DIMPACT

Insight to action on digital carbon impacts

The carbon impact of AI video generation

New research commissioned by DIMPACT will help media and entertainment companies make climate-informed decisions about deploying AI video generation in production. Assessing the climate impacts of generative AI requires a standardised methodology for measuring the lifecycle carbon footprint of AI systems across value chains and greater transparency from AI model providers.

The Carbon Impact of AI Video Generation was written by The Carbon Trust with support from an Expert Advisory Group[1] and contributions from DIMPACT participants, including the BBC, ITV, Netflix, and Spotify.

DIMPACT's objectives

DIMPACT commissioned the report for three reasons

Establish a common framework for quantifying the carbon footprint of AI

Existing studies about AI emissions often focus on individual parts of the AI system rather than the whole. By contrast, a comprehensive lifecycle approach that includes training, embodied, and operational emissions is needed for comparable AI-related carbon footprint disclosures across hyperscalers and AI providers. Greater transparency based on common measurement frameworks will empower companies across the media and entertainment value-chain, including DIMPACT participants, to better understand and manage their AI-related emissions.

Estimate the carbon footprint of video generation

Existing research on the environmental impacts of AI previously focused on text and image generation. This new research on video generation fills a gap and helps the media

[1] [1] Expert Advisory Group members:

- Mark Butcher, Posetiv Cloud
- Boris Gamazaychikov, Sustainable AI Group
- Simon Hinterholzer, Borderstep Institute
- Dr. Sasha Luccioni, Sustainable AI Group
- Sam Read, Sustainable Entertainment Alliance
- Dr. Daniel Schien, University of Bristol
- Dr. Iuna Tsyrulneva, Earth Observatory of Singapore

and entertainment industry better address a significant part of its AI-related carbon footprint.

Support decision-making during production

AI is being rapidly adopted across the media and entertainment sector. The outcomes of this research are intended to inform studios' AI implementation decisions from a sustainability lens. It is important to weigh the overall carbon footprint of using AI (including potentially significant growth) against the potential avoided carbon footprint from traditional workflows like physical production and intensive visual effects (VFX) rendering.

Research findings

Three key findings should inform AI-related climate strategies in the media and entertainment industry.

A common lifecycle approach to measuring AI's carbon footprint needs to be developed

Existing studies use differing methodologies and system boundaries to measure model training emissions, embodied emissions, and operational energy consumption. As a result, carbon estimates vary significantly and are difficult to compare. To address this challenge, the report proposes a common lifecycle approach that includes:

- Model development, training and testing
- Operational energy consumption during inference
- Ongoing re-training and re-testing
- Embodied emissions from IT hardware
- Data centre support services and infrastructure
- Idle capacity associated with AI infrastructure
- Model retirement and decommissioning activities

Including these lifecycle phases will provide a more comprehensive assessment of AI's carbon footprint than methodologies which focus solely on inference energy use. This framework is therefore instructive not just for video generation, but for overall GenAI emissions evaluation. The next stage of progression will be to turn the framework into an applicable and useable methodology that companies can begin using day to day to support strategy and reporting.

The current carbon footprint of AI video generation can be estimated

The report estimates that a 5.4-second, 720p resolution video at 15 frames per second with 50 denoising steps has a lifecycle carbon impact of approximately 50-100 gCO_2e per

video when generated on the US electrical grid. This estimate includes training emissions, embodied emissions, and operational energy consumption.

The estimate is highly sensitive to variables such as video resolution, frame count, denoising steps, electrical grid carbon intensity, and assumptions about model training emissions, and the report examines how changes in these variables affect carbon footprint estimates. The numbers used in this analysis reflect current estimates, but these figures will evolve as research continues and data improves, for example, by gaining specific information from GenAI video providers and hyperscalers.

Furthermore, the research acknowledges that efficiency gains at the task level do not necessarily reduce overall emissions because total energy use may increase as AI becomes more capable, accessible, and widely adopted. This dynamic, often referred to as Jevon's paradox, highlights the importance of continuing to measure and monitor both efficiency gains and overall demand when evaluating the environmental impacts of AI.

To help contextualise the calculated impact, this magnitude is broadly within the range of emissions associated with some common digital activities. For example, the Carbon Trust's external analysis of the DIMPACT video streaming methodology found that one to two hours of video streaming in Europe can result in emissions of a similar order of magnitude. The video streaming estimate excludes embodied emissions and therefore reflects a different footprint boundary from the assessment presented here. As such, direct comparisons are limited by differences in scope, methodology, and assumptions.

The environmental impacts of generative vs traditional production workflows can be compared

Using a detailed case study, the report compares a new generative workflow with a traditional VFX workflow based on 3D rendering. The analysis found that the AI-assisted approach could plausibly result in lower emissions than the traditional VFX approach, largely due to faster creative iteration and the subsequent reduction in workstation rendering requirements.

This case study shows how environmental impact can be integrated into decision-making when evaluating different production approaches. However, these findings should not be taken as evidence that AI is inherently lower carbon than traditional production methods. Results are highly dependent on the specific production scenario, workflow design, electricity source, training assumptions, and the number of creative iterations. Each use case should be assessed on its own merits and compared against a realistic counterfactual.

What comes next for DIMPACT

This research will shape DIMPACT's strategy to promote climate-informed decision-making about how AI is deployed in the media and entertainment industry.

Support greater consistency and transparency

The proposed lifecycle methodology is a starting point. DIMPACT will continue engaging with hyperscalers, AI providers and other stakeholders to support industry alignment on carbon footprint methodologies that enable comparisons and inform decision-making. Greater availability of customer-facing carbon footprint data will help organisations measure and manage AI-related environmental impacts.

Build on research and expand understanding of AI impacts

The environmental impacts of AI – and our understanding of them – will continue to evolve alongside the technology. As a next step, DIMPACT will build on this research by further analysing the footprint of specific AI video generation models and by exploring the impacts of a wider range of AI applications across digital media. DIMPACT will also continue to engage with model developers, operators, and industry stakeholders to improve data quality and transparency.

Apply the report's insights across production workflows

DIMPACT participants can now evaluate AI-enabled workflows against realistic alternatives across a wide range of production scenarios. This comparison will help to highlight where AI could avoid or reduce emissions associated with traditional production[2].

Conclusion

Reducing the environmental impact of AI in the media and entertainment sector will require increased collaboration and transparency across parties. It will also require companies to integrate sustainability into their holistic evaluation of AI's net value-add to the business. This research takes a first step in enabling sustainability-informed decision-making for the industry, and DIMPACT is committed to further promoting partnerships across the industry.

[2] BAFTA albert, *Accelerate 2025* (2025), ACCELERATE-2025-BAFTA-albert-report.pdf