

●○○ SCOPE3

The State of Sustainable Advertising

Q2 2023



A Letter from Lillie Ratliff

HEAD OF RESEARCH AND SOLUTIONS, SCOPE3

Since publishing our first report in April, decarbonization commitments (and action) continue to accelerate across the industry. The largest brands and agencies are extending their corporate sustainability goals into advertising-specific reduction targets. Publishers and tech platforms are seeing the business benefits of reducing.

Foundational to this transition is the reinforcement that sustainable media performs better.

While making progress on multiple fronts, our research exposes parts of the ecosystem that benefit from opacity and contribute waste, which we refer to as climate risk. “Made for Advertising” (MFA), a subset of this inventory, makes up 15% of advertiser spend, according to an ANA study recently published.

Many of our partners are mitigating their exposure by using Green Media Products and Climate Shield. Data from campaigns and deals implemented across Q2 show that these solutions are effective at combating emissions and improving performance. This industry-wide movement to identify, defund, and eliminate climate risk is helping to drive greater investment in quality content developed for the consumer. We will continue to ship solutions that enable turnkey reduction.

To progress in our mission to decarbonize advertising, we acknowledge and welcome the obligation to refine and expand our method as we uncover nuances key to accurate emissions modeling and as industry frameworks take shape. With each report, we evolve our process to reflect these learnings.

As you will see throughout the report, making sustainable changes drive second order benefits that pay dividends.

Thank you to our partners and customers for your collaboration, feedback, and support on this journey.



Executive Summary

Emissions data and insights are helping stakeholders across digital advertising establish a better understanding of the industry's overall impact on the planet.

This quarter's report provides updated industry benchmarks and a more comprehensive estimate of digital ad emissions. Developments from the last report include refinements to the Scope3 emissions model, and expansion of the data set to include more countries and channels.

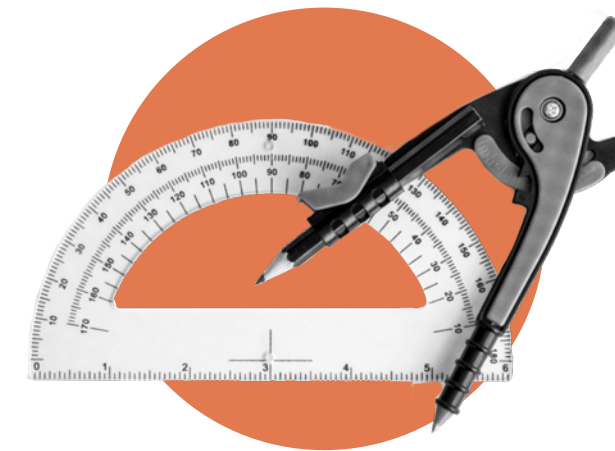
Beyond updated benchmarks, the report explores new data around the presence of climate risk, along with the impact it has on advertiser campaigns if blocked. The impression-level and market-specific insights, as well as real campaign performance data, offer marketers, publishers and technology providers additional insight into where opportunities exist to reduce emissions.

As the industry moves to adopt more sustainable business practices, it's also important to understand how optimizing toward lower emissions might influence a marketer's ability to balance other key metrics, like performance, attention and privacy. This installment of the report includes an analysis of the intersection between emissions and these dimensions using data from industry leading attention and privacy data sources.



Streaming brings digital ad emissions to 7.2M metric tons annually.

A year of digital advertising (streaming + display) emissions are the same as 1.4 M US homes' electricity usage yearly.



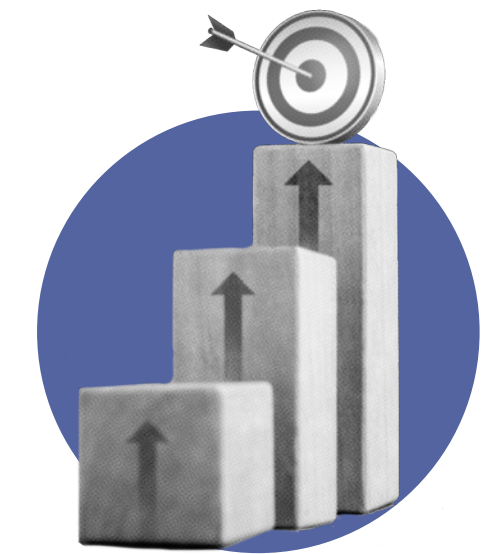
Reduction strategies will need to be channel specific.

Measurement of every channel highlights the nuances that exist in the emissions of different types of advertising.



Climate risk inventory is costing marketers.

Emissions from climate risk inventory are on average 2 times higher than the market average, while underperforming by 13%.



It's possible for marketers to have it all.

There's a 36% overlap between 'green inventory' and inventory that's performant, high attention and privacy compliant.

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The Emissions Data

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To fully understand the impact digital advertising has on the planet, the industry must be able to accurately measure its emissions. Our inaugural report provided the ad industry with its first emissions benchmarks, offering a comprehensive estimate of the carbon footprint of programmatic.

Scope3 continues to incorporate new data sets and fine-tune the methodology, which has increased not only the reliability of the data, but also breadth and depth of our view into the emissions of the broader digital advertising industry. References to "digital advertising" in this report include display and streaming only. Social, audio, and other digital channels are not yet covered.

Long-term industry reduction trends will emerge over time, but today the data can be used to spotlight how specific pockets of the industry are changing. We can draw conclusions about exactly which behaviors impact emissions.

Fluctuations occur naturally in the data since it is collected continuously and updated monthly. It may normalize as the industry better understands emissions measurement, but given the variables at play, paying attention to nuances is key. Methodology updates, changes to data sources and supply graphs, and seasonality are a few variables to take into account.

Knowing the burden of proof is high – tracing emissions back to what's released into the atmosphere – this quarter's report includes a number of improvements in the form of expansions and refinements to the data set.

A more robust global estimate.

The data now includes the top 30 countries by volume of impressions. (excluding China and Russia).

Adding more channels.

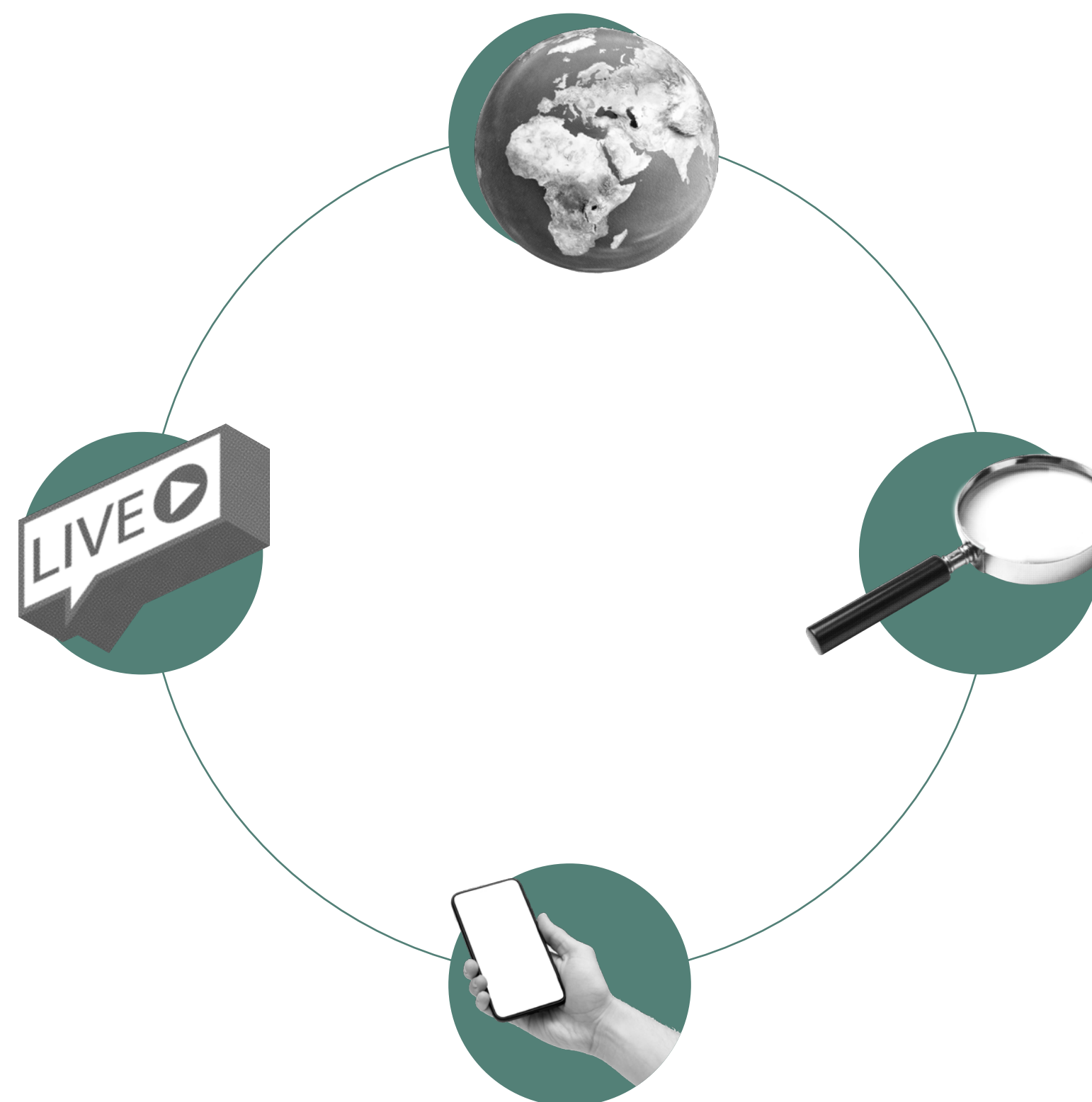
Scope3's measurement capabilities now include streaming. Audio, DOOH and social will be available later this year.

Improvements to the methodology.

Added new fields for more granularity and flexibility e.g. granular inputs on seller, channel and buying method, and modeling changes that account for ad stack integration.

Shifting with the industry.

These benchmarks exclude 'consumer device,' to account for flexibility across different measurement frameworks. This may change which is why it will continue to be measured (see page 13 for more details).



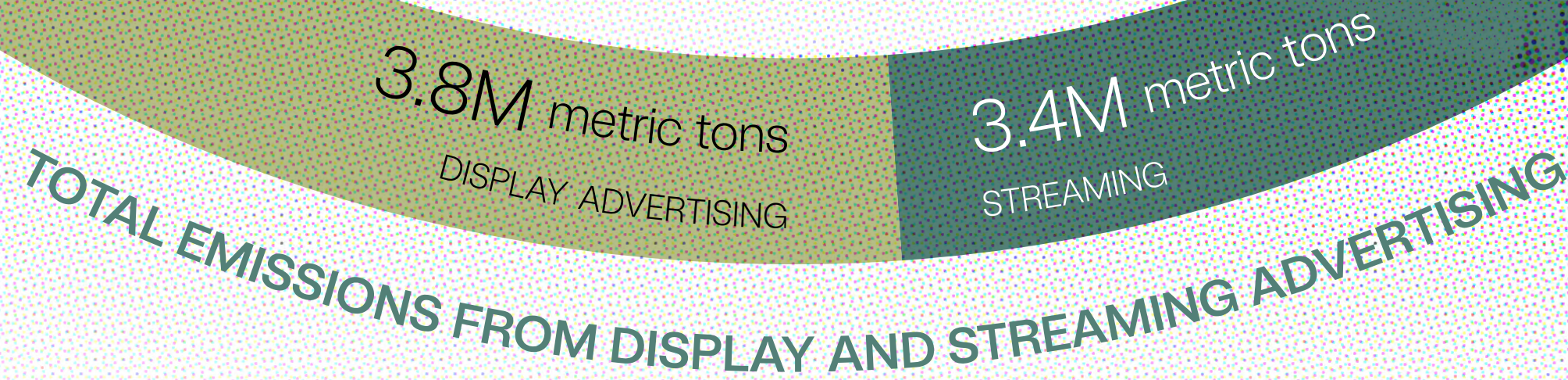
Combined, digital display and streaming ads produce **7.2M metric tons of emissions every year**

THE GLOBAL IMPACT OF ADVERTISING EMISSIONS

Based on the trillions of digital ad impressions processed every year, our latest emissions data shows that digital advertising (including display advertising and streaming*) emits 7.2 million metric tonnes of CO₂e annually—

that's the equivalent of yearly electricity usage for **1.4 million US households.**

Broken out by channel, display advertising accounts for just over half—3.8 million metric tons—and streaming contributes 3.4 million metric tons to the global number. To arrive at these figures, we use both a third-party data source in BIScience (to assess total impression volume by market) and Scope3's own model for emissions measurement.



Digital ad emissions from top 30 countries by volume of impressions, excluding China and Russia

Streaming emissions for this particular estimate include only devices available in BIScience – phone, tablet, pc, not tv – so it's important to note that actual emissions are likely higher.

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THE GLOBAL IMPACT OF ADVERTISING EMISSIONS (CONT.)

1
The Emissions Data

Comparing emissions from advertising to other industries or a country's total emissions can provide helpful context of the problem.

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We cross-referenced advertising emissions data with public emissions information from Global Carbon Project and Our World in Data. We found that digital advertising emissions are roughly equivalent to:

Additionally, for 'clean countries' where total country emissions are lower, a much higher than average share of emissions comes from digital advertising practices – this is the case for Sweden and Denmark.

However, in terms of absolute emissions, countries like the US, India and the UK are the biggest contributors. India has both high emissions as a country and a high share of emissions from digital advertising.

WHAT COUNTRIES HAVE THE MOST EMISSIONS FROM ADVERTISING?



The entire aviation and shipping industry of Portugal

OR

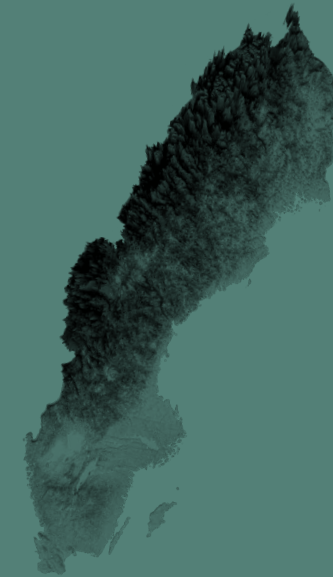


The entirety of Sweden's manufacturing and construction industry

TOP 3 GREATEST SHARE OF EMISSIONS FROM ADS

COMPARED TO TOTAL COUNTRY EMISSIONS

1st
Sweden



2nd
India



3rd
Denmark



TOP 3 ABSOLUTE EMISSIONS FROM ADVERTISING

1st
India



2nd
United States



3rd
United Kingdom



Additional data sources:
www.ourworldindata.org/emissions-by-sector
www.globalcarbonproject.org

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THE BIG PICTURE

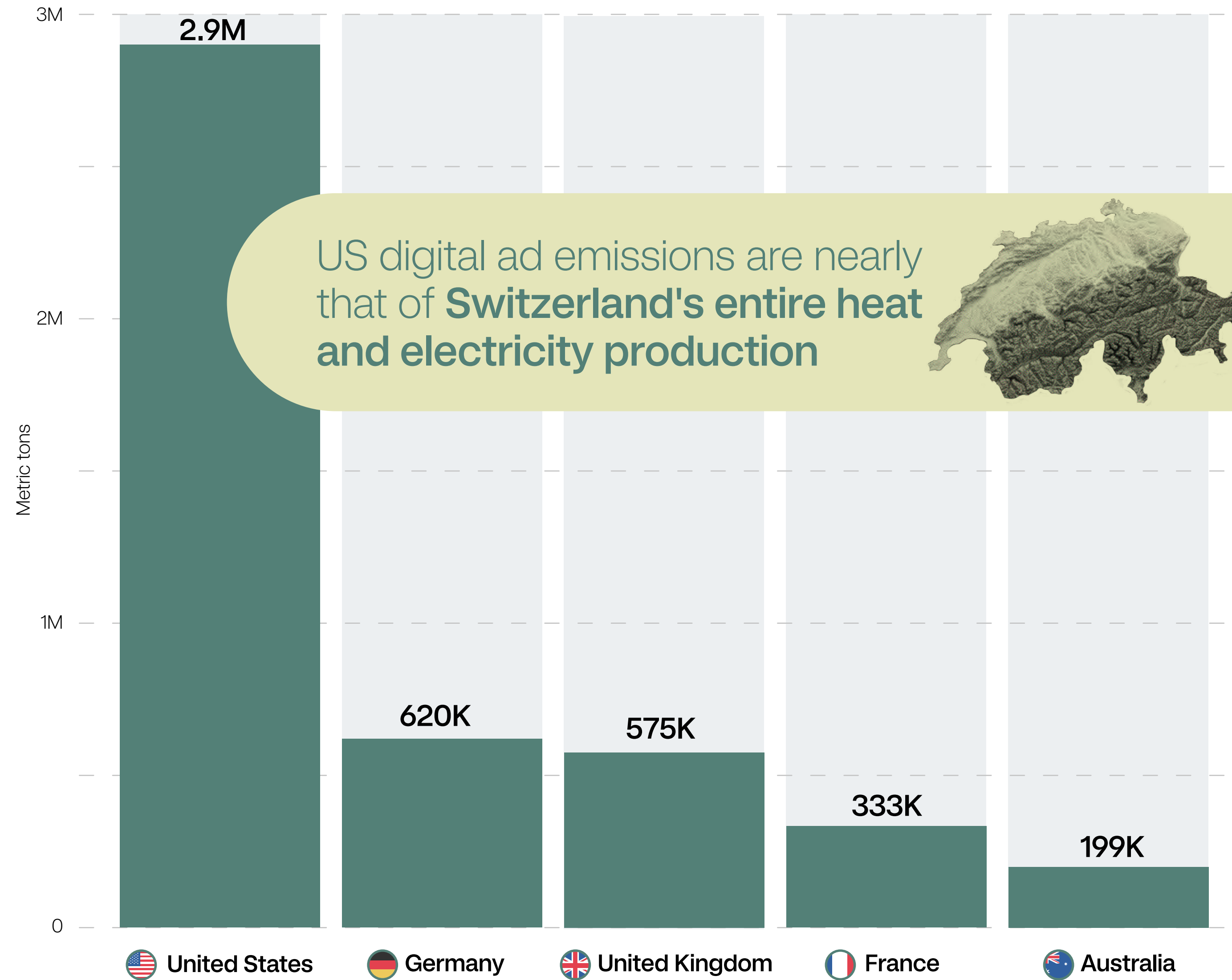
“ 94% of the total solution to curbing the climate crisis is cutting emissions, and emissions cuts that start in the 2020s make up 75% of what’s needed to meet existing climate goals. ”

– Dr. John Foley, Project Drawdown

Eliminating carbon from wasteful practices today prevents total emissions from spiraling out of control as removal technology improves and innovations are built. This means prioritizing **cutting** emissions.

The millions of metric tons coming from advertising every year fall into the category of emissions that can more readily be eliminated. From the macro data we have around advertising emissions compared to global emissions, and the micro insights on impression-level data, we can pinpoint areas of excess and inefficiency that can be reduced to make progress toward achieving climate goals.

EMISSIONS FROM DIGITAL ADVERTISING BY COUNTRY



AN IMPRESSION LEVEL UNDERSTANDING

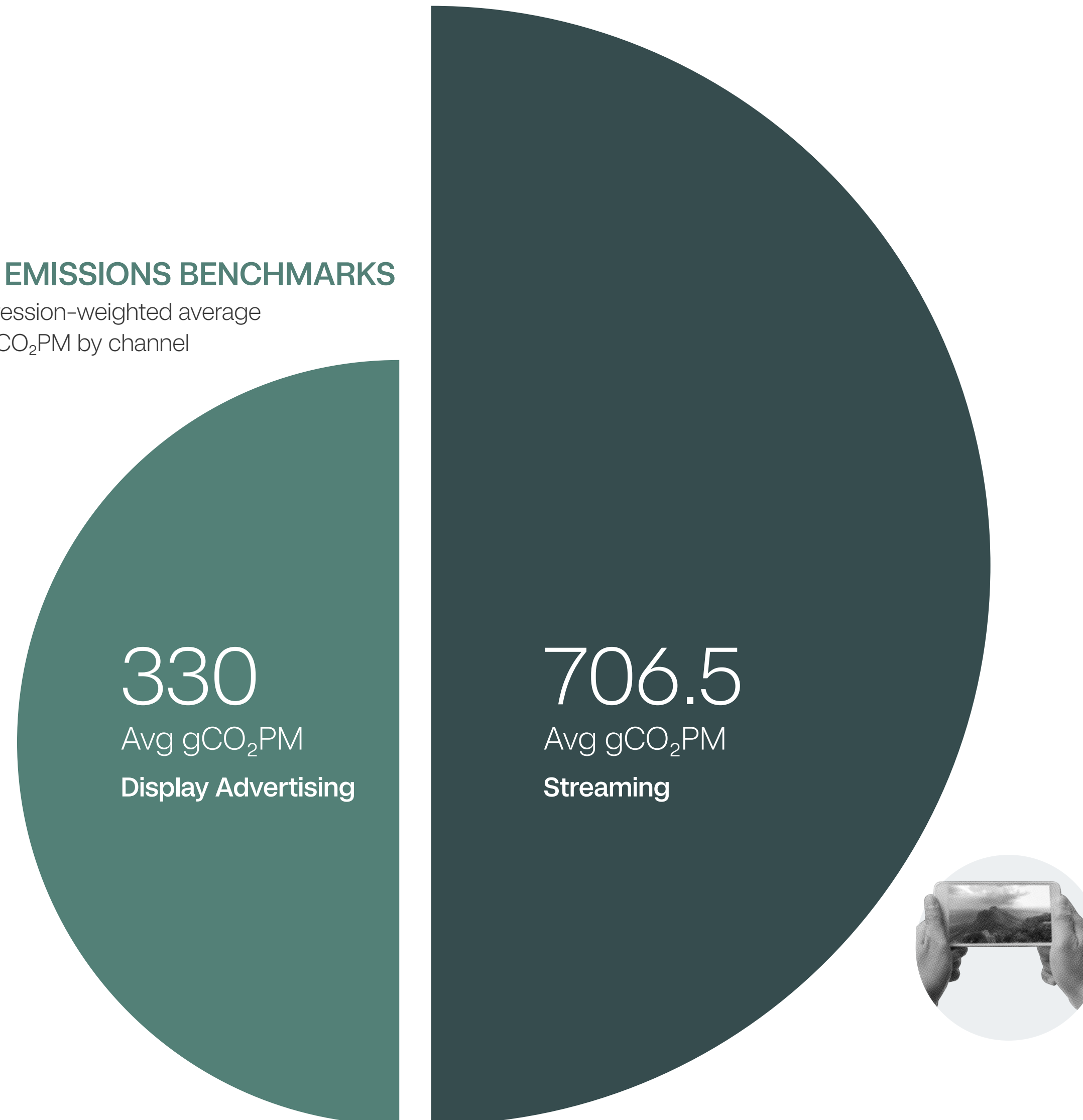
Understanding how ad industry emissions stack up at the global level is important, but using impression-level data is what surfaces useful insights that can drive behavior change. This section includes observations on emissions trends over time, as well as channel specific data marketers need to consider.

At a high level, gCO₂PM dropped slightly for display advertising – the average emissions for 1000 digital impressions is now 333 gCO₂PM. The Q2 average is slightly lower than the previous quarter's benchmarks primarily because of the decision to exclude consumer device emissions from the total emissions.

Comparing display to newly measured channels, streaming is more than double the emissions at 706.5 gCO₂PM.

Q2 EMISSIONS BENCHMARKS

Impression-weighted average of gCO₂PM by channel



Display advertising
Digital ad inventory including display web and display app



Streaming
Streaming video inventory on web and app across phone, tablet, pc and tv devices

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HOW DIFFERENT ARE THE AVERAGE EMISSIONS OF CLIMATE RISK INVENTORY?

Climate risk was introduced in the first installment of this report to describe extremely high carbon domains, the worst emitting media properties found online.

Given geographical nuances, climate risk varies by region and channel. Using display-web advertising as an example, across 5 key markets, gCO₂PM is on average 2x higher. The percentage of inventory considered climate risk changes across regions, too. Countries like France, Germany and Australia have upwards of 12-14% of inventory classified as climate risk.

To understand the impact of climate risk, we anonymized and normalized a sample of post campaign reports. The campaign data shows that climate risk performs below the median. Across key engagement metrics (video completion rate and click-through rate), it under-performs by 13%.

If climate risk was instead blocked for those campaigns, on average performance would have improved 5% and emissions would have decreased about 20%.

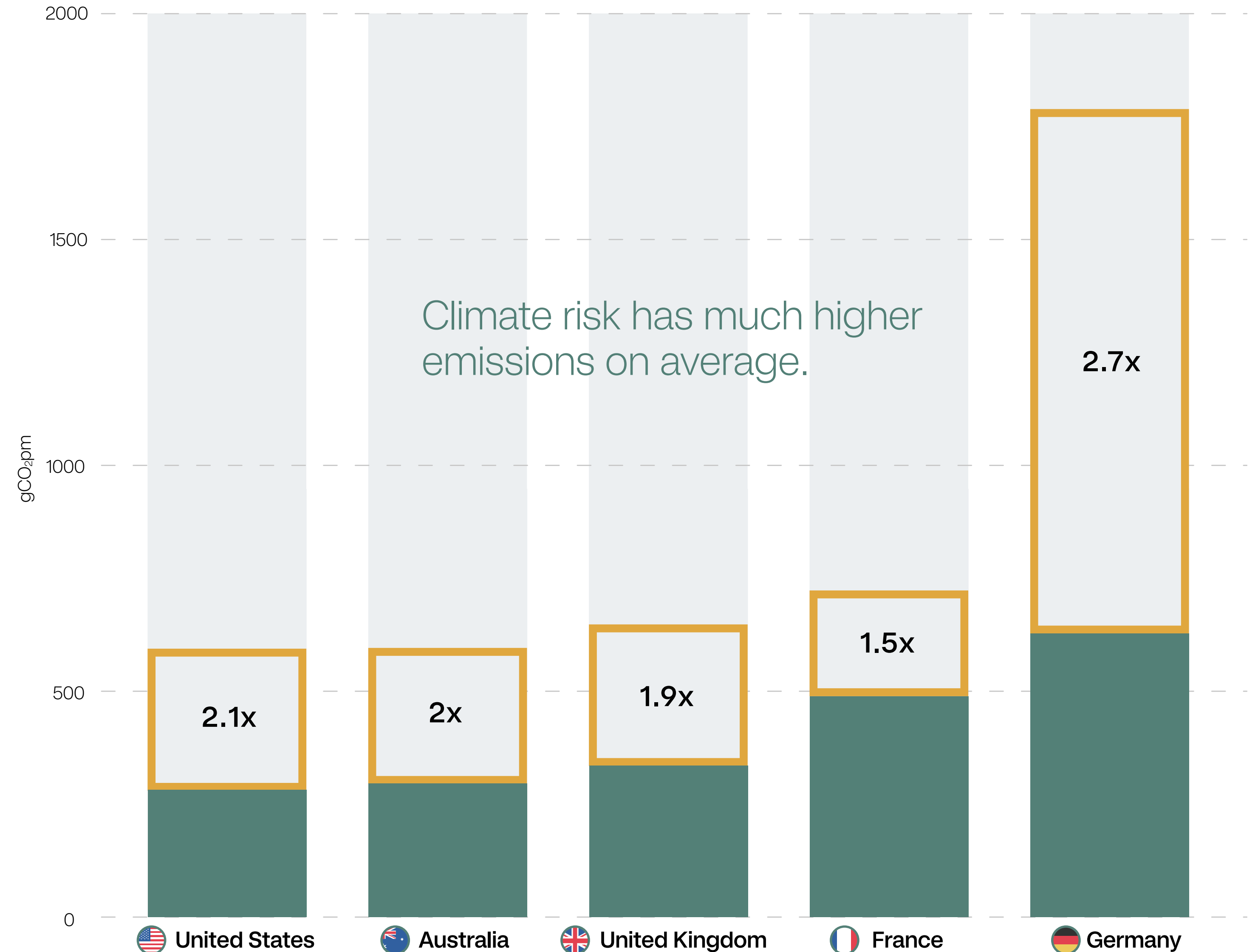
Climate risk can include upwards of 12-14% of inventory.

QUANTIFYING CLIMATE RISK AROUND THE WORLD

avg gCO₂PM of climate risk display-web inventory, by region

○ avg gCO₂PM of climate risk

● avg gCO₂PM of all domains



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TRENDS OVER TIME

Taking steps toward industry-wide reduction starts with measuring and applying our learnings from it. The data from the last several months contains a number of signals around what actions may be driving emissions up or down.

A selection of publisher domains and their emissions over time can be found in the graph on this page. This selection is a sample of the data that demonstrated the most notable shifts over time.

Investigating the specific data from publishers with the biggest decreases, we can conclude that for most cases elimination of duplicative paths and removal of resellers that drive outsized emissions in relation to monetization had a significant impact.

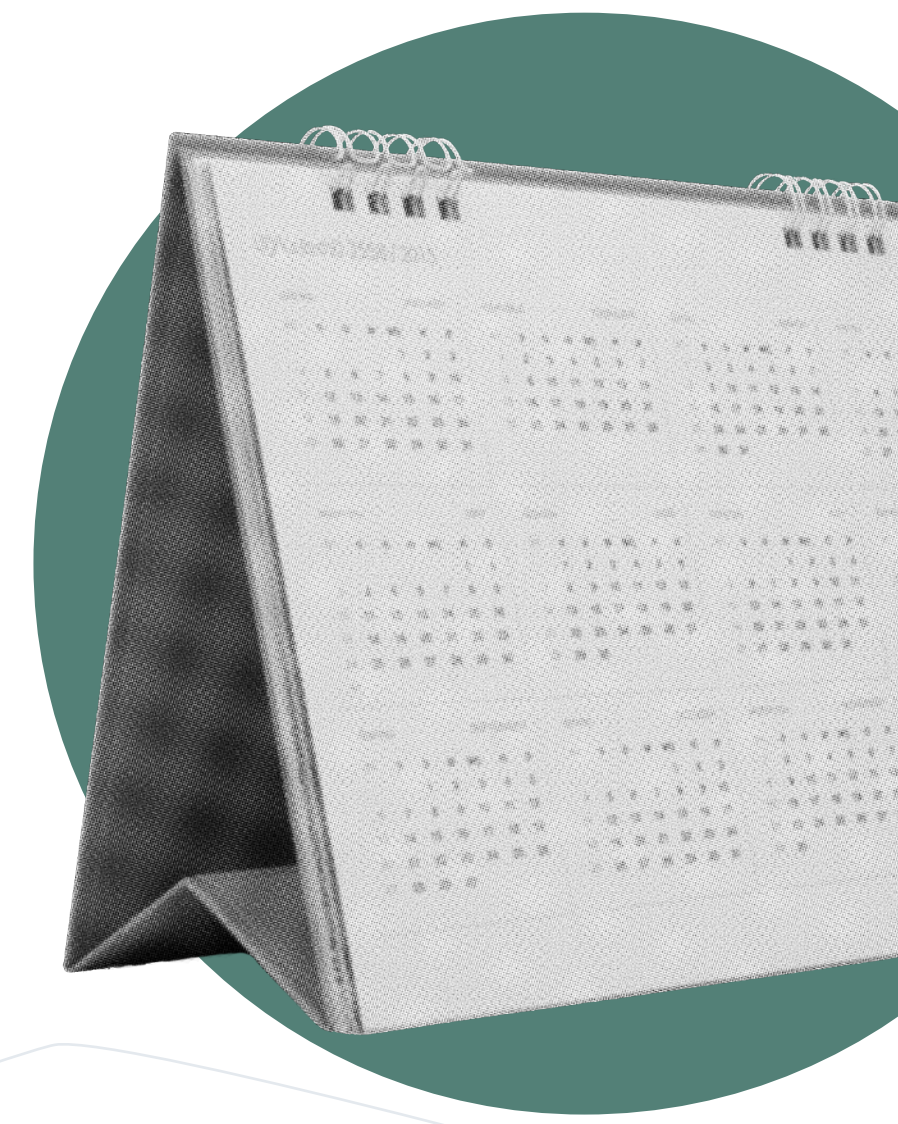
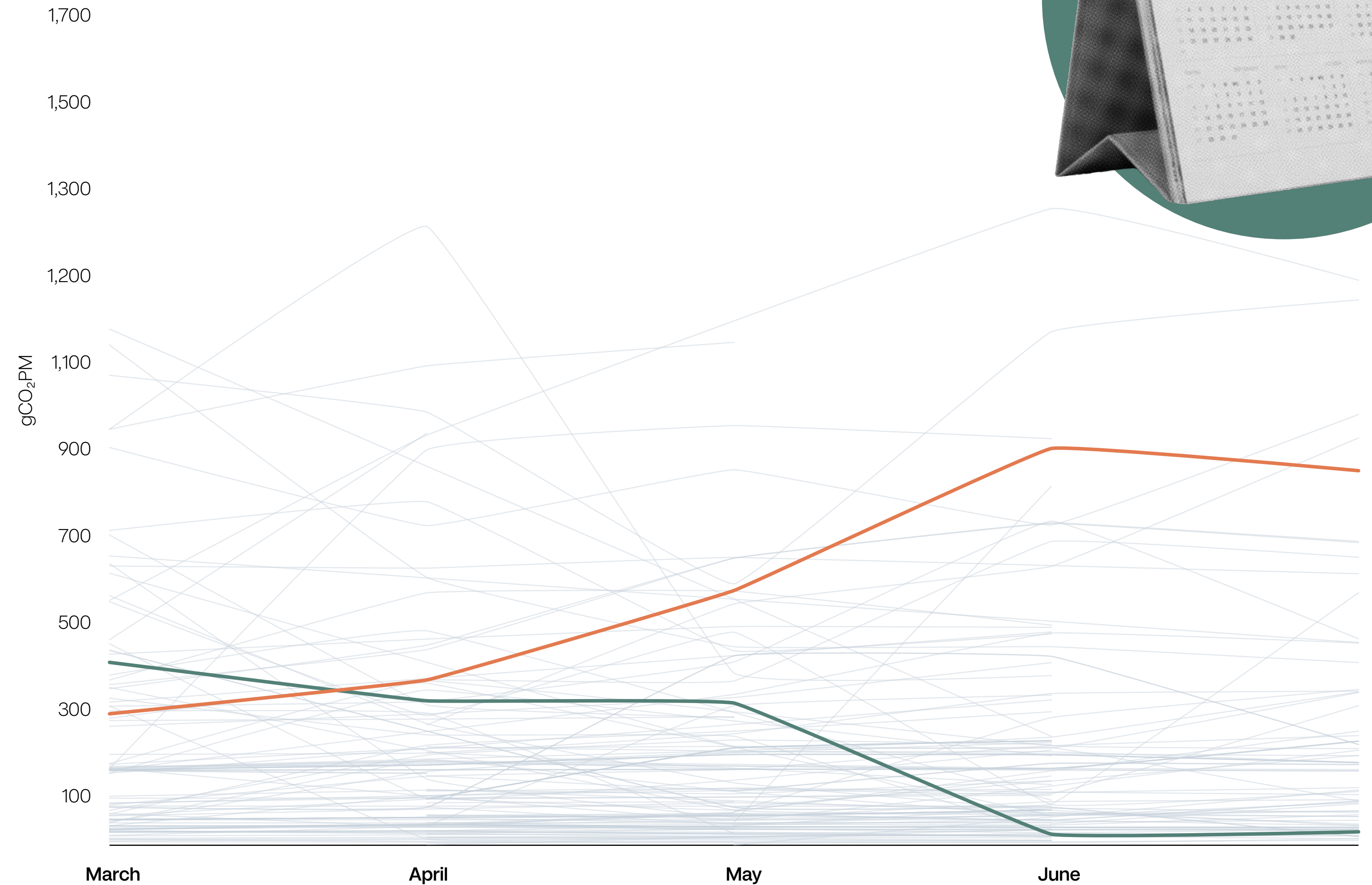
For instances of increased emissions, trends included major changes to the property's ad stack that included large increases to the number of partners and supply paths.

TRACKING EMISSIONS OVER TIME

Changes in gCO₂PM from Mar–July 1, 2023

— domain #1, example of gCO₂PM increase

— domain #2, example of gCO₂PM decrease



WHAT THE DATA SAYS ABOUT STREAMING EMISSIONS

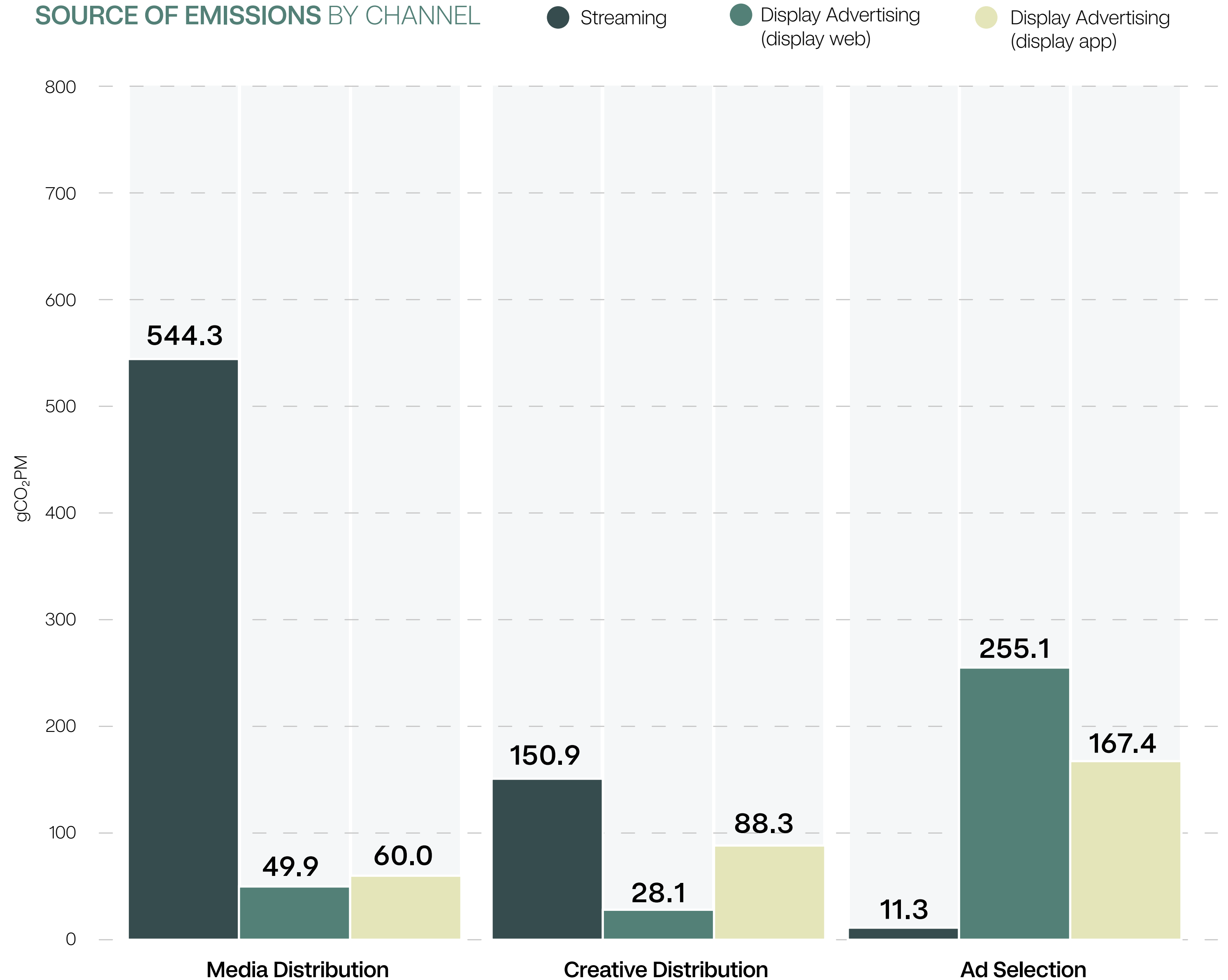
As the Scope3 methodology is updated to include more advertising channels, the data shows why granular measurement is essential for understanding a channel's contribution to industry emissions.

Streaming video drives more emissions when it comes to distribution (10x as high as display) and rendering of the media. But, a low ad selection figure indicates there is much less waste coming from ad tech. Diving deeper into the nuances of streaming, there are a couple reasons why there are fewer emissions from ad selection:

- Larger streaming apps (e.g. YouTube and Netflix) remain closed environments and do not use third party ad tech, do not resell programmatically, and use either one partner or leverage their own proprietary tech for ad decisioning.
- Many on-demand video streaming services have not yet rolled out unified programmatic auction technologies like header bidding as part of their monetization strategies.

This is an opportunity for the industry. With streaming still a burgeoning channel, publishers and media owners have not overcrowded their video ad tech with unnecessary partners and as header bidding develops in this channel, the industry can be mindful to build with sustainability in mind.

SOURCE OF EMISSIONS BY CHANNEL



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USING IMPRESSION LEVEL BENCHMARKS

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Methods for calculating benchmarks

There's a reason the benchmarks found in this report vary slightly from the benchmarks pulled using the Scope3 API. When we look at the distribution of carbon emissions in media, there are a number of high emitting properties that fall in the long tail. These are often the players in the industry that need to change or be defunded.

Reporting on the impression-**weighted average** of emissions in a given market appropriately accounts for high-emitting domains (the long tail) with lots of traffic. Doing so gives us the most representative figure for the emissions going into the atmosphere every time 1,000 impressions are delivered in that market.

However, this isn't helpful for pushing individual organizations to reduce their carbon emissions footprint. For this reason, the Scope3 API uses a **median approach** to benchmarks, offering something more similar to a ranking and providing a better context for how a company is positioned among its peers.

Measuring consumer device

Energy used in the "consumer view" stage of the lifecycle of an ad is part of the end-to-end value chain of any digital media and we refer to it as 'consumer device.'

Previously we included this metric when reporting on the state of sustainability of the programmatic industry. Including it can help provide a snapshot of the industry at a specific point in time while giving us a better idea of the total picture of advertising emissions. However, measuring consumer device emissions across all media channels is challenging, and, for the sake of consistency, we decided to exclude consumer device emissions for the time being to align with current industry boundaries.

This may change over time as the industry continues to define boundaries for emissions measurement and reporting, and as different advertising channels are added to methodology. We will continue to measure this part of the lifecycle.

Hidden Contributors of Climate Risk

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2 The Hidden Dangers

Made for advertising 'MFA' inventory is a known sub-set of climate risk inventory. It emits a disproportionate amount of carbon—on average. MFA inventory has **26%** higher carbon emissions than other domains. It is also a waste of advertiser money.

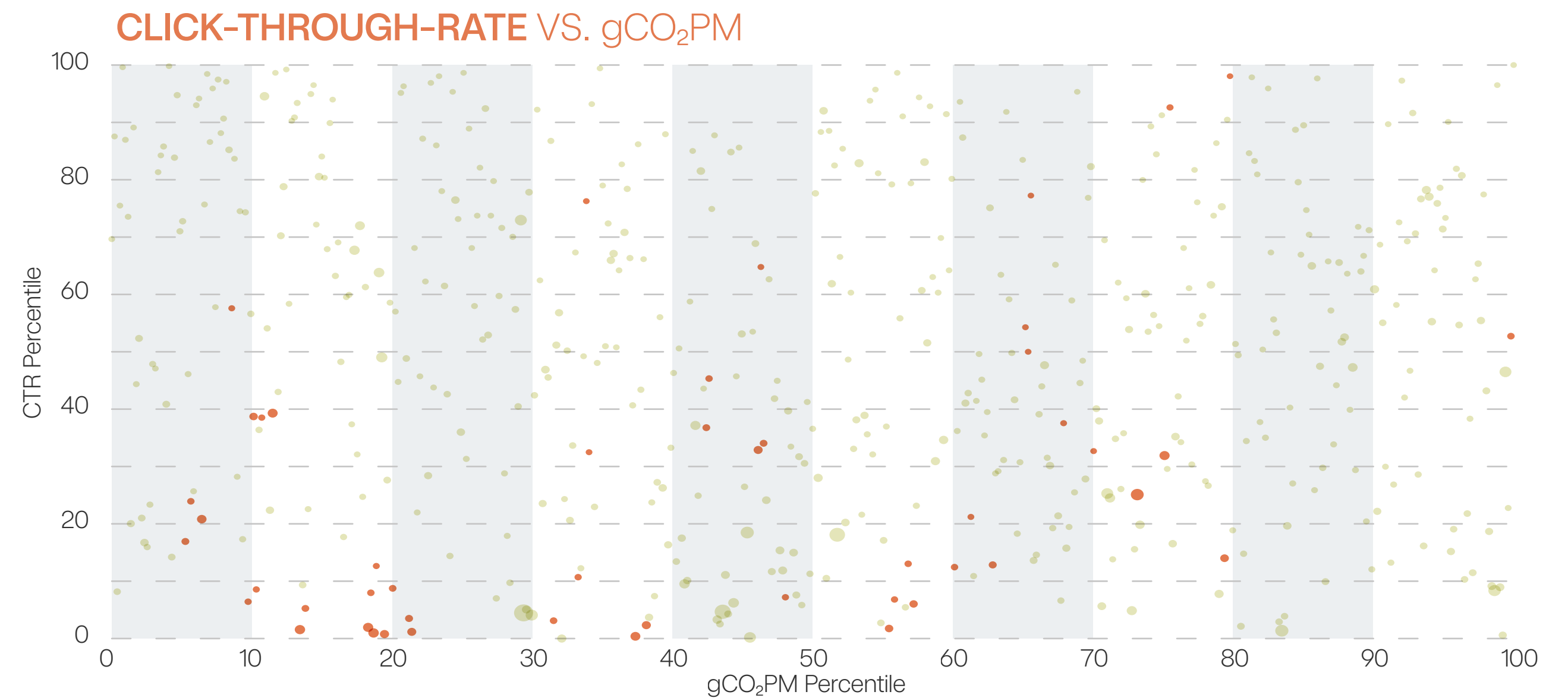
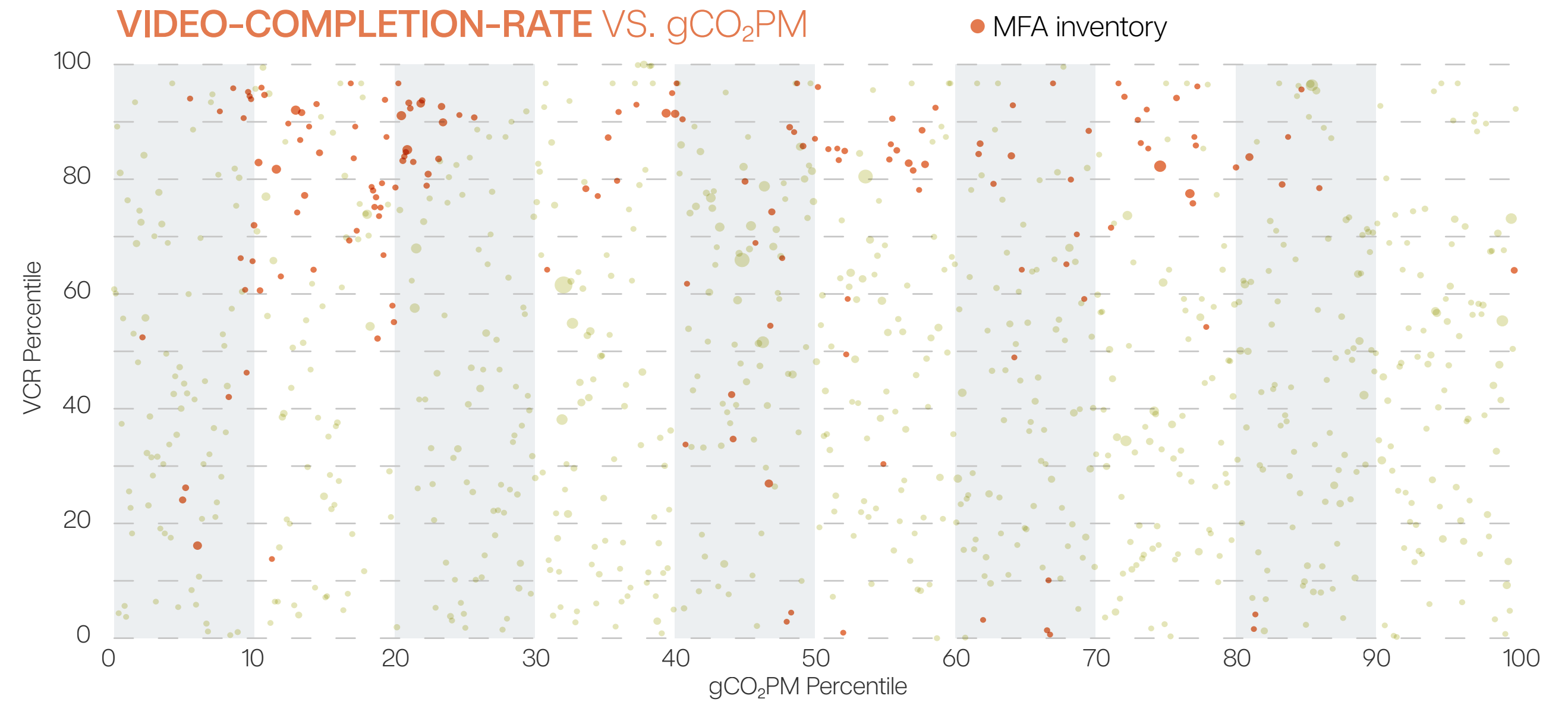
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4 Despite knowing this, ANA research highlighted just how prevalent it is in digital advertising – finding that MFA websites accounted for **21%** of study impressions and **15%** of spend.

The deeper we dive into the data, the more obvious the need to strike MFA from campaigns. But, why is it taking so long to de-fund something known to be bad for advertisers?

MANUFACTURED PERFORMANCE METRICS

Leveraging a normalized performance data set, we found that MFA sites are worse than average for emissions **and** campaign performance. Across all campaigns and performance metrics, the average performance rank of the MFA subset is 35th percentile, under-indexing in absolute performance values by nearly 30%.

Further, the few times MFA overperforms, it is for metrics that do not necessarily require user agency. The visuals here show video-completion-rate (VCR) rank and click-through-rate (CTR) rank vs. gCO₂PM rank for one campaign. MFA inventory (in red) gravitates to the top for VCR (83rd percentile on avg.) and to the bottom for CTR (17th percentile on avg.). These sites are often cluttered with autoplay videos and ads irrelevant to the user's search intent, which would explain the asymmetry in these metrics.



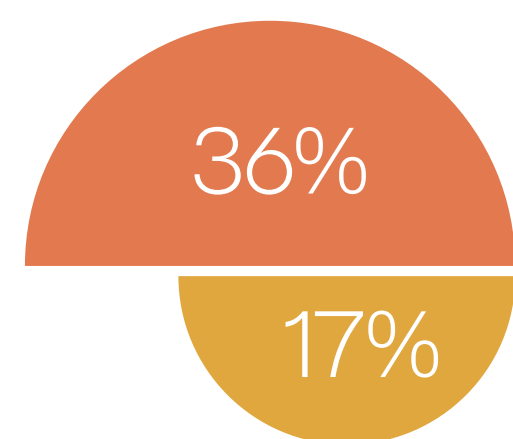
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RESELLER RELATIONSHIPS

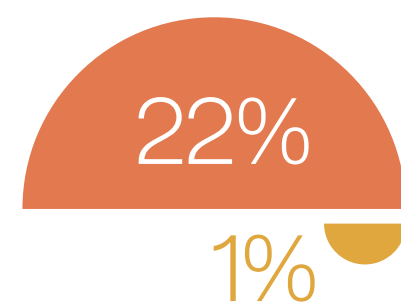
The pervasiveness of MFA could be the result of a polluted reseller landscape.

Publishers and SSPs have been told for years that they need to increase the number of partners to drive better monetization. On a mission to provide as much liquidity to the top publishers as possible, SSPs added many resellers over the years, which has caused great inventory to be surrounded by clutter.

No longer is it immediately clear which reseller partners in the ecosystem are providing additional value and which are the bad actors. As it turns out, some resellers represent a lot of MFA inventory. Here are two examples of reseller stats from global SSPs:



SSP 1
 36% of resellers have more than 5% MFA inventory. That 36% routes to 17% of impressions.



SSP 2
 22% of resellers have more than 15% MFA inventory. That 22% routes to 1% of impressions.

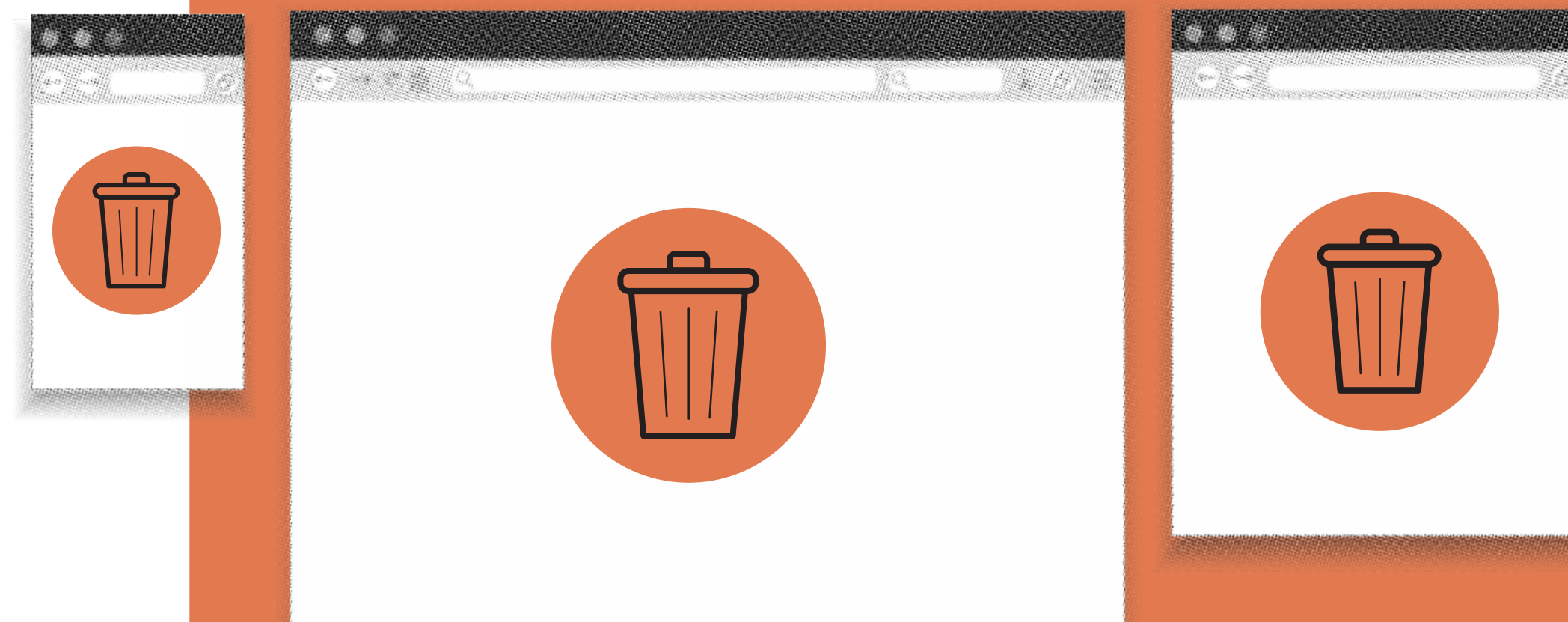
This example illustrates two different pictures of reseller relationships. If changes were made to remove resellers contributing to that **17%** of impressions identified as high in MFA share from SSP 1, that spend could be reallocated, which translates to better monetization for publishers that deserve those impressions. For SSP 2, there's also an opportunity to eliminate MFA. Given how few impressions they make up, removing the **22%** of resellers whose MFA share is more than **15%** would have a minimal impact on volume, and also therefore a minimal impact on revenue.

While nefarious resellers exist, selling MFA inventory does not necessarily imply nefarious intent. Some are smaller companies that may not have the means of identifying MFA inventory. SSP's need to maintain vigilance against MFA and work to reduce their reselling to an absolute minimum.

THE KNOCK-ON EFFECT OF RESELLERS

Instead of addressing problematic resellers directly, SSPs and exchanges added tech to weed out junk inventory. In many cases, engineering teams continue to burn through resources to develop smart algorithms and refine technology (uses more servers, networks, etc and energy!) to analyze and filter through hundreds of billions of impressions that end up being rejected. The additional resources that are deployed to weed out the junk inventory are a cost for both the bottom line and the environment .

Intelligent traffic shaping and filtering tools still have a purpose, but if emissions data shows us anything, it's that a lot of this junk MFA inventory can be stamped out much more efficiently by cutting ties with the bottom of the barrel resellers.



The Case for Responsible Media

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PERFORMANCE VS THE PLANET

Data continues to show a correlation between performant media and responsible media. Early results revealed that factoring emissions into a campaign improved performance. New data from a wider range of campaigns, featuring tens of thousands of domains, reinforces that sustainability and performance are not conflicting objectives. Quite the opposite:

- The lowest emitting quartile (25th percentile) over-indexes by 60%+ for performance metrics (CTR and VCR).
- For this sustainable set, the performance ranking on average is considerably above median (60th percentile).

WIN-WIN-WIN-WIN

Given responsible media is not just limited to sustainable media, we also wanted to understand what happened when emissions data was integrated with other responsible media metrics: attention and privacy.

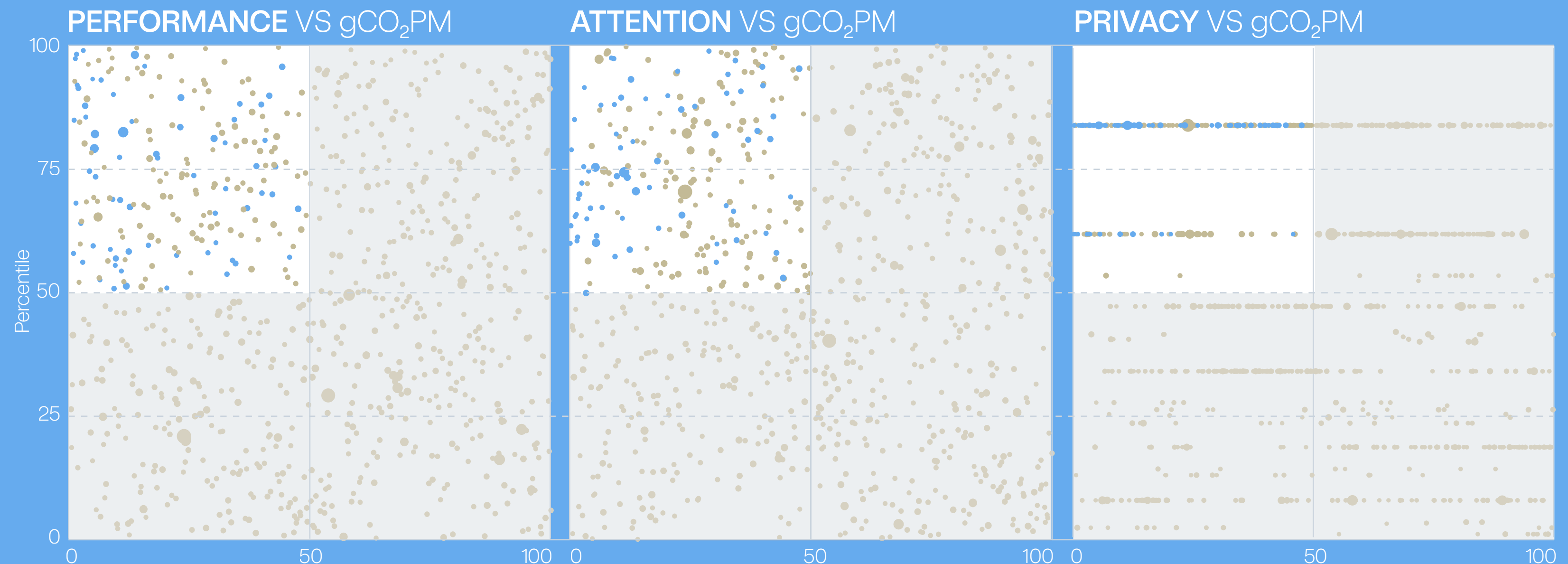
Our analysis leveraged data from Lumen for attention using APMs (attentive seconds per thousand impressions) and SourcePoint for a publisher's privacy score. The data in these graphs shows gCO₂PM rank on

the x-axis traded against the remaining three dimensions for our intersected inventory sample.

When focusing on the best quadrants in this four-dimensional tradespace, it revealed that 36% of inventory in any given "best" quadrant is shared across all of them – these are indicated by the blue dots. **It's not a win-win, but a four-way win.**

This set of properties is an opportunity to double down on responsible and performant media as average performance over-indexes by 47% – an advertising sweet spot for marketers. Removing 'performance' to focus on sustainability, privacy and attention, the amount of shared optimal inventory increases to 60%.

Nearly 10% of inventory is optimal across 4 dimensions: sustainability, performance, attention, privacy.



Additional data sources: Lumen and Sourcepoint
This describes the correlation between data across all 4 dimensions - where optimality is defined as being present in any given best quadrant.

Report Method

For the benchmarks report, we used representative samples from Q2 2023 Scope3 API activity. The samples are representative of players across the display and streaming advertising spaces: billions of impressions across tens of thousands of domains/apps on desktop, mobile and TV, including the long tail. The figures include video and banner formats.

With this data we assess overall ad tech emissions trends across three emission categories (ad selection, media distribution and creative distribution). The normalized unit for the report is grams of CO₂e per thousand impressions (gCO₂PM), and the benchmark values derived are weighted averages of emissions associated with activity we see across the domains and apps in that specific market.

We use a third-party data source, BIScience, to provide impression activity data for the top websites and apps across a variety of geos, and use that in combination with our emissions data to assess total emissions values for a given market. We also leverage the BIScience data set for validating representativeness of Scope3 API samples.

The performance data referenced throughout the report is drawn from a collection of post-campaign reports we ingested from various partners. The data is anonymized and normalized, so that generalized conclusions can be drawn. We use relative performance percentile ranks and median-based performance indexes (both metric-agnostic) as indicators of performance across these campaigns.

Attention data is provided by Lumen. The specific metric used for this report is APM: attentive seconds per thousand impressions. This is a composite metric that combines both the average likelihood that someone will view a particular type of ad and the average time that they spend looking at the ad.

Privacy data is provided by Sourcepoint. In this report, we have used Sourcepoint's privacy score, which measures publishers' commitment to compliance, data ethics and digital citizenship. The score varies by market (EU vs US), and evaluates several dimensions, spanning from the presence of a privacy policy to the TCF Framework version adopted.

More information on Scope3's emissions model is publicly available on GitHub, [here](#).

GLOSSARY

gCO₂PM Grams of carbon dioxide and equivalent greenhouse gasses emitted per 1000 impressions. Using a per-impression basis makes it easy to compare to widely recognized industry figures.

Scope 3 emissions Emissions from across your value chain, i.e. emissions from one of your suppliers. This is all emissions that sit outside of a company's scope 1 (direct emissions owned or controlled by a company) and scope 2 (indirect emissions, like purchasing heat for an office) emissions.

Climate Risk Climate Risk is defined as media properties across domains, apps, and bundle IDs, that fall into at least one of the two following sub-categories:
(1) Climate risk: monetization - inventory with extremely high emissions when compared to geo and channel benchmarks, or
(2) Climate risk: media - inventory flagged as proliferating practices that contribute to high emissions. These are often fraud, MFA, or low value inventory.

Display advertising Digital ad inventory including display web and display app.

Streaming Streaming video inventory (in stream) on web and app across phone, tablet, pc and tv devices.

Ad selection Total emissions associated with the supply path from the inventory ad slot and the complete graph of all advertising parties involved, including the scope 1, 2, and 3 emissions of each party per impression.

Media distribution Total emissions of an impression associated with media delivery, including the corporate emissions, data transfer, emissions and power grid intensity.

Consumer device The consumer's mobile, desktop, or TV emissions during consumption.

Creative distribution Total emissions associated with the creative distribution for an impression, including data transfer and all vendors involved.

About Scope3

Scope3 is on a mission to decarbonize media and advertising. For organizations seeking to make carbon-aware business decisions, Scope3 is the supply chain emissions data standard that delivers an accurate, comprehensive, and independent emissions model for every company in the digital ecosystem.

Leveraging an open-source and science-backed methodology, Scope3 emissions intelligence data powers the tools brands, agencies, publishers and technology providers use to measure, understand and take action to reduce their carbon footprint.

Founded in January 2022, Scope3 has a global workforce distributed across North America, Europe and APAC.

For questions about the report, or to learn how you can start measuring and reducing your carbon emissions, contact Scope3 [here](#).

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