriers to managing environmental sustainability in public assembly venues', *Sustainability* 12:24 (2020), 10477.

34 Timothy Kellison and Brian McCullough, 'A forecast for the mainstreaming of environmental sustainability', *Sport and Entertainment Review* 2:1 (2016), 11–18.

35 Chantal Dickson and Charles Arcodia, 'Promoting sustainable event practice: the role of professional associations', *International Journal of Hospitality Management* 29:2 (2010), 236-244. Myrsini Koukiasa , 'Sustainable facilities management within event venues', *Worldwide Hospitality and Tourism Themes* 3:3 (2011), https://doi.org/10.1108/17554211111142185

Professional classical musicians employed in symphony orchestras rehearse many hours weekly, both individually and in group rehearsals.[36] Prado-Guerra et al. find that the light source used during these rehearsals and performances is an important type of environmental impact related to orchestral activities. Additionally, there is the overall electricity use linked to concert venues, as temperature regulating systems and IT equipment used in office spaces need to be as energy efficient as possible.[37] Indeed, prioritising sustainability related to light sources and air conditioning systems is relevant for all types of big buildings. For instance, Algarvio and colleagues found that efforts to reduce energy consumption in a big public library led to a significant reduction in electricity usage, with a corresponding decrease in the annual costs of energy.[38] Temperature regulating systems were regulated more efficiently during peak hours and advantageous renegotiations were made with the energy retailer of the library, leading to annual savings.[39] The above indicates no relevant differences between the ways to improve the sustainability of concert venues and other types of big buildings. Such case studies, therefore, contain findings that can provide valuable knowledge in order to reduce the energy consumption of existing concert halls, as well as to potentially minimise the adverse impact of new venues. Although implementing sustainability measures in venues can lead to energy savings, doing so requires resources in the form of time and expertise and is another illustration of the recurring challenge of prioritising environmental sustainability over the cost of other assets. Moreover, Smith exemplifies the complexity of decision-making

36 Jesper Hvass Schmid, Ellen Raben Pedersen, Peter Moller Juhl, Jakob Christensen-Dalsgaard, Ture Dammann Andersen, Torben Poulsen, and Jesper Bælum, 'Sound exposure of symphony orchestra musicians', *Annals of Occupational Hygiene* 55:8 (2011), 893-905. Heli M. Laitinen, Esko M. Toppila, Pekka S. Olkinuora, and Kaarina Kuisma, 'Sound exposure among the Finnish National Opera personnel', *Applied Occupational and Environmental Hygiene* 18:3 (2003), 177-182.

37 Julie's Bicycle, *Green Orchestras Guide: A Simple Guide to Sustainable Practices* (2011), https://juliesbicycle.com/wp-ontent/uploads/2019/11/Green_Orchestras_Guide_2011.pdf

38 Hugo Algarvio, Joaquim Viegas, Fernando Lopes, Diogo Amaro, Anabela Pronto, and Susana M. Vieira, 'Electricity usage efficiency in large buildings: DSM measures and preliminary simulations of DR programs in a public library', in *International Conference on Practical Applications of Agents and Multi-Agent Systems* (Cham: Springer, Cham, 2015), pp. 249-259.

39 Algarvio et al., 2015.

concerning the building of new venues dedicated to fine arts, which are venues that are often seen as assets for the cities where they are located, and that can be viewed as symbols of 'highbrow' culture.[40] By analysing the opposing viewpoints expressed by those present during a planning hearing for the construction of a new concert hall, Smith suggests that, in the explicit debate on the types of building materials, a more implicit and value-laden discussion on elitism and valuation of culture takes place.[41] Hence, decisions regarding arts venues can be particularly complex with many factors in play alongside their environmental impact.

Where Do We Go From Here?

Various organisations are working on ways to develop and strengthen sustainable musical practices, and their projects are providing knowledge that can also be of use in classical orchestras. Organisations such as Julie's Bicycle (UK), Green Track Ghent (Belgium), Green Events (the Netherlands), Green Music Initiative (Germany), and Greener Events (Norway) are leading the way on these issues. The former in particular is one of the leading and most influential among these organisations.[42] Julie's Bicycle was founded in 2007, and even though the organisation was originally established to provide advice on how to strengthen environmentally friendly practices within the music sector, it has now expanded its consultancy to include the arts sector as a whole. It offers a wide range of reports, practical guides, webinars and case studies, and some of the material, such as the 'Green Orchestras Guide', is targeted specifically at classical orchestras. In order to examine the opportunities for orchestras to incorporate more environmentally friendly practices, some of the recommendations provided by Julie's Bicycle which are related to the topics discussed above will be reviewed, followed by two examples of how symphony orchestras are taking concrete action to become more sustainable.

40 Neil T. Smith, 'Concrete Culture: The Planning Hearing as a Stage for Cultural Debates', *Cultural Sociology* 16:2, (2021), 147-164.

41 Smith, 2021.

42 Matt Brennan, 'The infrastructure and environmental consequences of live music', in *Audible Infrastructures: Music, Sound, Media*, ed. by Kyle Devine and Alexandrine Boudreault-Fournier (Oxford University Press 2020), pp. 117-134.

The recommendations can be divided into three overarching categories: information and communication; reducing environmental impact; and monitoring of results. Information and communication have to do with the planning of actions to reduce impact, as well as communicating these intentions and actions both internally within organisations and externally, e.g. via an explicit organisational environmental policy.[43] A way of reducing the environmental impact is to encourage musicians and audiences to use the most environmentally friendly means of transport. Furthermore, the consumption of energy of concert venues as well as the usage of paper can be limited as much as possible.[44] Finally, monitoring in the form of knowing the current level of impact, setting goals for reduction and keeping track of the progress enables organisations to evaluate the outcome of their actions.[45]

The above does not offer an exhaustive overview but only an extract of the available material provided by Julie's Bicycle. Nevertheless, it can serve as a basis for investigating whether orchestras are focusing on the same areas when dealing with environmental issues.

Examples of Environmentally Sustainable Practices of Orchestras

More and more symphony orchestras are aware of how their activities might result in environmental impacts, and they are actively taking steps to reduce these. Two of these orchestras are The Royal Liverpool Philharmonic Orchestra and The Flanders Symphony Orchestra, which in various ways are engaged in pro-environmental practices.

The Royal Liverpool Philharmonic Orchestra provide an elaborated overview of their environmental sustainability policy on their website.[46] The aims of the orchestra's environmental policy are explained, as well as how they are going to be achieved, a strategy which includes, among other things, cross-organisational collaboration and involvement of, for example, the orchestra's executive and leadership team. Moreover,

43 Julie's Bicycle, 2011.
44 Julie's Bicycle, 2011 and 2015.
45 Julie's Bicycle, 2011.
46 Royal Liverpool Philharmonice, *Environmental Sustainability Policy* (2023), https://www.liverpoolphil.com/about-us/environmental-sustainability-policy/

an action plan shows the current areas the orchestra is working on to engage and train staff to improve sustainable behaviour. Concrete steps the orchestra is taking to reduce its environmental impact include a travel policy to reduce CO_2 emissions; reducing energy by measuring consumption and making efficient use of heaters, lighting and electrical equipment; reducing waste related to the catering and printed materials; making a procurement policy that includes taking environmental conditions into consideration when dealing with suppliers; and regularly communicating the progress related to the above both to relevant stakeholders and to audiences.

The Flanders Symphony orchestra also provide a list on their website of the domains they are focusing on in order to become more sustainable.[47] The orchestra encourages more environmentally friendly travel by offering incentives to staff members who travel by bike, while discouraging driving by removing all on-site parking facilities. Moreover, they engage in a number of other practices: for instance, monitoring energy and water consumption in order to make it more efficient; limiting the use of printed materials and taking care to reuse paper where possible; limiting waste and taking care of sustainable waste management; using local catering options; and making optimal use of building spaces. Lastly, the orchestra is a member of Green Track Ghent, a non-profit organisation the members of which include various cultural organisations, and which focuses on enhancing both environmental and social sustainability.

The above examples illustrate that the two orchestras are making efforts to improve their practices within more domains in compliance with the recommendations from Julie's Bicycle, for example the implementation of travelling policies and monitoring of energy consumption. Engaging in such improvements obviously requires information and planning, and these endeavours are communicated publicly via the orchestra's websites. All three recommended elements—the information and communication, the reduction of impact and the monitoring—are present in these examples. Nevertheless, concrete information on the orchestras' websites about the achieved results would make the communication about their efforts even more impressive.

47 Symfonie orkest Vlaanderen, *The Orchestra & Greeentrack*, https://www.symfonieorkest.be/en/pQ0j4CM/greentrack

Sustainability and the Future of Classical Music

This chapter has provided an overview of the current insights about the environmental impact of symphony orchestras, recommendations on how this impact can be reduced, and examples of environmentally friendly initiatives implemented by orchestras.

Reviewing research on the various activities performed by symphony orchestras with a negative environmental impact has led to more insights. Firstly, the finding by Prado-Guerra et al. that these activities vary in terms of the degree of their impact is discussed. The authors find that touring is the activity with the biggest impact, followed by printing of scores, noise profusion and usage of light within the venues. Thus, travelling is found to be significant; a conclusion repeated in this chapter. I have chosen to also include audience travel, and I ague that this, as well as touring, has the biggest impact. Hence, examining how to reduce the impact of these activities is more urgent than, for example, finding the most environmentally friendly format for sheet music. Secondly, it is apparent that the solutions to the problem of how this impact can be reduced are not always unambiguous. While making efforts to change the travelling patterns of both musicians and audiences to more sustainable means of transport is seemingly an obvious way of reducing CO_2 emissions, dealing with music dissemination and sheet music in the most environmentally friendly way is more complex. In both cases, there is research suggesting that digitalization provides more sustainable solutions than before, yet this viewpoint is challenged by others. Thirdly, it has become clear that the environmental sustainability of orchestras is a domain of great importance. Not only can reduction in energy use result in savings for orchestras on an organisational level, but making efforts to increase negative environmental impact is essential to the future of classical orchestras in general. Drawing on the research by Kellison and McCullough,[48] the societal demand for organisations to demonstrate awareness of environmental issues and a willingness to engage in reducing them is crucial for symphony orchestras to take into consideration. According to the authors, refraining from acting in line with the public concern related to the environment can cause a decrease

48 Kellison and McCullough, (2016).

in the support from the general public, for example their potential audience. For symphony orchestras, this would be unfortunate due to '[…] an ongoing debate on the relevance of the institution itself'.[49]

Thus, much can be gained for orchestras by investigating their environmental impact more thoroughly, actively engaging in sustainable practices to reduce this impact, and communicating this as a priority and part of their organisational profile in the future. Prioritising sustainable practices within symphony orchestras can serve as a means to safeguard the future of classical music by making sure the values and endeavours of the sector regarding sustainability are in line with the goals set to address the ecological challenges for society as a whole.

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