

The sustainability potential of virtual events

In 2020 the whole world was forced to re-think the way we meet and communicate. The events industry, which can only be praised for its resilience and innovation, pretty quickly re-designed planned events as virtual conferences and webinars. If a ship naming ceremony can be done virtually, then there really is no limit to the potential of virtual events and their organisers.¹

There is general agreement that virtual conferences have a significantly lower carbon footprint. Sara Eppel (Eppel Sustainability, former Head of Sustainable Consumption and Production at DEFRA) said: *'I think that virtual events will transform the way we do business, and that's a good thing for sustainability, on the whole.'* David Romps, a physicist at the University of California described the move to virtual events as a *'triple win for climate, accessibility, and costs'*.²

Let's look at one example. In 2019, the European Astronomical Society took place in Lyon, France. In 2020, it was held online. Organisers calculated the carbon emissions of their virtual event, including network-related emissions, laptop-related emissions, and Zoom server-related emissions, and concluded that the carbon footprint of the virtual meeting was roughly **3,000 times smaller** than the face-to-face meeting in France.³

However, before saying that virtual events are always more sustainable, we need to examine the carbon impact of ICT (Information and Communication Technology). It has been said that *"if the Internet was a country, it would be the 7th largest polluter"*⁴ and studies have presented a range of different estimates of the contributions to global emissions made by digital technologies, varying from 1.4% to 5.9% of global greenhouse gas emissions.⁵

This paper combines secondary research on the sustainability of virtual events with 27 interviews with leading academics, sustainability practitioners, business owners, and events professionals.

It provides 7 practical recommendations to help a more informed transition to virtual or hybrid event models and to mitigate any potential negative consequences.

¹ *'So, I attended a virtual ship naming ceremony'*, Marcus Hand, Seatrade Maritime News, October 02 2020 <https://www.seatrade-maritime.com/opinions-analysis/so-i-attended-virtual-ship-naming-ceremony%E2%80%A6>

² *'Opportunities and Challenges of Virtual Meetings'*, Katherine Kornei, Eos, 8 October 2020 <https://eos.org/features/opportunities-and-challenges-of-virtual-meetings>

³ *'The carbon footprint of large astronomy meetings'*, Leonard Burtscher, et al, Nature Astronomy 10 September 2020 <https://www.nature.com/articles/s41550-020-1207-z#ref-CR17>

⁴ <https://www.sustainablewebmanifesto.com/>

⁵ *'Digital technology and the planet: harnessing computing to achieve net zero'*, The Royal Society, December 2020 <https://royalsociety.org/-/media/policy/projects/digital-technology-and-the-planet/digital-technology-and-the-planet-report.pdf>

1. Measure the potential carbon savings of reduced travel

A paper 'Making industrial exhibitions green', compared a V-Ex virtual trade show with several live physical events, based on existing life-cycle assessments adhering to the ISO 20121:2012 standard. 'A three-day conference with 800 attendees has a carbon footprint of 455 tonnes of CO₂e, corresponding to an average of 0.57 tonnes CO₂e per participant. The main contributors to these emissions are travel activities, which accounts for a total of 378 tonnes CO₂e or 0.47 tonnes CO₂e per attendee. They compared this data to virtual events and decisively concluded that 'virtual events reduce carbon emissions by more than 99%.'⁶

Every event is different, and not every event will have the attendees flying from all over the world, but at the high end, Myles Allen, leader of the Climate Research Programme at Oxford's Environmental Change Institute calculated that attendees of just one conference travelled almost twice the distance between Earth and the Sun.⁷

Debbie Hopkins, Associate Professor at Oxford's School of Geography and the Environment noted:

*"The sum total of travel associated with attendance at one large academic conference can release as much CO₂ as an entire city in a week."*¹

We often use the word carbon 'savings' when comparing, but of course there wasn't an alternative to virtual events in 2020, and the first half of 2021, so we are talking about the potential savings and lessons we can learn for a healthier planet. We recommend measuring actual and prevented travel, including travel to and from the airport, and whether flights were economy or business class. Several professionals noted that the travel industry would need time to adjust to any meaningful change in behaviour past the pandemic.

'Virtual events are just so clearly more sustainable. I mean there is absolutely no question, even if you take into account all the energy used doing it virtually. And it's not only carbon to think about, but also water and land use. There's zero doubt that doing something remotely is better than lots of people flying long distances.'

- Dr Colin Cunningham (CBiol CEnv MRSB MEnvSc), Eco-Innovation Consultancy

2. Measure hotel and catering savings, but don't forget about energy and waste at home

⁶ 'Energy report confirms that virtual events reduce carbon emissions by more than 99%' V-Ex Virtual Exhibitions, 2020 <https://www.v-ex.com/energy-report-confirms-that-virtual-events-reduce-carbon-emissions-by-more-than-99/>

⁷ 'Reducing the carbon footprint of academic travel post COVID-19', Environmental Change Institute, University of Oxford, 15 July 2020 <https://www.eci.ox.ac.uk/news/2020/0727-reducing-carbon-footprint-travel-post-covid-19.html>

The same V-ex study noted travel activities are 'followed by hotel overnight stays (39 tonnes CO₂-eq in total) and catering (20 tonnes CO₂e, 0.25 tonnes CO₂e per individual)' in terms of carbon impact.⁸ Hotel rooms around the world produce very different amounts of carbon, for example 15.7 kg CO₂e/night in the UK and as much as 161.6 kg CO₂e/night in the Maldives.⁹

'If it turns out a lot of the offices, [hotels], and conference venues are not needed, they will be demolished, releasing carbon. There'll be energy required for that, and there will be new construction afterwards. Construction is one of the biggest consumers of energy.' (Steve Hill, Ethical AI)

Recently, venues like the Excel have been used (or were on stand by) as Nightingale coronavirus hospitals¹⁰, showing once again the importance of venues, and if there are fewer in-person events post pandemic, they should be re-purposed for the benefits of the local community, rather than demolished.

Although some venues and hotels have made incredible progress to improve the sustainability of sourcing, ban single use-plastic, prevent waste from going to landfill, and promote plant food¹¹, anyone who's been to a conference will know how much paper, unnecessary goody bags with branded products, water bottles, and snacks one gets upon just entering a conference. Attending a virtual event might prevent a lot of that waste, and people can prepare the food that they like in advance. *'Cisco's virtual Global Sales Experience was attended by 19,000 employees, preventing an estimated 84,400 tons of carbon entering the atmosphere from eliminating travel and a reduction in more than 200,000lbs of waste.'*¹²

However, we know that over half of all food waste takes place at home, so reducing waste is one action that all attendees can take to reduce carbon emissions.¹³ The carbon footprint of food produced and not eaten is estimated to be 3.3 Gtonnes of CO₂ equivalent. If food waste were a country it would be the 3rd largest emitter of greenhouse gases. According to Project DrawDown, reducing food waste is the number one solution to the climate crisis, coming above electric cars, solar power and plant-based diets.

⁸ 'Energy report confirms that virtual events reduce carbon emissions by more than 99%' V-Ex Virtual Exhibitions, 2020 <https://www.v-ex.com/energy-report-confirms-that-virtual-events-reduce-carbon-emissions-by-more-than-99/>

⁹ The 2020 UK Government GHG Conversion Factors for Company Reporting (the Defra/BEIS "Conversion_Factors_2020_- Full_set_for_advanced_users" spreadsheet.

¹⁰ 'UK government must publicly recognise events industry', Exhibition World, March 2021 <https://www.exhibitionworld.co.uk/long-read-uk-government-must-publicly-recognise-events-industry>

¹¹ *Catering to the Climate*, produced by the Center for Biological Diversity, found that after serving fajitas made with portobello mushrooms and peppers instead of beef reduces the amount of greenhouse gases generated by more than 75 percent and uses 92 percent less land to produce. 'Here's How the Events Industry Could Slash Greenhouse Gases', Barbara Palmer, PCMA, 4 December 2019 <https://www.pcma.org/sustainability-how-events-industry-can-slash-greenhouse-gases/>

¹² 'Virtual Events – the sustainable future', the Events Hub <https://theeventshub.com/virtual-events-the-sustainable-future/>

¹³ 'Energy report confirms that virtual events reduce carbon emissions by more than 99%' V-Ex Virtual Exhibitions, 2020 <https://www.v-ex.com/energy-report-confirms-that-virtual-events-reduce-carbon-emissions-by-more-than-99/>

In the *International Journal of Environmental Studies* (9th February 2021) Grant Faber¹⁴ summed up other actions that individuals can take to reduce the climate impact of virtual events: *'Individuals can reduce the climate impact of their own participation in virtual events by purchasing renewable electricity for their home if possible, replacing their computer less often, and choosing lower quality video feeds.'*

3. Educate attendees about the environmental impact of ICT and promote wider repair and recycling of tech

'Our biggest impact is going to be the decisions that our 25,000 students make when they go into industry.' Mark Warner, Sustainability Manager, Leeds Beckett University

Event organisers have similar power – they have the attention of potentially thousands of people and a unique opportunity to raise awareness of environmental issues, for example about the carbon footprint of ICT, which is not widely understood.

Digital technologies rely on *'a complex infrastructure of cables, fibres, computers, data centres, routers, servers, repeaters, satellites, radio masts and energy needed to perform their functions.'*¹⁵

'We have more and more devices, and more electricity is used, and more and more data centres are needed.' Paul Druckman, Chair, World Benchmarking Alliance

Although we don't know how many (if any) devices are purchased specifically to attend particular virtual events, William Young (Professor of Sustainability and Business, Sustainability Research Institute, University of Leeds, UK) said that *'we need to be careful about repetition of devices, so having desktops at work and laptops at home for virtual events as well.'*

'Computers are complex, multi-part products, which include rare metals. As with many products, it's important that we are given greater transparency as to where higher-risk componentry is sourced from, including the fair and equitable treatment of labour across related supply chains (particularly in relation to the mining sector).'

Christopher Webb, Head of sustainability, tb bennett

It is estimated that data storage could amount to 8% of planetary energy use by 2030 (from an already significant 2%),¹⁶ although other studies show that the uptake of renewable energy and innovation have helped reduce emissions from digital technology use.¹⁷ There

¹⁴ *'New study quantifies the carbon emissions of virtual conferences'*, Sarah deWeerd, Anthropocene Magazine, 9 February 2021, <https://www.anthropocenemagazine.org/2021/02/virtual-conferences-have-a-low-climate-impact-but-not-zero/>

¹⁵ *'Digital technology and the planet: harnessing computing to achieve net zero'*, The Royal Society, December 2020 <https://royalsociety.org/-/media/policy/projects/digital-technology-and-the-planet/digital-technology-and-the-planet-report.pdf>

¹⁶ *'Cut Back on Email If You Want to Fight Global Warming'*, Emily Chasan, Bloomberg Green, 25 January 2020 <https://www.bloomberg.com/news/articles/2020-01-25/cutting-back-on-sending-emails-could-help-fight-global-warming>

¹⁷ *'Digital technology and the planet: harnessing computing to achieve net zero'*, The Royal Society, December 2020 <https://royalsociety.org/-/media/policy/projects/digital-technology-and-the-planet/digital-technology-and-the-planet-report.pdf>

needs to be more transparency, accountability, and accessibility of this information, and more sharing of innovative ideas and best practices.

'With data centres, we also need to consider huge amounts of packaging and the transportation of the IT equipment. After servers have reached the end of their life, recycling is hugely important. We need to extract the precious metals, for instance. One of the issues is not just the companies that run data centres, but the infrastructure that's available to recycle. With waste electrical and electronic equipment waste growing exponentially more and more recycling facilities are required to keep up with demand.' (Philip Mossop, CTO, Pentatonic)

'It would make sense if more data centres were actually located in places like Iceland and Sweden where there's an awful lot of hydroelectric power, which is essentially free of carbon emissions.' (Steve Hill, Ethical AI)

Tony Cooke¹⁸ pointed out that it's really hard to know which data centre is being used when you're the client, and Mark Warner¹⁹ pointed out that it's difficult to know how exactly you would apportion the energy consumption of data centres to an increase of virtual events.

One thing that can easily be done by organisers is the promotion of helpful resources, such as *'Recycle your Electricals'*²⁰, a website which has information about repairing electricals and allows people to search for their nearest recycling point.

Digital technology is part of the problem but it can also be a part of the solution by proving innovation, and allowing people to work and meet effectively without the need to travel. Zoom claims to have *"helped reduce 45 million metric tons of carbon emissions by enabling millions of users to work from home during the pandemic"*²¹ but little detail of the methodology is available.

Another reason for hope is a new ITU standard which highlights that compliance with the Paris Agreement will require the ICT industry to reduce greenhouse gas (GHG) emissions by 45 per cent from 2020 to 2030. *'The standard will support ICT companies in reducing GHG emissions at the rate necessary to meet the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement's goal of limiting global warming to 1.5°C above pre-industrial levels.'* The recommended emission-reduction targets are the first targets specific to the ICT industry to be approved by the Science Based Target Initiative.²²

4. Consider turning cameras off

¹⁸ From an interview with Tony Cooke, Honorary Professor of Sustainability Leadership, University of Nottingham, Operations Director, International Cats Care

¹⁹ From an interview with Mark Warner, Sustainability Manager, Leeds Beckett University

²⁰ <https://www.recycleyourelectricals.org.uk/>

²¹ *'How Video Meetings Are Helping Reduce Environmental Impact'*, Priscilla Barolo, Zoom blog, 22 April 2019 <https://blog.zoom.us/how-video-meetings-are-helping-reduce-environmental-impact-infographic/>

²² *'ICT industry to reduce greenhouse gas emissions by 45 per cent by 2030'*, International Telecommunications Union, 27 February 2020 <https://www.itu.int/en/mediacentre/Pages/PR04-2020-ICT-industry-to-reduce-greenhouse-gas-emissions-by-45-percent-by-2030.aspx>

Gerry McGovern writes about the hidden pollution cost to online meetings, stating that a one-hour audio call consumes about 36 MB of data per person, and a one-hour ultra-high-definition video call consumes about 1.3 GB per person.²³ Assuming an average of one one-hour meeting a day involving two people, 250 days a year, then the audio-only calls would emit 0.08 kg of CO₂, and the ultra-high-definition calls would emit 2.8 kg of CO₂.

The difference is significant, and there is an easy solution – don't use ultra high-definition (is it even necessary?) and encourage attendees to turn off their cameras when it's not needed. As so many people are experiencing Zoom fatigue, people might appreciate having a camera off for more than one reason.

5. Carefully consider the purpose of your event

Zoom claims that it would take 32 trees a full year to offset the CO₂ of one in-person meeting. Comparatively, it would take 1 tree just 2 months to offset the CO₂ from one virtual meeting.²⁴ While this represents a saving, it is still a considerable environmental impact when multiplied by the sheer number of Zoom-based events and planning meetings. Any resource should be treated with care.

²³ 'The hidden pollution cost of online meetings', Gerry McGovern, 8 March 2020 <https://gerrymcgovern.com/the-hidden-pollution-cost-of-online-meetings/>

²⁴ 'How Video Meetings Are Helping Reduce Environmental Impact', Priscilla Barolo, Zoom blog, 22 April 2019 <https://blog.zoom.us/how-video-meetings-are-helping-reduce-environmental-impact-infographic/>

'I think it's important to always go back to the why. If you're doing an event and it has to be virtual, don't just organise one for the sake of it, there needs to be a good reason'

Lizzy Eaton, Founder of award-winning Events and Marketing Consultancy Oddity

6. Think about wider sustainability

It is reported that the UK events industry emits 1.2bn kg of CO₂e every year,²⁵ so has a considerable environmental impact that needs to be mitigated, however the impact of an event is much wider than that. The ISO 20121:2012 is a management system based on the 2009 version of the British Standard 'BS8901', which was prepared in anticipation of the 2012 London Olympics. Crucially, it requires a systematic approach to addressing and practicing sustainable development issues in relation to event planning.²⁶ The standard guides organisations of all sizes in the management of social, economic, as well as environmental impacts (notably it is the management system of the event organisers, not the event itself.)

It was calculated that in 2017 in-person business events produced \$2.5 trillion of business sales alone and provided 26 million jobs²⁷ but some aspects are more difficult to measure. What is the value of an event where 3,000 heart surgeons get together to share knowledge to save lives?²⁸

'Behind the scenes of many in-person events, you have a lot of inter-related suppliers and industries supporting local economies to consider: stand builders, electricians, designers, printers, caterers, hoteliers, for example. Sustainable development is multi-faceted; it's not just about 'greening', so while virtual events naturally solve certain sustainability issues, they can cause others along the way. If we're developing strategies to move away from in-person events, we should also map the activities we propose replacing, and offer viable alternatives as far as possible so no-one is left behind.'

Carra Santos, Sustainability Strategist

Several Sustainable Development Goals (SDGs) are related to the potential benefits of virtual events, in particular: SDG 10 'Reduce inequalities', SDG 11 'Sustainable cities and communities', and SDG 12 'Responsible consumption and production'.²⁹ As each event is unique, we recommend spending the time looking at the Sustainable Development Goals and honestly considering where your event might have a negative impact, and who might be excluded. You can take action, for example, by subsidising data for attendees who might not

²⁵ 'UK events industry emits 1.2bn kg of CO₂e every year, says report', Stuart Wood, Conference News, 2 June 2019 <https://www.conference-news.co.uk/news/uk-events-industry-emits-12bn-kg-co2e-every-year-says-report>

²⁶ 'Getting started with ISO 20121 Sustainable Event Management', British Standards Institute <https://www.bsigroup.com/en-GB/iso-20121-sustainable-events-management/Introduction-to-ISO-20121/>

²⁷ 'Global Economic Significance of Business Events, Events Industry Council', Events Industry Council, November 2018 <https://dev-meetingsmeanbusiness.pantheonsite.io/sites/default/files/OE-EIC%20Global%20Meetings%20Significance%20%28FINAL%29%202018-11-09-2018.pdf>

²⁸ 'UK government must publicly recognise events industry', Exhibition World, March 2021 <https://www.exhibitionworld.co.uk/long-read-uk-government-must-publicly-recognise-events-industry>

²⁹ 'Digital technology and the planet: harnessing computing to achieve net zero', The Royal Society, December 2020 <https://royalsociety.org/-/media/policy/projects/digital-technology-and-the-planet/digital-technology-and-the-planet-report.pdf>

be able to afford it, so the poorest stakeholders don't have to be faced with a choice 'between data and dinner.'³⁰ The key is to be as flexible as possible.

7. Use positive language

Having a responsibility for sustainability can feel like a daunting task, with few perfect answers, but it can also be an amazing opportunity to make a difference and influence lasting change by inspiring your guests to make choices that are better for the planet.

'There's a lot of apocalyptic films and lots of visions of future destruction of the planet. We need a more positive vision for the future and a more positive language around sustainability. Creativity is an energy that's renewable in all of us, and it's there, it's in abundance. We need to inspire people to create positive scenarios for how things can be.'

Lauren Davies, Events Manager, University of Birmingham, and a trustee of Swarm Dynamics (a charity that brings together artists and experts to advance zero carbon futures)

Events are organised to connect people, to educate, to inspire, to promote businesses and ideas, and to celebrate. Although virtual events appear more environmentally sustainable (mainly due to reduced travel), we believe that both virtual and in-person events can, on balance, be actively beneficial if we take the time to carefully consider their impact, and take steps to mitigate any negative impact.

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Annex 1

Alternative models for events in the next normal

'It is both a waste of time and a huge waste of Earth's resources to go back to predominantly physical events.'

³⁰ 'Data or Dinner: What is data poverty and why don't we know more about it?', Rob Ashfold et al, Nesta, 9 September 2020
<https://www.nesta.org.uk/project-updates/data-or-dinner/>

What needs to happen with virtual events, is that they need not to copy physical events, but to use innovation to be effective.'

Paul Druckman (Chair, World Benchmarking Alliance)

There are alternatives to events that are purely virtual, or mega carbon-intensive in-person conferences.

1. Hyperlocal

These are potentially the most environmentally sustainable, after not having an event at all due to reduced travel and hotel use.

Stella Creative Director, Festival of Thrift, explains:

'There's beauty and value in hyperlocal events and I'm really glad we helped people build relationships with their neighbours as well as with us. We've demonstrated how you can still celebrate in your locality, even during a pandemic. But we must still find ways of connecting people from different backgrounds together too. And for me, that is a particularly important achievement of Festivals - that we can bring international artists in, and people with different abilities and different points of view to connect and learn and celebrate together.'

2. Mixed

When coronavirus restrictions are lifted, we might alternate between in-person and virtual events and meetings.

At one of my boards we decided that next year we'll probably hold half of the meetings live and half virtually.' (Neal Ransome, Chairman of ProVen VCT Plc and former Head of PwC Pharmaceutical & Healthcare Corporate Finance).

In-person conferences can be bi-annual, for example.

3. Hybrid

To have the best of both worlds, you can combine, well, both worlds.

William Young (Professor of Sustainability and Business, Sustainability Research Institute, University of Leeds) said: *'I think hybrid is going to mean virtual and physical events happening at the same time.'*

Nike Netherlands experimented with a hybrid product launch - the new products were shipped to each site in advance and the announcement was made virtually. *'This way, all*

employees shared the excitement of the moment and physically experienced the products collectively in real-time.³¹

Richard Parncutt and Nils Meyer-Kahlen wrote about the multi-location semi-virtual conferences, where all talks at all hubs are live-streamed.

'At each hub, a local program and a virtual program run in parallel, and participants can switch back and forth between them. **Per-capita emissions are reduced by 50-90% (the more hubs, the better).**'¹

For the in-person part of a hybrid event, we recommend trying to reduce flights as much as possible, booking venues that follow sustainable practices (demonstrated by internationally recognised certifications), and ordering plant-based food. The ISO 20212:2012 standard can be of great help as it addresses all stages of an events' supply chain and includes monitoring and measuring guidelines.³² The British Standards Institution stated that ISO 20121 can help:

- Identify ways to improve event planning and delivery.
- Achieve best practice levels of efficiency and performance.
- Define roles and responsibilities for staff, contractors, and suppliers.
- Cut costs through better energy and waste management.³³

More guidance on how to organise green in-person events can be found [here](#).

Interviews

Special thanks are due to the following individuals who took the time to be interviewed for this project and for their generous approach to sharing their knowledge and ideas.

1. Carra Santos, Sustainability Strategist
2. Catherine Cameron, Director Agulahs Knowledge
3. Christopher Webb, Head of Sustainability, tb bennett
4. Clive Longbottom, Quocirca Ltd
5. Dr Colin Cunningam, Consultant, Eco-Innovation Consultancy
6. Harvey Jones, Founder, Refreshing Logic

³¹ 'Hybrid Green Events: How to Boost Sustainability in the Industry's New Normal', Group Delphi, 1 February 2020 <https://www.groupdelphi.com/blog/trade-show/hybrid-green-events-sustainability/>

³² 'Energy report confirms that virtual events reduce carbon emissions by more than 99%' V-Ex Virtual Exhibitions, 2020 <https://www.v-ex.com/energy-report-confirms-that-virtual-events-reduce-carbon-emissions-by-more-than-99/>

³³ 'Getting started with ISO 20121 Sustainable Event Management', British Standards Institute <https://www.bsigroup.com/en-GB/iso-20121-sustainable-events-management/Introduction-to-ISO-20121/>

7. John Swannick, Director, Swannick
8. Karen Fitzgerald, Volunteer Greenpeace Speaker & Head of Health of Policy and Services Research, Cancer Research
9. Lauren Davies, Events Manager, University of Birmingham, Trustee of Swarm Dynamics
10. Lizzy Eaton, Founder of Events and Marketing Consultancy Oddity
11. Marie Ekerholm, Senior Consultant, Non-Executive Directors Association
12. Mark Warner, Sustainability Manager, Estate Services, Leeds Beckett University
13. Neal Ransome, Chairman of ProVen VCT Plc and former Head of PwC Pharmaceutical & Healthcare Corporate Finance
14. Paul Drackman, Chair, World Benchmarking Alliance
15. Phil Clarke, Director, Consciam
16. Philip Mossop, CTO, Pentatonic
17. Professor Tavi Murray, Swansea University
18. Sara Eppel, Eppel Sustainability
19. Sarah Holloway, Co-Founder, Impact Advisors Group
20. Scott Walker, Director, Matter Innovation
21. Sherei-Leigh Miles, Director, Net Positive Futures
22. Stella Hall, Creative Director, Thrift festival
23. Stephen Hill, Founder, Ethical AI
24. Tony Cooke, Honorary Professor of Sustainability Leadership, University of Nottingham, Operations Director, International Cats Care
25. Tricia Duffy, Founder, Lily Grey
26. Veronica Heaven, Director, the Heaven Company
27. William Young, Professor of Sustainability and Business, Sustainability Research Institute, University of Leeds

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24. The 2020 UK Government GHG Conversion Factors for Company Reporting (the Defra/BEIS "Conversion_Factors_2020_-_Full_set_for_advanced_users" spreadsheet