

Environmental Impact Report WOW Online 2021

Summary

This report provides an initial analysis of the carbon footprint of WOW Film Festival by comparing activity in Aberystwyth in 2019 and WOW Online in 2021.

The purpose of the report is to help inform a decision as to whether WOW should continue to screen online or whether to return to 'in cinema' screening. What is the right course of action in the light of the climate and ecological emergency?

Within the limitations of the data and methodology it shows that WOW's carbon footprint was **around 97%** less in 2021 than in 2019.

This is overwhelmingly due to the reduction in audience travelling to the cinema by car.

Introduction

This report is a first look at the changes in carbon footprint resulting from WOW Film Festival going online. The carbon footprint of WOW at Aberystwyth Arts Centre in 2019 is assessed and compared to that of the Aberystwyth online audience in 2021.

Methodology and Assumptions

This report looks at emissions related to running the film festival. The following are the main sources of carbon emission.

WOW 2019	WOW 2021
Audience travel	Energy use of device (TV or laptop)
Speakers' travel	Data transmission
WOW staff travel	Data centres
Building related emissions of Aberystwyth Arts Centre	

This report does not consider in any detail the 'avoided activity': ie what would the cinemagoer have been doing if they had not been attending a cinema or streaming WOW content?

For a brief analysis of this issue see **Appendix 3: Avoided activity analysis**.

Events

All films were assumed to be 100 minutes long. Speaker events in 2019 were assumed to be 45 minutes long, in 2021 they ran for 60 minutes.

Audience, WOW staff and speaker travel

Julie's Bicycle's Creative Green Tools was used to calculate audience travel footprint, and rail and air footprint of speakers attending 2019 festival (ig-tools.com).

All audience members were assumed to have travelled by car. It was assumed that those people with postcodes outside Wales were visiting the area and had travelled locally. These 'outlying' postcodes were replaced with the average distance travelled by remaining attendees.

Attendees not providing their postcode were assumed to have travelled the average distance travelled by remaining attendees. The average carsharing ratio for UK journeys was used at 1.45 people per car.

It was assumed that no audience members travelled solely to attend the speaker events but stayed on after a film.

Two speakers who flew from Sardinia were already attending an event at Aberystwyth University, 10% of their travel emissions have been ascribed to WOW. The speakers were assumed to travel economy class.

Staff travel was estimated as follows.

Staff member 1	644 km
Staff member 2	457 km
Guest pick up	16 km

Building energy use – Aberystwyth Arts Centre

Data on building size and carbon emissions was taken from the building Display Energy Certificate January 2020. To account for use of the café, shop, & reception areas the audience at the festival were assumed to use 10% of floor space in addition to the cinema auditorium.

Total useful floor area of Arts Centre	7,474 square metres
Annual carbon emissions - electricity	372 tonne CO ₂ / year
Annual carbon emissions - heating	180 tonne CO ₂ / year
Auditorium size	100 square metres
Additional area used (reception/ café etc)	10% of auditorium
No of films screened at Aberystwyth	20
Average length of film	1.7 hours
Average length of event	45 minutes
Hours of films screened at Aberystwyth	33
Hours of other events at Aberystwyth	4

“Aberystwyth audience equivalent” 2021

The analysis of WOW 2019 in this preliminary report is confined to that of Aberystwyth Arts Centre attendees, due to limited data and time. To compare 2019 to 2021 in this context a 2021 audience which is equivalent to Aberystwyth attendees of 2019 must be defined.

In 2021 WOW saw greatly increased attendee numbers and a change in type of content watched, with many more speaker events being accessed than in 2019. WOW 2021 also saw a much greater geographic spread of attendees. The increase in the total volume of time watched is significant and is the most valid metric for the required comparison: carbon emissions 2019 (from actual attendees) and 2021 (from streamed hours).

Therefore, the total number of hours watched across WOW in 2019 and in 2021 were compared. It was found that 3.3 times as many hours were watched in 2021 than in 2019, over the whole WOW festival. The number of hours watched by the Aberystwyth audience in 2019 should therefore be multiplied by 3.3 to find an equivalent for 2021 to the Aberystwyth audience of 2019.

Details can be found in **Appendix 1: “Aberystwyth audience equivalent” 2021.**

Emissions from streaming content

The following assumptions were made regarding the method of streaming WOW content, these are based on anecdotal evidence only and should be investigated further.

Proportion of streaming done using a television (assumed)	75% (50" LED)
Proportion of streaming done using a laptop (assumed)	25%
Streaming quality (assumed)	HD
Data centres (assumed)	UK

Data for streaming energy use was taken from the International Energy Agency article and tools *The carbon footprint of streaming video: fact-checking the headlines* (Kamiya, December 2020).

Devices - TV	27.36 gCO ₂ /hour
Devices - laptop	5.02 gCO ₂ /hour
Data transmission	4.18 gCO ₂ /hour
Data centres	1.35 gCO ₂ /hour

Building energy use - home

Building energy use resulting from an attendee staying at home to watch WOW film in 2021 may include increased lighting, heating, use of appliances in the home. For the purposes of this report it has been ignored.

Results

WOW Film Festival 2019 at Aberystwyth Arts Centre

Audience travel

Number of films	20
Ticket count	1,254
Total travel distance	39,606 km
Audience travel CO₂ emissions	5,000 kg CO₂e

Speakers' travel

Number of speakers	4
Total distance by train	1,380 km
Total distance by air	685 km
CO ₂ emissions train	57 kg CO ₂ e
CO ₂ emissions air	174 kg CO ₂ e
Speaker travel CO₂ emissions total	231 kg CO₂e

Staff travel

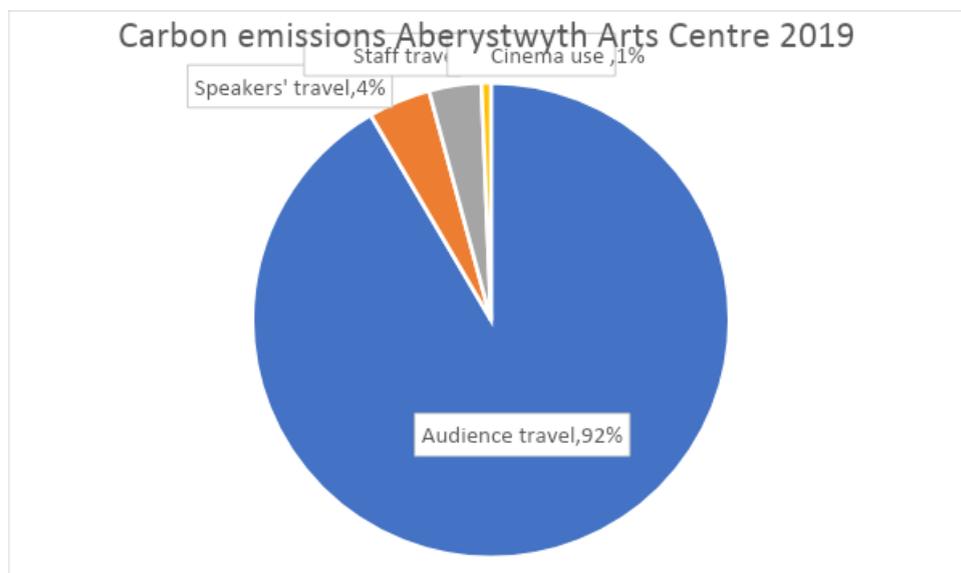
Total distance travelled by staff for Aberystwyth events	1,117 km
Staff travel CO₂ emissions total	194 kg CO₂e

Building energy use

Total floor area used to host a film or event	110 square metres
Total hours at Aberystwyth Arts Centre	37 hours
Volume of Arts Centre used by WOW	4,107 m ² .hours
Percentage of total annual venue floor area. time which is used for WOW	0.006%
Aberystwyth Arts Centre building CO ₂ attributable to WOW - electricity	23.3 kg CO ₂
Aberystwyth Arts Centre building CO ₂ attributable to WOW - heating	11.3 kg CO ₂
Aberystwyth Arts Centre building CO₂ attributable to WOW	35 kg CO₂

Carbon emissions 2019: summary

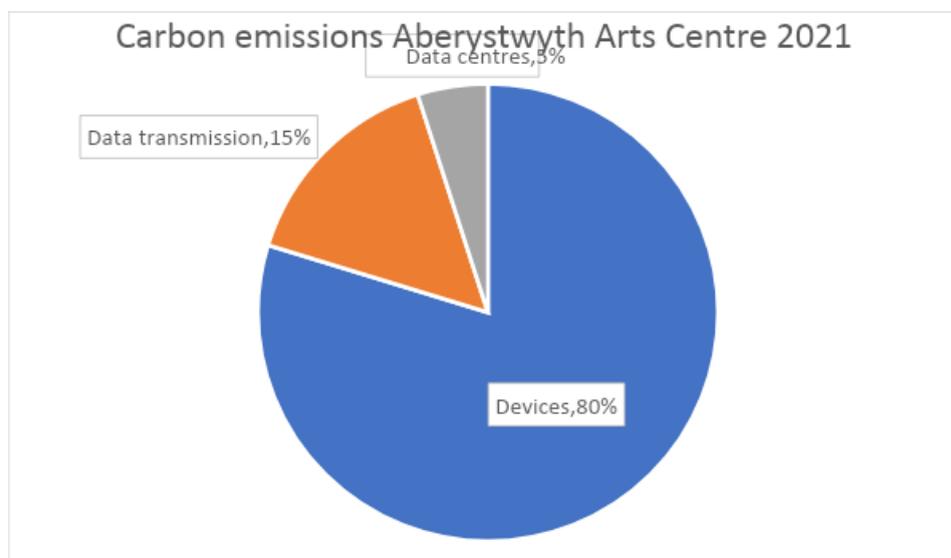
Activity	Carbon emissions
Audience travel	5,000 kg CO ₂ e
Speakers' travel	231 kg CO ₂ e
Staff travel	194 kg CO ₂ e
Cinema use	35 kg CO ₂
Total	5,459 kg CO₂e



WOW Film Festival 2021 online: Aberystwyth equivalent

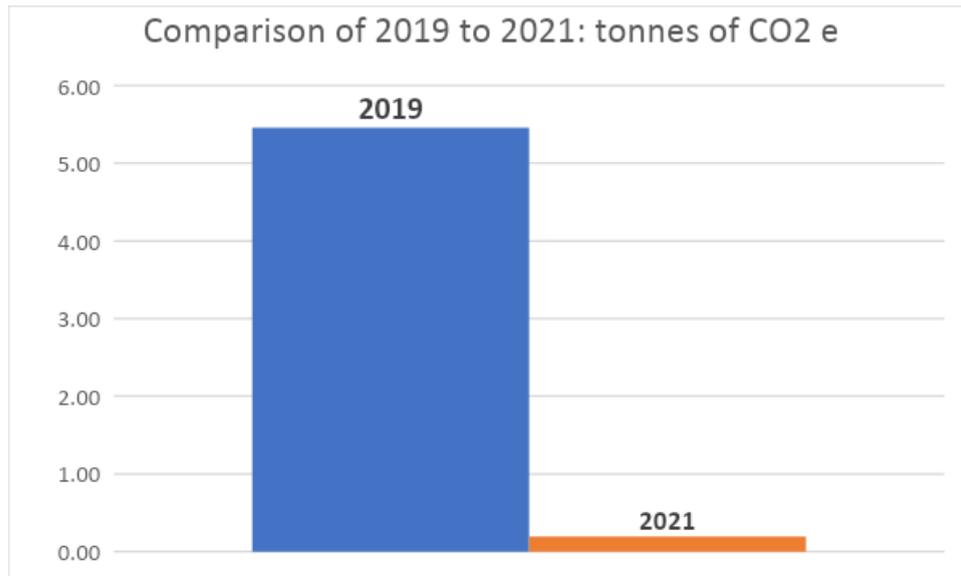
Emissions from streaming content

Devices	154 kg CO ₂ e
Data transmission	29 kg CO ₂ e
Data centres	10 kg CO ₂ e
Total energy use from devices, data transmission and data centres	193 kg CO₂e



Comparison of 2019 to 2021

Carbon footprint 2019: Aberystwyth	5,459 kg CO ₂ e
Carbon footprint 2021: Aberystwyth equivalent	193 kg CO ₂ e
Reduction in carbon footprint from 2019 to 2021	97%



Analysis

Carbon emissions for 2021 festival have been reduced **97%** on 2019 emissions, i.e., in 2021 our emissions were less than **one thirtieth** of what they were in 2019.

This is despite the fact that **more than three times** as many hours of content were watched by this part of the WOW audience in 2021 as in 2019.

Further work

The following steps are required for a more complete analysis of carbon emissions and a comparison 2019 to 2021.

- The analysis should be included to cover the whole of WOW 2019. So as to cover audiences living in more urban areas such as Swansea & Newport
- Attendee questionnaire information should be gathered and used to inform calculations.

For more detail see

Appendix 1: “Aberystwyth audience equivalent” 2021

In 2019 some 3,900 hours were watched in WOW auditoriums across Wales.

In 2021 12,700 hours were watched online: a 3.3 times increase on 2019.

To find the total number of streamed hours which should be ascribed to our equivalent audience in 2021 this report has scaled the Aberystwyth audience of 2019 by 3.3 times.

2019	Total number of festival attendees in 2019	2,333
	Total number of Aber attendees in 2019	1,293
2021	Total number of festival attendees in 2021	8,613
	Total number of “Aber attendees” equivalent in 2021	?
2019 Aber	Aber tickets to films 2019	1,243
	Aber tickets to events	100
	Hours of films	2,072
	Hours of events	75
	Aber hours watched 2019	2,147
2019 total	Total tickets to films 2019	2,233
	Total tickets to events	200
	Hours of films	3,722
	Hours of events	150
	Total WOW hours watched 2019	3,872
2021 total	Total film viewings 2021	6,171
	Total event viewings including YouTube 2021	2,442
	Hours of films	10,285
	Hours of events	2,442
	Total WOW hours watched 2021	12,727
2019 to 2021 comparison	Increase in hours watched 2019 to 2021	3.3
	Assumed total "Aber equivalent" hours watched 2021	7,057

The events hosted by WOW were provided on YouTube. The total number of views as at 27th April 2021 was taken and it was assumed that further viewings would not have material effect on the results.

Appendix 2: Questionnaire

In order to gather data from the audience to inform future analysis a more comprehensive questionnaire should be circulated. It is advised that questions are multiple choice wherever possible to facilitate analysis of results. It is suggested that the following questions would need to be included at a minimum.

- How do you stream WOW films?

I generally watch WOW on a smartphone / tablet / laptop / TV

I use HD (high definition) / SD (standard definition) / a mobile phone / don't know

- How have you normally travelled to WOW film events in the past?

Walk / train / bus / car / bike / motorbike

- If you would normally have travelled by car to WOW events would you have carshared?

No, would drive alone / Yes with 1 other / Yes with 2 others / Yes with 3 others / Yes with 4 others

Appendix 3: Limitations of approach

Certain simplifying assumptions have been made that haven't been properly assessed at this stage:

- Audience travel: assumed no use of low carbon transport
- Staff travel: assumed distance
- Building use: assumed that WOW attendees use 10% additional space outside the auditorium.
- WOW attendees use of technology: device used for streaming, use of HD or SD
- Scaling of audience is based on 2019 and 2021 data only. In 2019 events in Swansea and Newport had abnormally poor attendance meaning Aberystwyth attendees make up a larger proportion of the total audience than they normally would.
- It should be noted that the travel habits of the audience of Aberystwyth Arts Centre differs considerably to that of residents in the cities of South Wales. Use of low carbon transport in these urban areas means comparison of 2019 and 2021 carbon footprint is likely to show a somewhat less drastic reduction.

Not included in this assessment:

- Avoided activity
- Hotel use by staff and speakers
- Building energy use in the home
- Upstream emissions of film industry

Considerations outside the scope of this assessment:

- Contribution of 'live' events to mental and social wellbeing
- Ease of access benefits of online events
- Ability of online events to access more diverse speakers

Appendix 3: Avoided activity analysis

If a WOW attendee had not attended or streamed a WOW event they would have engaged in some other activity. This activity has its own associated carbon emissions and by providing films WOW may have eliminated these carbon emissions. The data does not currently exist with regards WOW film festival.

Analysis of avoided activity would give a more complete picture of the carbon debt of WOW in cinema and WOW online. With better questionnaire data these activities could be better assessed.

The analysis of avoided activity has the potential to further reduce the carbon emissions attributable to conducting WOW online, in particular if WOW online prevents people from driving to another event, or results in attendees watching content in a more sociable way with others.

Even with questionnaire data there are limitations to the extent to which avoided activity can reasonably be assessed.

Analysis of reduction in carbon due to WOW going online has given a very clear result. This isn't reasonably expected to be significantly changed by analysis of avoided activity.

Suggested questions for future questionnaire to inform assessment of avoided activity might be:

1. What would you have been doing if you had not attended WOW?

Streaming other content / attending an event outside the home / reading or other low carbon activity / other (please state)

2. If attending an event outside the home how far would your return journey have been, in km?
3. If attending an event outside the home how would you have travelled?

Walk / train / bus / car / bike / motorbike

4. If attending an event outside the home would you have car shared and with how many people?

No, would drive alone / Yes with 1 other / Yes with 2 others / Yes with 3 others / Yes with 4 others

5. If attending an event outside the home would you have deferred the activity to another day or not done the activity at all?

Deferred to another day / avoided the activity completely

6. If you had been streaming content at home would what kind of device would you have watched it on?

I generally watch content (not WOW) on a smartphone / tablet / laptop / TV

7. If you had been streaming content at home would you have watched it with others?

No, would watch alone / Yes with 1 other / Yes with 2 others / Yes with 3 others / Yes with 4 others

8. If you had been streaming content at home and watching with others what would they have otherwise been doing?

Streaming other content / attending an event outside the home / reading or other low carbon activity / other (please state)