

“Feeding” the Cloud: Reducing Carbon Emissions from Social Media and Streaming Services Through Private Information Disclosure

ABSTRACT

Despite their well-known negative aspects, social media and streaming services have become integral for consumers’ daily entertainment and social connection. Although most users have some idea of these services’ harmful mental impacts, they are typically unaware of the carbon emissions that result from them. This dissonance is not an accident, but rather the direct result of incomplete data and the omission of individual user-level estimates for carbon emissions in private governance reports published by social media and streaming companies. Where these governance reports do include user-level figures, they are not provided in a meaningful way such that users could consequentially alter their behavior to minimize that harm. Though the impact of individual usage may initially seem minimal on a micro-level, minor changes in individual carbon contributions may have substantially positive impacts where numerous consumers implement them on a macro-level; these services benefit from billions of users, thus, seemingly small behavioral changes that reduce usage time can result in notable emissions reductions in the aggregate.

While regulatory actions may retroactively address these consequences, stronger solutions reside in the private sphere through actions like reducing reliance on addictive algorithms, offering paid subscriptions that eliminate or decrease advertisements, and bolstering information disclosure to users through these companies’ internal governance reports. While most adults in the United States are in agreement that environmental concerns are an important national focus, disagreement remains over adequate responses, and many environmentally harmful industries are still economically essential. As a result, attention must be afforded to these widespread energy uses for entertainment sectors and their resulting emissions.

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Users of social media and streaming platforms may know that every like, repost, and minute of scrolling emits dopamine and serotonin in their brains, but they are likely unaware that each of these activities also emits carbon dioxide due to the data processing energy required for these actions.¹ Despite increasing time spent on these

1. Rasan Burhan & Jalal Moradzadeh, *Neurotransmitter Dopamine (DA) and its Role in the Development of Social Media Addiction*, 11 J. NEUROLOGY & NEUROPHYSIOLOGY 1, 1–2 (2020); Sarah Lewis, Roy Pea & Joseph Rosen, *Beyond Participation to Co-Creation of Meaning: Mobile Social Media in Generative Learning Communities*, 49 SOC. SCI. INFO. 351, 356 (2010); Larissa Sapone, *Moving Fast & Breaking Things: An Analysis of Social Media's Revolutionary Effects on Culture and its Impending Regulation*, 59 DUQ. L. REV. 362, 365–66 (2021); see Claudia Tam, *How Social Media Habits are Contributing to Internet Pollution*, EARTH.ORG (Sept. 27, 2021), <https://earth.org/how-social-media-habits-are-contributing-to-internet-pollution> [perma.cc/DHA9-

platforms during the COVID-19 pandemic, individual users may be unaware of the heightened energy demand for this uptick in global consumption and the increase in carbon emissions.² As younger generations account for increasing user shares on social media and streaming services, more attention should be directed to the carbon emissions from the overall usage of these services in anticipation of the necessity of private intervention to decrease screen time and the resulting emissions.³

I. THE EMERGENCE OF SOCIAL MEDIA AND STREAMING SERVICES

In a digital world, where entertainment is constantly at one's disposal in seemingly infinite and overwhelming amounts, it is difficult to imagine a time before social media and streaming services, especially for younger generations.⁴ While modern social media and streaming

MVCF] (explaining that these services emit carbon because internet usage and data processing requires electricity, which is still largely powered by the burning of fossil fuels).

2. Lillian Rizzo & Drew FitzGerald, *Forget the Streaming Wars – Pandemic-Stricken 2020 Lifted Netflix and Others*, WALL ST. J. (Dec. 30, 2020, 9:33 AM), <https://www.wsj.com/articles/forget-the-streaming-wars-pandemic-stricken-2020-lifted-netflix-and-others-11609338780> [perma.cc/DMD8-V9XM]; Chavi Mehta & Lisa Richwine, *Netflix Subscribers Growth Slows After Pandemic Boom, Shares Fall 11%*, REUTERS (Apr. 20, 2021, 3:09 PM), <https://www.reuters.com/business/media-telecom/netflix-misses-expectations-quarterly-paid-subscriber-additions-2021-04-20/> [https://perma.cc/5PF7-P8QU]; Mike Cummings, *Surge in Digital Activity Has Hidden Environmental Costs*, YALE NEWS (Jan. 27, 2021), <https://news.yale.edu/2021/01/27/surge-digital-activity-has-hidden-environmental-costs> [perma.cc/WW3G-CBPC]; Renee Obringer, Benjamin Rachunok, Debora Maia-Silva, Maryam Arbabzadeh, Roshanak Nateghi & Kaveh Madani, *The Overlooked Environmental Footprint of Increasing Internet Use*, 167 RES., CONSERVATION & RECYCLING 1, 1 (2021), <https://doi.org/10.1016/j.resconrec.2020.105389> [https://perma.cc/NC59-G9LW].

3. Brooke Auxier & Monica Anderson, *Social Media Use in 2021*, PEW RSCH. CTR. (Apr. 7, 2021), <https://www.pewresearch.org/internet/2021/04/07/social-media-use-in-2021/> [perma.cc/T58H-PZ2M]. A 2018 consumer report by Adobe found that, on average, consumers spend 8.8 hours per day engaging with digital content, with Gen Z and Millennials spending about eleven hours per day doing the same. Giselle Abramovich, *5 Consumer Trends That Are Shaping Digital Content Consumption*, ADOBE BLOG (Feb. 16, 2019), <https://blog.adobe.com/en/publish/2019/02/16/5-consumer-trends-that-are-shaping-digital-content-consumption> [https://perma.cc/9D6H-8RPQ].

4. While the growth of streaming and social media has increased entertainment options, the breadth of those options often overwhelms users because of the sheer number of possibilities to choose from. See Marisa Dellato, *Streaming Viewers Feel Overwhelmed by Options, Nielsen Survey Suggests*, FORBES (Apr. 6, 2022, 11:51 AM), <https://www.forbes.com/sites/marisadellatto/2022/04/06/streaming-viewers-feel-overwhelmed-by-options-nielsen-survey-suggests/?sh=52a83a50705f> [perma.cc/CYK8-SQLZ]; *Streaming is the Future of TV, but the Abundance of Platform Choice is Overwhelming for Viewers*, NIELSEN (Apr. 2022), <https://www.nielsen.com/insights/2022/streaming-is-the-future-of-tv-but-abundance-of-platform-choice-is-overwhelming-for-viewers/> [perma.cc/GQ67-4HBP]; Dr. Pragya Agarwal, *5 Ways to Overcome Online Social Media Fatigue for Mental Well-Being*, FORBES (July 30, 2018, 8:07 PM), <https://www.forbes.com/sites/pragyaagarwaleurope/2018/07/30/5-ways-to-overcome-online-social-media-fatigue-for-mental-well-being/?sh=52e892851cfa> [https://perma.cc/N5KH-8X5C]. But see Stacy Jo Dixon, *U.S. Gen*

platforms did not emerge until the 1990s, with the widespread integration of personal computers, social media took shape in the 1970s with bulletin board systems.⁵ With the introduction of chat services years later, such as AOL and instant messengers, coupled with tools such as friend lists and school affiliations that allowed users to create a network with others, social media became inescapable throughout the 1990s and into the early 2000s.⁶ These applications continued to grow in ways beyond imagination, assuming users so rapidly that, by 2018, young adults between the ages of eighteen and thirty-four spent 43 percent of their time on digital platforms, with nearly a third of that time on smartphone apps or the web.⁷

While all social media and streaming platforms share a broad, common history with similar services, there is still wide variation in the design and purpose behind each platform. From connecting with friends on Facebook, to uploading photos on Instagram, to posting videos on TikTok, to sending disappearing messages and images with Snapchat, the plethora of social media platforms offer diverse uses and meet varying needs.⁸ These platforms are huge and continuously growing; for example, while people typically do not think of Pinterest as a widely used social media site, it nonetheless is the third-largest source of referral traffic on the internet, reaching 433 million monthly users in

Z and Millennials Social Media Brand Usage, STATISTA (Dec. 16, 2022), <https://www.statista.com/statistics/1286815/united-states-social-media-brand-usage-gen-z-millennials/> [perma.cc/M5UY-WSCJ].

5. See Colleen T. Scarola, *What Happens On Social Media...Could Derail Your Legal Career: Teaching E-Professionalism in Experiential Learning*, 44 VT. L. REV. 165, 169 (2019) (stating that bulletin board systems first appeared in the 1970s but did not come into common usage until personal computers became more publicly available and affordable); Tehrim Umar, *Total Eclipse of the Tweet: How Social Media Restrictions on Student and Professional Athletes Affect Free Speech*, 22 JEFFREY S. MOORAD SPORTS L.J. 311, 314 (2015) (highlighting the belief that, even predating the bulletin board system, CompuServe created the first social interaction service in 1969, which allowed users to share information and send digital messages to each other); Fouad A. Tobagi & Joseph Pang, *StarWorks – A Video Applications Server*, IEEE COMPUT. SOC'Y PRESS, DIG. PAPERS: COMPCON SPRING 11 (1993) (discussing StarWorks, a JPEG streaming product created by Xing Technology in 1992 which allowed for random video access on ethernet networks).

6. See Scarola, *supra* note 5, at 169–70.

7. See *id.* at 170 (citing *Time Flies: U.S. Adults Now Spend Nearly Half a Day Interacting with Media*, NIELSEN (July 2018), <https://www.nielsen.com/us/en/insights/article/2018/time-flies-us-adults-now-spend-nearly-half-a-day-interacting-with-media/> [perma.cc/K6A4-ET8X]); Abramovich, *supra* note 3.

8. Carolyn Elefant, *The “Power” of Social Media: Legal Issues & Best Practices for Utilities Engaging Social Media*, 32 ENERGY L.J. 1, 4 (2011).

the first quarter of 2022 and becoming the fourth most popular social media site in the United States in 2021.⁹

While modern streaming services serve similar purposes now, that was not always so. Netflix, Prime Video, HBOMax, and Hulu are aimed at streaming commercial films and television series that were previously available only through DVDs, and Disney+ serves the same goal, but offers content specifically created or acquired by the Walt Disney Corporation.¹⁰ On the other hand, YouTube is accessible to individual creators and is designed to facilitate streaming of content filmed and uploaded by independent users, such as home videos and vlogs.¹¹ Like social media, these streaming services are also colossal and rapidly expanding in terms of their public use. For example, merely a year and a half since its start, YouTube amassed over twenty-five million views per day, and in 2023, it attracted more than seventy billion views per day.¹²

The sheer amount of combined users of social media and streaming services highlight their growing importance in the digital space as well as their arising prevalence as avenues for social discourse and information gathering.¹³ Researchers began tracking social media

9. Tomio Geron, *Ben Silbermann on How Pinterest Slowly Grew to Massive Scale*, FORBES (Oct. 22, 2012, 2:11 AM), <https://www.forbes.com/sites/tomiogeron/2012/10/22/ben-silbermann-on-how-pinterest-slowly-grew-to-massive-scale/?sh=19a5dd272a81> [perma.cc/L8VK-ULMW]; Stacy Jo Dixon, *Pinterest: Number of Monthly Active Users Worldwide 2016-2022*, Statista (Feb. 12, 2024), <https://www.statista.com/statistics/463353/pinterest-global-mau/#:~:text=Pinterest%3A%20number%20of%20monthly%20active%20users%20world-wide%202016%2D2020&text=As%20of%20the%20fourth%20quarter,million%20international%20monthly%20active%20users> [perma.cc/J3LD-U485]. *Social Media Fact Sheet*, PEW RSCH. CTR. (Apr. 7, 2021), <https://www.pewresearch.org/internet/fact-sheet/social-media/#which-social-media-platforms-are-most-popular> [https://perma.cc/LP7L-RH5D].

10. Brooks Barnes & John Kublin, *Disney Plus Streaming Service is Unveiled to Hollywood Fanfare*, N.Y. TIMES (Apr. 11, 2019), <https://www.nytimes.com/2019/04/11/business/media/disney-plus-streaming.html> [https://perma.cc/DZ4V-HWC9]. See, e.g., *The Story of Netflix*, NETFLIX, <https://about.netflix.com/en> [https://perma.cc/US6P-VBK9] (last visited Feb. 17, 2024); *Media Release: HBO Max Launches Today*, WARNER MEDIA (May 27, 2020), <https://press.wbd.com/us/media-release/max/hbo-max-launches-today> [perma.cc/M67H-NZXD]; Emily St. James, *What is HBO Max? And What Isn't It?*, VOX (May 27, 2020, 9:00 AM), <https://www.vox.com/culture/21267943/hbo-max-explained-hbo-hbo-go-hbo-now-friends> [perma.cc/Y5B8-WHWW].

11. See Paige Leskin, *YouTube is 15 Years Old. Here's a Timeline of How YouTube Was Founded, Its Rise to Video Behemoth, and Its Biggest Controversies Along Way*, BUS. INSIDER (May 30, 2020, 10:00 AM), <https://www.businessinsider.com/history-of-youtube-in-photos-2015-10> [perma.cc/TVX4-VTBF].

12. Susan Wojcicki, BRITANNICA, <https://www.britannica.com/biography/Susan-Wojcicki> [perma.cc/T787-L4SQ]; *YouTube User Statistics 2024*, GLOB. MEDIA INSIGHT (Feb. 1, 2024, 1:33 AM), <https://www.globalmediainsight.com/blog/youtube-users-statistics/> [perma.cc/GKM9-S54B].

13. See *Social Media and News Fact Sheet*, PEW RSCH. CTR. (Nov. 15, 2023), <https://www.pewresearch.org/journalism/fact-sheet/social-media-and-news-fact-sheet/>

adoption in 2005, and at that time only 5 percent of US adults used at least one such platform, but by 2012, that had risen to about half of all Americans, and as of 2021 about 72 percent of the public used some form of social media.¹⁴ Moreover, users often visit these platforms multiple times a day.¹⁵

II. SOCIAL MEDIA AND STREAMING SERVICES' IMPACT ON ENVIRONMENTAL ORGANIZATIONS

Despite a tendency to overlook carbon emissions generated through social media usage, these social platforms can raise awareness for environmental causes, as they are global platforms that disclose information on a broad scale.¹⁶ For example, residents of Flint, Michigan began to complain about their water's taste and color on Twitter in early 2015 and gained significant attention from other users under the hashtag #FlintWaterCrisis—eventually leading to national media coverage one year later and the return of Flint's lead levels to below federal limits another year later.¹⁷ Increased awareness, however, does not necessarily equate to deepened engagement.¹⁸ Studies in this field report inconclusive effects of social media on users' external social participation, although some have found a positive impact on this participation in some specific forms, such as protest.¹⁹

Compared to social media, streaming services are not intended for users to self-distribute but rather consume service-provided content that is already published.²⁰ Even still, viewership for environmental

[perma.cc/96N5-GBJ8] (reporting that half of US adults get news at least sometimes from social media, with the two largest social media sites for this being Facebook and YouTube).

14. *Social Media Fact Sheet*, *supra* note 9.

15. For example, seven out of ten Facebook users and six out of ten Instagram and Snapchat users visit these respective sites at least once per day. *Id.*

16. See Chris Fletcher, *Corporate Social Responsibility: A Legal Framework for Socioeconomic Development in Tibet*, 17 YALE H.R. & DEV. L.J. 120, 148 (2014) (“[I]ndividuals around the world increasingly have at their disposal technological tools with which to document human rights/environmental abuses and corporate misconduct.”); Charles T. Karpus, Comment, *Fifteen Minutes of Shame: Social Media and 21st Century Environmental Activism*, 29 VILL. ENV'T L.J. 101, 103–04 (2018).

17. Karpus, *supra* note 16, at 107–08, 112.

18. *Id.* at 103–04 (detailing that while overall awareness and engagement with these issues have grown in the digital space, the quality of individual instances of activism has decreased because organization only requires small efforts from a large audience, or “microactivism,” rather than sizeable efforts from a few).

19. *Id.* at 118–19.

20. See Raizel Liebler & Keidra Chaney, *Here We Are Now, Entertain Us: Defining the Line Between Personal and Professional Context on Social Media*, 35 PACE L. REV. 398, 404 (2014) (“As more marketing and advertising professionals began to use social media platforms to promote

shows, documentaries, and movies has surged.²¹ Netflix proudly attests that, in 2020, 160 million households around the globe watched at least one film or show on the service about sustainability.²² Netflix's own production, *Don't Look Up*, which depicted an allegorical warning that Earth may be facing consequences of its inhabitants' behavior, weighs in as the platform's second most popular film of all time.²³ Furthermore, seven of the top thirty TV shows of all types, as ranked by IMDb users in 2021, were wildlife documentaries.²⁴ Yet, as with social media, interest in this content does not necessarily change behavior toward conservation or climate change.²⁵

III. THE MECHANICS OF SOCIAL MEDIA AND STREAMING: THE ENERGY REQUIRED

The average social media user, although perhaps unfamiliar with of the chemical processes like dopamine release that undergird their actions, is likely aware that every like, share, streak, or feed refresh feels enjoyable.²⁶ That being so, the user is likely unaware that each of those digital activities has tangible environmental consequences due to the energy required to process the data from them.²⁷

corporate brands, individual users themselves began to use social media as a platform for building a professional public identity, or 'personal brand.'").

21. See John Koblin, *Nature Shows Are Hot Again*, N.Y. TIMES (Jan. 17, 2020), <https://www.nytimes.com/2020/01/15/business/media/hot-nature-shows.html> [<https://perma.cc/BP6P-GJQK>] (detailing that Netflix and similar firms view wildlife series and films as a wise investment because they are appropriate for all ages and appeal to an international audience since they typically feature little to no talking).

22. Emma Stewart, *Net Zero + Nature: Our Commitment to the Environment*, NETFLIX (Mar. 30, 2021), <https://about.netflix.com/en/news/net-zero-nature-our-climate-commitment> [<https://perma.cc/DJ85-EN86>] [hereinafter *Net Zero*].

23. *Our Progress on Sustainability: One Year In*, NETFLIX (Mar. 30, 2022), <https://about.netflix.com/en/news/netflix-sustainability-progress-one-year-in> [<https://perma.cc/7JNU-AZDJ>].

24. John Aitchison, Rowan Aitchison & Fredi Devas, *Assessing the Environmental Impacts of Wildlife Television Programmes*, 3 PEOPLE & NATURE 1138, 1139 (2021), <https://doi.org/10.1002/pan3.10251> [<https://perma.cc/YW69-UX8B>].

25. *Id.* at 1141.

26. See Gregory Day & Abbey Stemler, *Are Dark Patterns Anticompetitive?*, 72 ALA. L. REV. 1, 3 (2020); Peter O'Loughlin, *Cognitive Foreclosure*, 38 GA. ST. U.L. REV. 1097, 1160 (2022); Sapone, *supra* note 1, at 365.

27. Tam, *supra* note 1; see Jaine Morley, Kelly Widdicks & Mike Hazas, *Digitalisation, Energy, and Data Demand: The Impact of Internet Traffic on Overall and Peak Electricity Consumption*, 38 ENERGY RSCH. & SOC. SCI. 128, 129 (2018) (noting that data centers have evolved in their efficiency, but predictions of their growth ranged from 3–70 percent, and these increases in efficiency do not match the growth rate of the overall data to be processed). The following analysis concedes the inherent difficulties in measuring emissions for these applications and services, and it implements the figures and statistics that follow as the best available estimates

The underlying operations of data processing, while complex and enigmatic for the average person, require power, and all social media and streaming services employ the same basic structure to obtain it.²⁸ Given the expertise needed to fully appreciate the complexities of data processing, the following explanation and aggregate estimates of the resultant carbon emissions are designed as a stylized overview of the general interactions and data at play with social media and streaming services; a precise recitation of the complex array of actors and figures involved in this space are beyond the scope of this Note, however, a general understanding of the underlying processes is imperative to understand the issue.

To begin, social media and streaming services use data centers to store all the data that goes into serving the content on their sites or applications to individuals who use them.²⁹ Those users then receive their content on their devices using internet services—powered by their local electricity grid—and their actions on these sites create an array of data points like posts, comments, likes, and hover rates that are returned to these firms as additional data to process and store on their servers.³⁰ The content that an individual consumes is generated and

given the dearth of information these firms make available to the public as to the precise energy they require. *See, e.g.*, NETFLIX, ENVIRONMENTAL SOCIAL GOVERNANCE: 2019 SUSTAINABILITY ACCOUNTING STANDARDS BOARD (SASB) REPORT 2 (2019), https://s22.q4cdn.com/959853165/files/doc_downloads/2020/02/0220_Netflix_EnvironmentalSocialGovernanceReport_FINAL.pdf [perma.cc/MQ8M-U85S] [hereinafter NETFLIX 2019 ESG REPORT]; *Introducing Meta: A Social Technology Company*, META (Oct. 28, 2021), <https://about.fb.com/news/2021/10/facebook-company-is-now-meta/> [perma.cc/8J83-9GMH]; THE WALT DISNEY CO., 2021 CORPORATE SOCIAL RESPONSIBILITY REPORT 29 (2021), <https://impact.disney.com/app/uploads/Current/2021-Disney-CSR-Report.pdf> [perma.cc/VAK3-PHEP]; AMAZON, DELIVERING PROGRESS EVERYDAY: AMAZON'S 2021 SUSTAINABILITY REPORT 3, 10–12, 98 (2021), <https://sustainability.aboutamazon.com/2021-sustainability-report.pdf> [perma.cc/G6AZ-ZDV8]. This Note argues for more robust information disclosure of these figures in these firms' preexisting social governance reports as one of several solutions to this issue, which would further accountability and oversight on this issue by enhancing the verity of future studies.

28. *See* Jeff Bender, *Are Social Media Companies Getting Into the Data Center Business?*, EQUINIX INTERCONNECTIONS: BLOG (Apr. 6, 2022), <https://blog.equinix.com/blog/2022/04/06/are-social-media-companies-getting-into-the-data-center-business/> [perma.cc/E8VY-AJRQ]; Steven J. Vaughan-Nichols, *How Social Networking Works*, COMPUTERWORLD (Jan. 7, 2010, 12:54 PM), <https://www.computerworld.com/article/2759107/how-social-networking-works.html> [perma.cc/C76X-GNPN]; *see, e.g.*, *Meta Data Centers*, META, <https://datacenters.fb.com> [perma.cc/QM3U-DQBH] (last visited Feb. 17, 2024).

29. *See* Bender, *supra* note 28; Vaughan-Nichols, *supra* note 28.

30. *See* Sarah Griffiths, *Why Your Internet Habits Are Not as Clean as You Think*, BBC (Mar. 5, 2020), <https://www.bbc.com/future/article/20200305-why-your-internet-habits-are-not-as-clean-as-you-think> [perma.cc/VKC7-2HAL]; Brad Plummer, *The U.S. Has Billions for Wind and Solar Projects. Good Luck Plugging Them In.*, N.Y. TIMES (Feb. 23, 2023), <https://www.nytimes.com/2023/02/23/climate/renewable-energy-us-electrical-grid.html> [https://perma.cc/4EUR-NLK7] (“There is no single grid; the United States has dozens of electric networks, each overseen

optimized with distinct user-generated data based on individual activity; as such, the interaction between content and user activity creates a dataset specific to each individual user and complicates the extraction of all measurable datasets.³¹ For example, an individual Instagram or Facebook user wanting aggregation of their information must request a copy of the information from the sites' parent company, Meta, which stores that person's profile and activities on the platform.³² Meta, however, has access to this information in the aggregate.³³ Even after requesting one's individual information from one of those platforms, it may take up to thirty days to receive, whereas Meta has more immediate access.³⁴

Moreover, while social media and streaming services have adopted initiatives to maximize their data centers' efficiency and reliance on renewable energy, improvements in efficiencies can nonetheless result in the heightened collection of user data and allow the firms to host more users, which could potentially offset improvements in these areas by creating more information to be processed.³⁵

by a different authority."). Renewable energy typically accounts for lower shares of the total energy demands in local electricity grids than in the data centers streaming and social media firms use to maintain their sites. See Catherine Clifford, *Here's Why the U.S. Electric Grid Isn't Running on 100% Renewable Energy Yet*, CNBC (Dec. 29, 2022, 8:30 AM), <https://www.cnbc.com/2022/12/29/why-isnt-the-us-electrical-grid-run-on-100percent-renewable-energy-yet.html> [perma.cc/G2RE-RRWR] (stating that 61 percent of electricity generation in the United States came from burning coal, natural gas, or petroleum in 2021, with only 20 percent coming from renewables, and another 19 percent coming from nuclear power).

31. See *Privacy Policy*, META (Dec. 27, 2023), <https://mbasic.facebook.com/privacy/policy/printable/#7> [perma.cc/9VL3-QFYW].

32. *Id.* (providing links for each user to access the information Meta collects, view the off-Facebook activity stored, change ad preferences, and manage the data stored)

33. *Id.* (providing that Meta collects "[y]our activity and information you provide," with "[y]our" presumably referencing all users and not just the individual one since the page with the Privacy Policy is broadly accessible).

34. Using a personal Instagram account and the process for requesting a copy of all information Meta maintained from that single account, the generated response stated it can take up to thirty days for Meta to collect that and send it, and there was a further limitation that a user may only request a file every four days. *Assessing and Downloading Your Instagram Information*, META, <https://help.instagram.com/contact/505535973176353> [https://perma.cc/W6WW-LZNN] (last visited Apr. 10, 2024).

35. See *Meta Data Centers*, *supra* note 28 (noting its data centers have achieved net zero carbon emissions and are supported by 100 percent renewable energy). Meta collects content that users create, including posts, comments, or audio, the messages users send and receive, and the time, frequency, and duration of users' activities on Meta products. *Privacy Policy*, *supra* note 31 (clarifying that Meta collects information on "[c]ontent you create, like posts, comments or audio" along with "[m]essages you send and receive, including their content, subject to applicable law" and "[t]he time, frequency and duration of your activities on our Products" to name a few).

For illustration, under recent estimates, posting one image on Instagram emits 0.15g of CO₂, and scrolling on its feed for one minute emits 1.5g of CO₂.³⁶ The average Instagram user spends twenty-eight minutes scrolling per day, and emissions from that alone amount to 42g of CO₂ per user on that platform per day.³⁷ While this figure might seem minimal, an accurate measure of CO₂ emissions from social media applications cannot be effectively calculated without accounting for their global consumption.³⁸ For context, since Instagram averages 500 million active daily users, based on the estimated 42g of CO₂ each user emits per day just from scrolling, that application alone emits an estimated average of 21,000 metric tons of CO₂ per day from scrolling alone.³⁹

Other social media platforms produce comparable effects. Each minute spent on TikTok emits an estimated 2.63g CO_{2e}, and the average TikTok user spends 45.8 minutes per day on the app for an average of 120.45g CO_{2e} per user per day.⁴⁰ With a total of 45.24 million daily active users, TikTok consumption emits an estimated 5,449 metric tons of carbon per day.⁴¹ Similarly, Facebook yields 0.79g CO_{2e} per

36. Tam, *supra* note 1. This section uses grams of CO₂ and grams of CO_{2e}, consistent with the data reported from each available source. Where these figures are multiplied by the total users for a specific platform, the CO₂ or CO_{2e} retained in the resulting number comes from the measurements used in the referenced data sets. CO₂ refers to the quantity of only this GHG, and considerations of this figure alone can lead to an understatement of total global warming impact, as the term CO_{2e} signifies the amount of CO₂ which would have the equivalent global warming impact. See MATTHEW BRANDER, GREENHOUSE GASES, CO₂, CO_{2E}, AND CARBON: WHAT DO ALL THESE TERMS MEAN?, *ECOMETRICA 2* (July 2023), <https://ecometrica.com/assets/GHGs-CO2-CO2e-and-Carbon-What-Do-These-Mean-v2.1.pdf> [perma.cc/DN2F-GXCH].

37. Tam, *supra* note 1.

38. See *id.* (observing that 65.5 percent of the world's population has access to the internet); Stacy Jo Dixon, *Number of Global Social Network Users 2018–2027*, STATISTA (Sep. 16, 2022), <https://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/> [perma.cc/RH7A-XK6T] (reporting that 49 percent of the global population, amounting to 4.26 billion people, used social media in January of 2021, and predicting that this figure will grow further).

39. Brian Dean, *Instagram Demographic Statistics: How Many People Use Instagram in 2022?*, BACKLINKO (Mar. 25 2024) <https://backlinko.com/instagram-users> [perma.cc/YM9C-PSWR]; Tam, *supra* note 1.

40. Sara Lebow, *In a First, TikTok Will Beat YouTube in User Time Spent*, INSIDER INTELL. (May 26, 2022), <https://www.insiderintelligence.com/content/tiktok-beats-youtube-user-time-spent/> [perma.cc/J8H2-S45L]; *What Social Media Site Has the Biggest Carbon Footprint?*, GOVTECH (Feb. 15, 2022), https://www.govtech.com/question-of-the-day/what-social-media-site-has-the-biggest-carbon-footprint?utm_source=sj&utm_medium=referral&utm_campaign=kat059_stonejunction [perma.cc/U6SJ-YMPC]; *Social Carbon Footprint Calculator*, COMPARE THE MKT., <https://www.comparethemarket.com.au/energy/features/social-carbon-footprint-calculator/> [perma.cc/7SMP-54MR] (last visited Feb. 17, 2024).

41. Laura Ceci, *Global TikTok iOS DAU 2019–2022*, STATISTA (Aug. 15, 2022), <https://www.statista.com/statistics/1090764/tiktok-dau-worldwide-ios/> [perma.cc/479D-BATF];

minute, and the average Facebook user in 2022 spends thirty-three minutes per day on the platform, resulting in 26.07g CO_{2e} per user per day.⁴² As of July 2022, Facebook has 1.96 billion daily users, meaning emissions come to approximately 49,533 metric tons of CO_{2e} per day.⁴³ This suggests that daily emissions from Instagram, Facebook, and TikTok alone account for an estimated 75,982 metric tons of CO_{2e} per day.⁴⁴

In scaling the average daily emissions from users on these platforms to their global reach, estimates of their relative impact become more numerically comprehensible, yet disparagingly material. Some estimate that the carbon footprint from electronic consumption of social media accounts for 3.7 percent of global greenhouse emissions.⁴⁵

Streaming services produce similar impacts, with estimates that streaming one hour's worth of Netflix emits 36g of carbon.⁴⁶ Even though Netflix announced a goal of reaching net zero carbon emissions by 2022, this measure explicitly excluded emissions from internet transmission that subscribers use to watch Netflix.⁴⁷ Despite some

Laura Ceci, *Global TikTok Android DAU 2019-2022*, STATISTA (Aug. 15, 2022), <https://www-statista.com/statistics/1090659/tiktok-dau-worldwide-android/> [perma.cc/32X2-6HZ8].

42. Stacy Jo Dixon, *Carbon Emissions of Leading Social Media Apps 2021*, STATISTA (July 8, 2022), <https://www-statista.com/statistics/1177323/social-media-apps-energy-consumption-milliamperere-hour-france/> [perma.cc/JJ6U-A9LF] [hereinafter Dixon, *Carbon Emissions of Leading Social Media Apps 2021*]; Stacy Jo Dixon, *Average Daily Time Spent on Social Media by U.S. Adults 2017-2022*, STATISTA (Aug. 19, 2022), <https://www-statista.com/statistics/324267/us-adults-daily-facebook-minutes/> [perma.cc/ZE7R-KXK5] [hereinafter Dixon, *Average Daily Time Spent on Social Media by U.S. Adults 2017-2022*].

43. Stacy Jo Dixon, *Facebook: Number of Daily Active Users Worldwide 2011-2022*, STATISTA (July 28, 2022), <https://www-statista.com/statistics/346167/facebook-global-dau/> [perma.cc/FQZ6-L72E] [hereinafter Dixon, *Facebook: Number of Daily Active Users Worldwide 2011-2022*].

44. Tam, *supra* note 1; Dean, *supra* note 39; Lebow, *supra* note 40; *What Social Media Site Has the Biggest Carbon Footprint?*, *supra* note 40; *Social Carbon Footprint Calculator*, *supra* note 40; Ceci, *supra* note 41; Dixon, *Carbon Emissions of Leading Social Media Apps 2021*, *supra* note 42; Dixon, *Average Daily Time Spent on Social Media by U.S. Adults 2017-2022*, *supra* note 42; Dixon, *Facebook: Number of Daily Active Users Worldwide 2011-2022*, *supra* note 43.

45. Tam, *supra* note 1. In comparison, the aviation industry accounts for around 2.5 percent of global carbon dioxide emissions, and the international shipping industry accounts for about 2 percent. See *International Shipping*, INT'L ENERGY AGENCY (July 11, 2023), <https://www.iea.org/reports/international-shipping> [perma.cc/3TAU-ZZVM]; Hannah Ritchie, *Climate Change and Flying: What Share of Global CO₂ Emissions Come from Aviation?*, OUR WORLD IN DATA (Oct. 22, 2020), <https://ourworldindata.org/co2-emissions-from-aviation> [perma.cc/72L3-5SHU].

46. Tam, *supra* note 1; see George Kamiya, *The Carbon Footprint of Streaming Video: Fact-Checking the Headlines*, INT'L ENERGY AGENCY (Dec. 11, 2020), <https://www.iea.org/commentaries/the-carbon-footprint-of-streaming-video-fact-checking-the-headlines> [perma.cc/BG2P-GJ5J] (estimating that one hour of streaming video in 2019 produced 36g CO₂).

47. *Net Zero*, *supra* note 22. The exclusion of emissions from electronic devices used for streaming is especially noteworthy given that a report funded at least in part by Netflix found

criticisms, Netflix reasoned that it omits emissions from users' internet transmission and electronic devices from its calculations because internet service providers and device manufacturers have more control over equipment design and function and those providers should account for that separately.⁴⁸ Excluding those emissions, Netflix reported a carbon footprint of 1.1 million metric tons in 2020, with about half resulting from the physical production of Netflix-branded films and series, another 45 percent coming from corporate operations and purchased goods, and 5 percent from cloud services to stream the service.⁴⁹

Outside of service-specific calculations, estimates of emissions from one hour or half-hour of streaming can vary considerably based on temporal, geographical, and technological factors like electricity grid emissions.⁵⁰ Across the globe, emissions from one hour of streaming have been estimated as 76g CO₂ in Germany and 63.5g CO₂ in Australia, but emissions from a half-hour of streaming have been approximated as 3g CO₂ in Sweden and 0.74g CO₂ in Norway.⁵¹

Emissions from one hour of streaming as reported by Netflix comes from an estimate based on a European electricity grid average emission factor from 2020, resulting in an average footprint for Europe of 55g CO_{2e}.per hour.⁵² Taking the European average footprint of 55g

that, based on European average emissions, end-user devices hold the biggest share of emissions coming from one hour of video streaming, accounting for 51 percent of that total. CARBON IMPACT OF VIDEO STREAMING, CARBON TR. 1, 49 (June 2021), <https://ctprodstorageaccountp.blob.core.windows.net/prod-drupal-files/documents/resource/public/Carbon-impact-of-video-streaming.pdf> [perma.cc/YP62-6ATK].

48. *Net Zero*, *supra* note 22 (noting that GHG accounting guidance for emissions from internet transmissions does not exist for streaming companies, and stating the common way to allocate emissions to another company is through the operational control method, under which a company only accounts for all emissions from another if it or a subsidiary has full authority over it to introduce operating policies) (citing A CORPORATE ACCOUNTING AND REPORTING STANDARD, GREENHOUSE GAS PROTOCOL 18 (rev. ed. 2004)).

49. *Net Zero*, *supra* note 22.

50. CARBON IMPACT OF VIDEO STREAMING, *supra* note 47, at 8 (highlighting the inherent uncertainty in the estimation of the carbon impact of video streaming, as with most carbon footprint assessments).

51. *Id.* at 50. Ian Tiseo, *Global CO2 Emissions from a 30-Minute Netflix Stream 2019*, STATISTA (Feb. 6, 2023), <https://www.statista.com/statistics/1109760/co2-emissions-half-hour-netflix-show-globally-by-country/> [perma.cc/K3KV-6MQ2] (using CO₂ as the study's measurement unit). CO₂ as a unit of measurement reflects the effects of the studied subject on carbon emissions alone, whereas CO_{2e} includes other greenhouse gas effects as well, but the fundamental metric is still comparable for the stylized estimations herein. See BRANDER, *supra* note 36.

52. This figure appears in Netflix's initial announcement of its net-zero goal, a blog post about streaming's carbon impact, and a report made possible by seed funding from Netflix. *Net Zero*, *supra* note 22; Emma Stewart & Daniel Schien, *The True Climate Impact of Streaming*, NETFLIX (June 10, 2021), <https://about.netflix.com/en/news/the-true-climate-impact-of-streaming>

CO_{2e} per hour of streaming for 2020 and the 54 million Netflix subscribers in Western Europe that same year, under the unlikely assumption that each only watched one hour of content that year, that still results in an estimated 2,970 metric tons of CO_{2e} produced from streaming on that platform in that region alone.⁵³

The US Environmental Protection Agency (EPA) has a Greenhouse Gas Equivalencies Calculator that measures the number of greenhouse gases generated given its estimate of the amount of electricity in the United States from fossil fuels.⁵⁴ The tool is designed to provide consumers with an informal estimate of emissions from their activities.⁵⁵ Using this tool, one hour of Netflix consumes 0.8 kWh, which results in an estimated 346g CO_{2e}.⁵⁶ Using this figure, if the 58.4 million US subscribers Netflix had in 2018 each streamed for only one hour, it would result in an approximated 20,068 metric tons of CO_{2e}.⁵⁷

[<https://perma.cc/B8DC-VKCW>]; CARBON IMPACT OF VIDEO STREAMING, *supra* note 47, at 2 (acknowledging Netflix's funding to DIMPACT made the report possible).

53. 2.970 metric tons was devised by multiplying 55gCO_{2e} per hour by the number of subscribers in Western Europe for that same year, resulting in 2.97 trillion gCO_{2e}, which was then converted to metric tons. The 55gCO_{2e}/hour figure is an average from all of Europe, so applying it to the sample of subscribers from Western Europe is concededly imperfect but is offered merely to illustrate that emissions can be minimized when reported at the individual level without reference to the overall sample size. See Julia Stoll, *Number of Netflix Subscribers in Western Europe from 2015 to 2027*, STATISTA (Oct. 10, 2022), <https://www.statista.com/statistics/671557/netflix-subscribers-in-western-europe/> [perma.cc/2HN8-SA7U].

54. *Greenhouse Gas Equivalencies Calculator*, U.S. ENV'T PROT. AGENCY (July 21, 2023), <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator> [perma.cc/3MLG-LANZ].

55. *Id.* This Note uses the tool to give the reader a reference point to generally understand the potential scope of emissions from streaming, not as a precise measurement. See *id.*

56. See *id.*; Maxime E. Hess & Jean-Noel Geist, *Did The Shift Project Really Overestimate the Carbon Footprint of Online Video*, SHIFT PROJECT 17 (June 2020), https://theshiftproject.org/wp-content/uploads/2020/06/2020-06_Did-TSP-overestimate-the-carbon-footprint-of-online-video_EN.pdf [perma.cc/9KSB-PM3J].

57. See *Greenhouse Gas Equivalencies Calculator*, *supra* note 54. The figure based on each subscriber streaming for one hour counts only individual subscribers, and one subscriber could give several viewers access to the site, so the carbon impact of every viewer in the United States streaming only one hour of Netflix would likely be larger than reflected here. See Alex Sherman, *Netflix is Finally Going After Password Sharing. Here's How It's Likely to Work*, CNBC, (Apr. 27, 2022, 6:36 PM) <https://www.cnbc.com/2022/04/23/how-netflixs-password-sharing-crackdown-is-likely-to-work.html> [perma.cc/8RWQ-6MDW]. Moreover, current statistics on Netflix's subscribers in the United States combined that figure with the number of subscribers in Canada, so the 2018 statistic is used as the last available figure for just the United States. See Todd Spangler, *Netflix Handily Beats Q3 Subscriber Forecast, Gains 7 Million New Customers*, VARIETY (Oct. 16, 2018, 1:08 PM), <https://variety.com/2018/digital/news/netflix-handily-beats-q3-subscriber-forecast-stock-pops-1202981817/> [perma.cc/3BYH-7DE2]. Lastly, as with the European average footprint and the number of Netflix subscribers in Western Europe, this assumes that every US subscriber from 2018 streamed just one hour of content and multiplied the 58.4 million subscribers by the estimated 346gCO_{2e}/hour to result in 20.068 billionbillion gCO_{2e}, which was then converted to metric tons. See *Greenhouse Gas Equivalencies Calculator*, *supra* note 54.

These emissions are expected to see continued growth alongside overall data traffic.⁵⁸ Increases in video streaming propel this growth, and the latest analysis states that long-form video-on-demand accounted for about 40 percent of all web traffic in 2020, or about 45 percent of all total internet traffic.⁵⁹ Further, global web video traffic represented 75 percent of all web traffic in 2017.⁶⁰

IV. INADEQUATE RESPONSES TO GROWING SOCIAL MEDIA AND STREAMING USAGE

A. Predicting Usage Trends: Generational, Addicted, and Global Consumers

The consumption of digital media likely will continue to rise with the overall share of users expected to increase due to generational differences in social media and streaming use and increased access to the internet.⁶¹ Moreover, the intensity of consumption will probably heighten as younger generations fall more susceptible to addictive usage patterns and design tools.⁶² With younger generations to soon form a larger portion of the broader population, social media users alone are expected to grow to 5.17 billion people in 2024.⁶³ On top of increasing numbers of users, the generational change in these users also signifies a shift in behavior since US adults sixty-five and older are three times as likely as adults eighteen to twenty-nine years old to say they always try to live in ways that protect the environment.⁶⁴ Even those born between 1981–1996 are also somewhat less likely than other

58. Vida Rozite, *Data Centers and Data Transmission Networks*, INT'L ENERGY AGENCY (July 11, 2023), <https://www.iea.org/energy-system/buildings/data-centres-and-data-transmission-networks#tracking> [perma.cc/3THX-5LT4].

59. CARBON IMPACT OF VIDEO STREAMING, *supra* note 47, at 34. The Cisco forecasts are from analyses conducted in 2018, so they do not reflect any impact of increased video streaming or internet traffic from the COVID-19 pandemic. *See id.*

60. *Id.*

61. *See id.* at 35; *The 2024 Social Media Demographics Guide*, KHOROS, <https://khoros.com/blog/social-media-demographics-guide> [perma.cc/RKG2-QWW7] (last visited Feb. 17, 2024).

62. *See* David S. Bickham, *Current Research and Viewpoints on Internet Addiction in Adolescents*, CURRENT PEDIATRICS REP. (Jan. 9, 2021), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7796811/pdf/40124_2020_Article_236.pdf [perma.cc/78YT-AX6Q].

63. *The 2024 Social Media Demographics Guide*, *supra* note 61.

64. Karpus, *supra* note 16, at 121 (citing Monica Anderson, *For Earth Day 2017, Here's How Americans View Environmental Issues*, PEW RSCH. CTR. (Apr. 20, 2017), <https://www.pewresearch.org/fact-tank/2017/04/20/for-earth-day-heres-how-americans-view-environmental-issues/> [https://perma.cc/D5YC-GZNK]).

generations to view themselves as environmentalists than other generations.⁶⁵

The increased consumption of these social media and streaming services during the COVID-19 pandemic is an illustration of the additional carbon emissions that could arise from peaks in energy consumption due to additional users. During this time, the increased online media consumption driven by social distancing resulted in a demand for up to 42.6 million megawatt hours of additional electricity to support data transmission and to power data centers.⁶⁶

Given the global imperative in managing emissions produced by digital media consumption, addictive behaviors related to its consumption are more troubling than ever.⁶⁷ The World Health Organization now recognizes the public health implications of internet addiction.⁶⁸ Several types of internet addictions can result from digital activities, and many psychological mechanisms feed these platforms, including endless scrolling and streaming as well as social pressure, comparison, and reward.⁶⁹ Endless scrolling is a technique used to prolong usage time, and the occasional discovery of entertaining content at the bottom of the never-ending feed enhances this behavior through intermittent conditioning.⁷⁰ The same dynamic occurs with the streaming services' auto-play feature.⁷¹ Social pressure enters these platforms via nudges that influence user behavior through these applications' respective system designs, which are set up so that they typically have notifications turned on by default.⁷² Although users can alter that default and limit their screen time for certain applications,

65. *Id.* (citing *Millennials in Adulthood: Detached from Institutions, Networked with Friends*, PEW RSCH. CTR. (Mar. 7, 2014), <https://www.pewresearch.org/social-trends/2014/03/07/millennials-in-adulthood/> [perma.cc/5JEF-WN92]).

66. Cummings, *supra* note 2. Between January and March of 2020, Netflix reported a 16 percent increase in daily traffic, and Zoom experienced a tripling of usage. Obringer et al., *supra* note 2.

67. See Christian Montag, Bernd Lachmann, Marc Herrlich & Katharina Zweig, *Addictive Features of Social Media/Messenger Platforms and Freemium Games Against the Background of Psychological and Economic Theories*, 16 INT'L J. ENV'T RSCH. & PUB. HEALTH 2 (2019), <https://www.mdpi.com/1660-4601/16/14/2612> [https://perma.cc/5NTU-MA3S].

68. *Id.*; *Public Health Implications of Excessive Use of the Internet and Other Communication and Gaming Platforms*, WORLD HEALTH ORG. (Sept. 13, 2018), <https://www.who.int/news/item/13-09-2018-public-health-implications-of-excessive-use-of-the-internet-and-other-communication-and-gaming-platforms> [perma.cc/Y9Q5-GBSY];

69. Montag et al., *supra* note 67, at 4, 5–7.

70. *Id.* at 5.

71. *Id.*

72. *Id.* at 6.

the percentage of users that change or even check the default settings depends on several factors and is often a small share of overall users.⁷³

Social comparison and reward mechanisms are characteristic of social media platforms.⁷⁴ Some argue this influence is highly intentional and detrimental, as they prolong usage of the application and produce more data the firms can provide to third parties for a fee.⁷⁵ These mechanisms can be seen most easily through the ability to give and receive likes on uploads to these platforms, as they show positive social feedback, which has strong neuroscientific effects.⁷⁶ Receiving several likes on an image produces increased activity in the ventral striatum, a part of the brain involved in the processing of rewards.⁷⁷ Further, studies have shown instances of lower gray matter volumes of the nucleus accumbens, a subcortical brain structure known for its roles in pleasure and addiction, after longer and more frequent use of Facebook, as well as a relationship between lower gray matter volumes and addictive tendencies.⁷⁸

B. Federal and International Initiatives Are Inadequate Thus Far

Domestic government initiatives have thus far inadequately responded to the emissions resulting from social media and streaming consumption, mainly focusing on voluntary efforts to broaden the available data and prioritizing data centers in their regulatory initiatives.⁷⁹ The federal government attempted to regulate this issue in the mid-2000s when the EPA held two public meetings that highlighted the need for data centers to become energy efficient—focusing on putting restrictions on backup diesel generators because of their air polluting emissions—but these meetings did not ultimately

73. *Id.*

74. *Id.* at 6–7.

75. *Id.* at 9–10.

76. *Id.* at 6–7 (referencing Lauren E. Sherman, Ashley A. Payton, Leanna M. Hernandez, Patricia M. Greenfield & Mirella Dapretto, *The Power of the Like in Adolescence: Effects of Peer Influence on Neural Behavioral Responses to Social Media*, 27 ASSOC. FOR PSYCH. SCI. 1027, 1027–35 (2016)).

77. Henry H. Wilmer, Lauren E. Sherman & Jason M. Chein, *Smartphones and Cognition: A Review of Research Exploring the Links Between Mobile Technology Habits and Cognitive Functioning*, 8 FRONTIERS IN PSYCH. 1, 10 (2017).

78. Montag et al., *supra* note 67, at 7. The nucleus accumbens is a piece of the ventral striatum thought to be a key mechanism for mediating the interaction between motivation and action. Sanjay Salgado & Michael G. Kaplitt, *The Nucleus Accumbens: A Comprehensive Review*, 93 STEREOTACTIC & FUNCTIONAL NEUROSURGERY 75, 75 (2015).

79. See CARBON IMPACT OF VIDEO STREAMING, *supra* note 47, at 78–80.

lead to regulation on the matter.⁸⁰ Instead, the EPA established the voluntary National Data Center Energy Efficiency Information Program, which relies on stakeholders developing tools to assist data center operators in reducing energy consumption in their facilities.⁸¹

Internationally, the United Nations has recognized the importance of social media for individual users and noted its potential impact on the environment.⁸² In May of 2011, the United Nations General Assembly's Human Rights Council declared that access to the internet was a basic human right, which, if restricted, would be a violation of international law.⁸³ In light of that acknowledgment, in November of 2014, an independent expert group appointed by the United Nations Secretary-General issued a report offering recommendations on how the data revolution could be mobilized for sustainable development, stating that the clean and affordable energy goal could be achieved by reducing waste from the collection of electricity, gas, and water consumption data.⁸⁴ Despite this, the UN neglected a crucial risk for sustainable development by failing to consider the environmental footprint of social media and streaming.⁸⁵

Another approach has been the European Green Deal—a comprehensive set of proposals published in 2020 and designed to help the European Union reach climate neutrality by 2050 through revisions to climate, energy, and transportation legislation—that includes a strategy for the digital sector.⁸⁶ This digital sector strategy mainly focuses on contributions from the Information and Communication Technology (ICT) sector to global energy use and emissions, estimating

80. Federica Lucivero, *Big Data, Big Waste? A Reflection on the Environmental Sustainability of Big Data Initiatives*, SCI. & ENG'G ETHICS, 1009, 1016 (2020). Many studies have centered on the emissions and energy efficiency from these facilities, producing conflicting findings. See generally David Mytton & Masao Ashtine, *Sources of Data Center Energy Estimates: A Comprehensive Review*, 6 JOULE 2032, 2032 (2022), <https://doi.org/10.1016/j.joule.2022.07.011> [<https://perma.cc/HXR3-U3TQ>] (analyzing "258 data center energy estimates from 46 original publications from 2007 to 2021 to assess their reliability by examining the 676 sources used").

81. CARBON IMPACT OF VIDEO STREAMING, *supra* note 47.

82. See Jennifer Jacobs Henderson, *The Boundaries of Free Speech in Social Media*, in SOCIAL MEDIA AND THE LAW: A GUIDEBOOK FOR COMMUNICATION STUDENTS AND PROFESSIONALS 1, 4 (Daxton R. Stewart ed., 2017).

83. *Id.* (citing United Nations Gen. Assembly Human Rts. Council, Frank LaRue (Special Rapporteur), Report of the Special Rapporteur on the Promotion and Protection of the Right to Freedom of Opinion and Expression, A/HRC/17/27 (May 16, 2011), https://www2.ohchr.org/english/bodies/hrcouncil/docs/17session/A.HRC.17.27_en.pdf [perma.cc/Y9Q5-GBSY]).

84. Lucivero, *supra* note 80, at 1010.

85. *Id.*

86. See CARBON IMPACT OF VIDEO STREAMING, *supra* note 47, at 77; *European Green Deal*, EUR. COUNCIL OF THE EUR. UNION (Dec. 6, 2022), <https://www.consilium.europa.eu/en/policies/green-deal/> [<https://perma.cc/SJN3-JXMC>].

that such contributions account for 5–9 percent of global electricity use and over 2 percent of global greenhouse gas emissions.⁸⁷ While providing these estimates, the strategy also recognizes that innovations in that sector could help reduce emissions in general by potentially offsetting its own emissions, but it says nothing about social media or streaming specifically as a sizeable piece of contributions from that sector.⁸⁸

The European Union has also taken efforts toward collecting more robust data and has requested public consultation on environmental management and performance for telecommunications and ICT services.⁸⁹ The request states that these sectors should set the best environmental management practices for the industry and give specific environmental performance metrics where possible.⁹⁰ While a request for public consultation does not necessarily result in legislation, it nonetheless demonstrates other governments' interest in improving emissions from the digital space.⁹¹

France, Germany, and the United Kingdom have shared in the global push for stronger data on emissions from the digital sector as well.⁹² The French Senate introduced legislation in 2020 to obtain clear and objective data and methodologies for the environmental impact of digital technology, proposing measures including an environmental barometer for digital companies.⁹³ Germany introduced an

87. CARBON IMPACT OF VIDEO STREAMING, *supra* note 47, at 77. The ICT sector generally refers to the industries that store, transmit, and display electronically stored information. See *Measuring the Information Economy*, ORG. FOR ECON. CO-OPERATION & DEV. 81 annex 1 (2002), <https://www.oecd.org/digital/ieconomy/1835738.pdf> [perma.cc/W9SX-NMWB] (“In 1998, OECD member countries agreed to define the ICT sector as a combination of manufacturing and services industries that capture, transmit and display data and information electronically.”).

88. See *European Green Deal*, *supra* note 86; CARBON IMPACT OF VIDEO STREAMING, *supra* note 47, at 77.

89. See CARBON IMPACT OF VIDEO STREAMING, *supra* note 47, at 77.

90. *Id.*

91. *Id.*

92. See *id.* at 78; *Shaping Digitalisation for Humans and the Environment*, FED. MINISTRY FOR THE ENV'T, NATURE CONSERVATION & NUCLEAR SAFETY 1, 6 (Feb. 2020), https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Digitalisierung/digitalagenda_policy_paper_en_bf.pdf [<https://perma.cc/9QTH-ZJZ5>]; *Greening Government: ICT and Digital Services Strategy 2020–2025*, DEP'T FOR ENV'T FOOD & RURAL AFFS. (Sep. 10, 2020), <https://www.gov.uk/government/publications/greening-government-ict-and-digital-services-strategy-2020-2025/greening-government-ict-and-digital-services-strategy-2020-2025> [perma.cc/2STR-VW4C] [hereinafter *Greening Government*].

93. CARBON IMPACT OF VIDEO STREAMING, *supra* note 47, at 78; Clara Bauer & Mathieu Pollet, *French Government Presents Roadmap to Bridge Digital and Environmental Transitions*, EURACTIV (June 14, 2023), <https://www.euractiv.com/section/energy-environment/news/french-government-presents-roadmap-to-bridge-digital-and-environmental-transitions/> [perma.cc/CJ4D-Q4FF].

environmental digital agenda with a multitude of measures to make the sector more sustainable, noting the significant ecological footprint from digital technologies, the need for reliable data to achieve responsible digital decisions, and the feedback loop in energy consumption from ever-expanding technologies.⁹⁴ The United Kingdom also released a digital services strategy in 2020, identifying guidelines for the ICT sector to reach climate targets with a goal of full traceability of ICT at end-of-life and complete compliance and transparency in supply chains.⁹⁵

C. Current Private Environmental Governance Initiatives Provide Insufficient Information

Some digital service conglomerates already have private social or environmental governance programs in place, but most fail to provide users with specific figures that demonstrate a user's environmental impact, instead opting to report that in the aggregate.⁹⁶ Thus, even if users want to reduce the environmental impact associated with their usage of these platforms, they cannot do so under the current landscape because they have no reliable estimates for this category of action at the user level.⁹⁷ Mentions of the service's carbon impact at an individual

94. See CARBON IMPACT OF VIDEO STREAMING, *supra* note 47, at 77–78; see also Laura Marks, Joseph Clark, Jason Livingston, Denise Oleksijczuk & Lucas Hilderbrand, *Streaming Media's Environmental Impact*, 2 STATES OF MEDIA & ENV'T 1, 2 (2020), <https://doi.org/10.1525/001c.17242> [perma.cc/LXL5-ZWGC] (referring to a similar idea of the Jevons paradox that more efficient technologies tend to encourage greater use of a resource, reducing or eliminating emissions savings); *Shaping Digitalisation for Humans and the Environment*, *supra* note 92.

95. The policy paper states that the true sustainability of digital is not clear, and there are issues of transparency from firms related to the services, but it sets minimum business rules whereby all ICT suppliers must commit to net zero targets consistent with the Paris Agreement and follow that with action plans showing progress toward the goal a carbon positive outcome through the services provided. *Greening Government*, *supra* note 92; see CARBON IMPACT OF VIDEO STREAMING, *supra* note 47, at 78.

96. While Netflix has an Environmental, Social, and Governance (ESG) report, it mainly describes its aggregate impacts and reports figures for the carbon impact of one hour of streaming on the platform from a white paper it funded. See *Net Zero*, *supra* note 22; Our Progress on Sustainability: One Year In, *supra* note 23; NETFLIX, ENVIRONMENTAL SOCIAL GOVERNANCE REPORT 2021: SUSTAINABILITY ACCOUNTING STANDARDS BOARD (SASB) REPORT 8–9, 11 (Mar. 10, 2023), https://s22.q4cdn.com/959853165/files/doc_downloads/2022/03/30/2021-SASB-Report-FINAL.pdf [perma.cc/5Q9R-ATDD]; NETFLIX, ENVIRONMENTAL SOCIAL GOVERNANCE 2020: SUSTAINABILITY ACCOUNTING STANDARDS BOARD (SASB) REPORT 6 (Mar. 10, 2023), https://s22.q4cdn.com/959853165/files/doc_downloads/2021/03/2020-SASB-Report_FINAL.pdf [perma.cc/U6EY-DMM7] (reporting figures from the same white paper funded by Netflix).

97. See *Net Zero*, *supra* note 22.

user level have been sparse.⁹⁸ Meta has an Environmental, Social, and Governance (ESG) report, but it says nothing about CO₂ emissions per Instagram or Facebook user and provides no such estimates for emissions produced by user activity.⁹⁹ Therefore, it fails to enable a given user to understand the individual impact on emissions by not providing data on carbon emissions at the level of a singular user.¹⁰⁰ Additionally, Meta's ESG report does not organize these figures for Instagram as removed from Facebook; a user of both would not know if the reported usage was for one or the other.¹⁰¹

Streaming services, on the other hand, like the Walt Disney Corporation, have Corporate Social Responsibility (CSR) and ESG reports, but likewise provide figures for the broader company—failing to include figures from emissions that result from streaming on a specific platform.¹⁰² Amazon similarly has an annual Sustainability

98. See NETFLIX 2019 ESG REPORT, *supra* note 27 (laudably stating that 100 percent of its estimated direct and indirect non-renewable power was matched with renewable energy certificates and carbon offsets, but not including an estimate of carbon emissions on an individual user scale in the report).

99. Meta is the entity formerly known as Facebook and now owns that several social media platforms like Instagram and WhatsApp. See *Introducing Meta*, *supra* note 27; Shruit Bose, *Facebook Acquisitions – The Complete List (2022)!*, TECHWYSE (Feb. 17, 2022), <https://www.techwyse.com/blog/general-category/facebook-acquisitions-infographic/> [<https://perma.cc/WD6A-DRWS>]. Meta commendably reports on scope 1, 2, and 3 emissions for the company itself, but it only includes the downstream emissions from energy usage associated with Portal or Oculus devices, failing to provide Facebook and Instagram users with an approximate value for the emissions generated by each hour of scrolling or various actions taken of these sites. META, 2021 SUSTAINABILITY REPORT 12, 94–95 (2021) <https://sustainability.fb.com/wp-content/uploads/2022/06/Meta-2021-Sustainability-Report.pdf> [perma.cc/Y3D3-VP6Z] (noting Meta first reported scope 1 and 2 GHG emissions in 2011 and began reporting scope 3 emissions in 2019 and providing estimated emissions from data centers the company uses to power its facilities); see *Meta's Environmental Metrics Methodology*, META, <https://sustainability.fb.com/wp-content/uploads/2022/06/Metas-Environmental-Metrics-Methodology-2022-Update.pdf> [perma.cc/D6AU-FHR8] (last visited Feb. 23, 2024).

100. Meta currently does not provide users with this information, yet it acknowledges one of its goals is to make it easier for them to live more sustainably, and under its “ESG Product Solutions,” it details a commitment to creating and investing in products that deliver positive results for societal and environmental health and allow users to track and minimize their environmental impact. See META, 2021 SUSTAINABILITY REPORT, *supra* note 99, at 81, 91.

101. See *id.* at 84.

102. See THE WALT DISNEY CO., 2021 CORPORATE SOCIAL RESPONSIBILITY REPORT, *supra* note 27 (reporting scope 1 and 2 carbon emissions from the company itself, but not including figures that estimate the impact of streaming itself or figures that break down the impact on an individual consumer level); THE WALT DISNEY CO., 2020 CORPORATE SOCIAL RESPONSIBILITY REPORT 45, 52 (2020), <https://impact.disney.com/app/uploads/2022/01/2020-CSR-Report.pdf> [perma.cc/Y7J6-E49Z] (last visited Feb. 23, 2024) (reporting the same for 2020); THE WALT DISNEY CO., 2019 CORPORATE SOCIAL RESPONSIBILITY REPORT 11, 36 (2019), <https://impact.disney.com/app/uploads/2022/01/CSR2019Report.pdf> [perma.cc/M746-YZVK] (not reporting scope 1 and 2 emissions but detailing efforts to use renewable and lower carbon energy at Disney parks and listing retired carbon credits for the company).

Report, but it provides emissions for the entire company and does not provide figures for Prime Video by itself.¹⁰³

V. SOLUTIONS: PUBLIC AND PRIVATE ACTIONS

Because these applications and streaming services involve a variety of environmental impacts, they also raise a variety of potential responses, including both public and private action.¹⁰⁴ As for public action, one route is regulatory action that would require these services to disclose their environmental impact to users.¹⁰⁵ Additionally, the federal government retains the power to impose a carbon tax on companies that engage in large-scale data processing.¹⁰⁶ The difficulties in implementing these public actions, however, indicate that private action is a more viable avenue for change.¹⁰⁷ In the private realm, companies could also voluntarily avoid addictive algorithms and constant feedback loops.¹⁰⁸ The two most promising solutions utilize information disclosure as effective tools of emissions reductions from total consumption of these services through either private ordering or public action: (1) they can enhance their current ESG and CSR reports with data on emissions from individual usage of these platforms; or (2) the federal government can require them by regulation to maintain a

103. See AMAZON, DELIVERING PROGRESS EVERYDAY: AMAZON’S 2021 SUSTAINABILITY REPORT 3, 10–12, 98, *supra* note 27 (conveying that Amazon has committed to net-zero emissions across its business by 2040, and reporting scope 1, 2, and 3 emissions, but not providing estimates on emissions from streaming on Prime Video). Amazon’s commitment to 100 percent renewable energy by 2025 also only applies to businesses such as operations facilities, corporate offices, Amazon Web Services data centers, and all subsidiaries. See *Renewable Energy Methodology*, AMAZON, <https://sustainability.aboutamazon.com/renewable-energy-methodology.pdf> [perma.cc/4PF2-JTPX] (last visited Feb. 23, 2024).

104. Studies show that people tend to be more accepting of a solution when one response can adequately address the given problem on its own, and since environmental issues are often complex, including the one at issue in this Note, this solution aversion is an obstacle that must be overcome in crafting a variety of solutions that work in conjunction with one another. See Troy H. Campbell & Aaron C. Kay, *Solution Aversion: On the Relation Between Ideology and Motivated Disbelief*, 107 J. PERSONALITY & SOC. PSYCH. 809, 823–24 (2014), <https://psycnet.apa.org/doi/10.1037/a0037963> [perma.cc/25HB-BC6W]; see, e.g., Tony Hockley, *Solution Aversion*, BEHAV. PUB. POL’Y—BLOG (Mar. 27, 2018), <https://bppblog.com/2018/03/27/solution-aversion/> [perma.cc/72DE-EQZD] (describing that social aversion also means that people react to different solutions based on their ideological beliefs about those solutions, which indicates that responses, such as the ones advanced in this Note, that utilize several solutions is favorable because they would appeal to a broader range of actors).

105. See *infra* Section V.A.

106. See U.S. CONST. art. 1, § 8, cl. 1; *infra* Section V.B.

107. See *infra* Section V.C.

108. See *infra* Section V.C.

transparency page that would allow users to assess accurate estimates of their daily carbon emissions from usage.¹⁰⁹

Increased disclosure, whether through private or public action, would give users a robust understanding of the environmental consequences of usage, which would positively change consumption habits for environmental benefit.¹¹⁰ Though both avenues could achieve the same goal of emissions reductions, private information disclosure is still the most efficient solution because social media and streaming services already have information at the individual user level at their disposal, whereas federal agencies may incur nontrivial public expenses in supplying or verifying the same information.¹¹¹

A. Promulgate Federal Regulations That Require Disclosures of Environmental Impacts

A federal regulation that mandates these services to provide users with information about their individual carbon emissions from their consumption of them could resemble a digital warning label or simply a specifically formatted information label.¹¹² Moreover, the Federal Trade Commission (FTC), Federal Communications Commission (FCC), and EPA are the three agencies with the most institutional competence to regulate in this regard, but the EPA is the best of these options.¹¹³

109. See *infra* Section V.C.

110. See *infra* Section V.C.

111. Promulgating a federal regulation is typically of substantial expense due to the complicated procedures agencies must follow in this process under the APA. *A Guide to the Rulemaking Process*, FED. REG., https://www.federalregister.gov/uploads/2011/01/the_rulemaking_process.pdf [perma.cc/B5MN-AEVW] (last visited Apr. 10, 2024).

112. See *Inflation Reduction Act Programs to Fight Climate Change by Reducing Embodied Greenhouse Gas Emissions of Construction Materials and Products*, ENV'T PROT. AGENCY (Dec. 22, 2023), <https://www.epa.gov/inflation-reduction-act/inflation-reduction-act-programs-fight-climate-change-reducing-embodied> [perma.cc/L3X5-M7P4].

113. The FTC is governed by the Communications Act of 1934, regulates communications by radio, television, wire, satellite, and cable, and is the nation's main agency for communications law. See 47 U.S.C. § 151; *What We Do*, FED. COMM'N COMM'N, <https://www.fcc.gov/about-fcc/what-we-do> [perma.cc/FD6E-YH9V] (last visited Feb. 23, 2024). The FTC is governed by the Federal Trade Commission Act of 1914 and issues regulations that define specific acts or practices that are unfair or deceptive. See 15 U.S.C. §§ 41–58; *About the FTC*, FED. TRADE COMM'N, <https://www.ftc.gov/about-ftc> [perma.cc/3KD8-DGLR] (last visited Feb. 23, 2024). The EPA is governed by various federal environmental laws and promulgates regulations to protect people and the environment from substantial health risks. *Our Mission and What We Do*, ENV'T PROT. AGENCY (May 23, 2023), <https://www.epa.gov/aboutepa/our-mission-and-what-we-do> [perma.cc/GHJ8-FTKU] (providing that, among many other goals, the agency works to ensure that all parts of society, including individuals and businesses, “have access to accurate information sufficient to effectively participate in managing human health and environmental risks”).

Most of the scholarship on digital warning labels has commented either on the advertisements content creators promote or the misinformation users spread through these sites.¹¹⁴ Since they operate in the digital realm, social media and streaming firms occupy a uniquely protected space through Section 230 of the Communications Decency Act (CDA), which allows them to censor users' posts for misinformation or other dangerous content, but also excuses them from liability for taking no action concerning such posts.¹¹⁵ This section has acted as a shield to recovery, even in cases of severe injury or death resulting from content on these sites.¹¹⁶ While the FTC has taken steps to fortify its authority over influencers since its initially light approach, both the current scheme and this proposed expansion subject *users* of these sites to disclosure requirements.¹¹⁷ Under FTC guidance from 2009, updated in 2019, social media influencers must disclose their connection to any product they promote.¹¹⁸ As part of the regulatory

114. See Christopher Terry, Eliezer Joseph Silberberg & Stephen Schmitz, *Throw the Book at Them: Why the FTC Needs to Get Tough With Influencers*, 29 J.L. & POL'Y 406, 411–13, 421 (2021) (arguing for the FTC to enforce restrictions against deceptive online content to individual influencers, not just businesses and platforms, that the agency has challenged in other media); Meghan E. McDermott, *Mitigating Misinformation on Social Media Platforms: Treating Section 230 of the Communications Decency Act as a Quid Pro Quo Benefit*, 55 CONN. L. REV. ONLINE 1, 4–5 (2023) (noting several bills introduced in Congress in 2021 and 2022 regarding social media regulation, with most proposing substantial amendments to § 230 of the Communications Decency Act, which currently provides that interactive computer platforms like social media are not responsible for the content their users' posts, even if it includes misinformation).

115. 47 U.S.C. § 230; see Alexandra VanBlaricum, *I Saw It on Facebook so It Must Be True: The Effects of Misinformation Tags*, 46 L. & PSYCH. REV. 181, 182–85, 193 (2021–22) (highlighting that § 230 of the CDA allows internet firms to censor users' posts, but does not require them to do so, and accordingly describing the statute as both a sword and a shield).

116. See *Anderson v. Tiktok, Inc.*, 637 F. Supp. 3d 276, 278–79, 281–82 (E.D. Pa. 2022) (holding CDA § 230 barred wrongful death, defect, and failure to warn claims based on a minor's death caused by the "Blackout Challenge" since they were linked to the publication and distribution of third-party content, even though this challenge involved strangulation and TikTok knew it was being directed to children); *Gonzalez v. Google LLC*, 2 F.4th 871 (9th Cir. 2021), *vacated and remanded*, 598 U.S. 617 (2023), *rev'd sub nom.* *Twitter, Inc. v. Taamneh*, 598 U.S. 471 (2023) (affirming the district court's ruling upon litigation at the Ninth Circuit that CDA § 230 barred claims under the Anti-Terrorism Act for damages against Google, Twitter, and Facebook following death or injury to plaintiffs' relatives in terrorist attacks for their alleged allowance of posts from ISIS that communicated the group's message, radicalized recruits, and furthered its mission).

117. Craig C. Carpenter & Mark Bonin II, *To Win Friends and Influence People: Regulation and Enforcement of Influencer Marketing After Ten Years of the Endorsement Guides*, 23 VAND. J. ENT. & TECH. L. 253, 255–56 (2021) (drawing attention to recent FTC requests for public comments on a proposal that bolsters its authority over influencer marketing and raises the possibility of civil penalties); Timothy Barry, *#NotFinancialAdvice: Empowering the Federal Trade Commission to Regulate Cryptocurrency Social Media Influencers*, 16 OHIO ST. BUS. L.J. 279, 313 (2022).

118. 16 C.F.R. § 255.5 (2009); *Disclosure 101 for Social Media Influencers: Influencer Guide*, FED. TRADE COMM'N (Nov. 2019), <https://www.ftc.gov/system/files/documents/plain->

response to teen vaping, additionally, the FTC has found that several posts lacking nicotine warning label disclosures were deceptive practices and ordered six e-cigarette companies to supply their advertising schemes, but the agency has only sued two individual influencers for regulatory violations as of 2021, with the agency stating that companies are responsible for monitoring their promoters.¹¹⁹

In each of these contexts, the FTC has responded to certain user content on these sites, but due to CDA Section 230, it has yet to create a policy that channels how social media and streaming firms *self-regulate* their platforms.¹²⁰ Notwithstanding current protection afforded by CDA Section 230 and these services' avoidance of direct FTC regulation thus far, recent investigatory moves might signal a willingness to extend the agency's reach in the future.¹²¹

While the FTC could not directly require these services to disclose information about the environmental harms from protracted use of their platforms through a true warning label until it first determined that they utilize deceptive and unfair trade practices, the EPA or the FCC could still develop a regulation mandating these services to publish a uniform information label about those harms.¹²²

language/1001a-influencer-guide-508_1.pdf [perma.cc/WT5R-PVST]; Barry, *supra* note 117, at 309 (stating the FTC's elements for disclosure of a paid advertisement require an endorser to (1) clearly, and (2) conspicuously (3) publicly disclose any material connection with the seller if (4) a consumer would not expect such a connection and it would affect the evaluation of the endorsement).

119. See Krystina Dorta, *Be Held Accountable*, 29 CATH. U. J.L. & TECH. 131, 152–53 (2021).

120. Although the FTC has not created a policy regarding self-regulation of these platforms, it did issue investigatory orders in this regard in 2020. *Id.* at 156–57; *FTC Issues Orders to Nine Social Media and Video Streaming Services Seeking Data About How They Collect, Use, and Present Information*, FED. TRADE COMM'N (Dec. 14, 2020), <https://www.ftc.gov/news-events/news/press-releases/2020/12/ftc-issues-orders-nine-social-media-video-streaming-services-seeking-data-about-how-they-collect-use> [perma.cc/4N9M-N7FJ]; *6(b) Orders to File Special Reports to Social Media and Video Streaming Service Providers*, FED. TRADE COMM'N: DIV. PRIV. & IDENTITY PROT. (Dec. 2020), <https://www.ftc.gov/reports/6b-orders-file-special-reports-social-media-video-streaming-service-providers> [perma.cc/W6YZ-QWL6].

121. CDA Section 230 provides digital platforms immunity for publishing content from other parties, like users, and any harm deriving from it. 47 U.S.C. § 230(c)(1) (“No provider or user of an interactive computer service shall be treated as the publisher or speaker of any information provided by another information content provider.”).

122. Several sources have argued social media platforms were intentionally crafted to capture user attention for as long as possible, yet it is still a stretch to classify that aim as an unfair or deceptive trade practice. See generally Henry Fersko, *Is Social Media Bad for Teens' Mental Health?*, UNICEF (Oct. 9, 2018), <https://www.unicef.org/stories/social-media-bad-teens-mental-health> [perma.cc/X4UG-WDLE]; Montag et al., *supra* note 67, at 5. The FTC's enabling act permits the agency to issue industry regulations to address common unfair or deceptive practices and unfair methods of competition, so users of social media and streaming services must experience those specific harms before the agency could regulate in this sphere. See 15 U.S.C. § 45.

The FCC’s regulatory powers relate to digital communications and not explicitly to environmental concerns, and the EPA’s regulatory powers relate to the environmental matters but not digital communications.¹²³

Since Congress has expressly delegated regulatory power to the EPA to regulate emissions of hazardous air pollutants through the Clean Air Act, that agency has the most explicit congressional authority to require these services to disclose their carbon emissions to users.¹²⁴ While the FCC could potentially root such a regulation in the Communications Act of 1934, its authorizing statute, the EPA undeniably has the most explicit regulatory authority in the context of emissions reductions.¹²⁵ Nonetheless, the FCC’s recent final rule requiring that broadband internet service providers display a consumer label with information about the provider’s services offerings could serve as a model for the EPA to design and promulgate a similar user information label for emissions from social media and streaming.¹²⁶

The FCC’s broadband consumer label uses the familiar look of nutrition labels from the Food and Drug Administration to convey information about the monthly price, additional charges, discounts and bundles, and the speeds provided with the plan.¹²⁷ The EPA could use this format to require social media and streaming services to provide user-level information on carbon emissions based on the energy infrastructure of various locations for specified durations of consumption of the platform, along with the emissions associated with

Such a finding would likely require the FTC to determine that these services increase their profits by keeping users on the sites for longer and thereby maintaining higher audiences for advertising and data extracting to improve future advertisements without making that dynamic or prolonged usage known to the users. *See* 15 U.S.C. § 45(n) (defining an unfair act or practice as one that “causes or is likely to cause substantial injury to consumers which is not reasonably avoidable by consumers themselves and not outweighed by countervailing benefits to consumers or to competition.”); FTC POLICY STATEMENT ON DECEPTION, FED. TRADE COMM’N (Oct. 14, 1983), https://www.ftc.gov/system/files/documents/public_statements/410531/831014deceptionstmt.pdf [perma.cc/TZ5T-QHGR] (describing deceptive practices as those involving a material representation, omission, or practice that is likely to mislead a consumer who is acting reasonably under the circumstances).

123. *See* FED. COMM’N COMM’N, *supra* note 113; ENV’T PROT. AGENCY, *Our Mission and What We Do*, *supra* note 113.

124. 42 U.S.C. § 7401.

125. 47 U.S.C. § 151 (The FTC was created, along with many other purposes, for that “of promoting safety of life and property through the use of wire and radio communication, and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting authority with respect to interstate and foreign commerce in wire and radio communication . . .”).

126. Empowering Broadband Consumers Through Transparency, 47 C.F.R. pt. 8 (2023).

127. *Id.*

the type of activity the user engages in.¹²⁸ While this may not reflect the precise emissions of a given usage time or activity due to the complications with measuring it, the FCC's broadband consumer label shares a similar imprecision, and yet the agency still found benefits in increased user knowledge, even if only stated in general terms.¹²⁹ Notably, the FCC also required the regulated industry to supply this information and accordingly did not incur a substantial organizational cost in measuring and collecting it at the agency's expense.¹³⁰

The EPA could similarly require social media and streaming services to estimate and provide user-level carbon emissions data, but these services are likely to contest such a regulation, which would first need to proceed through the lengthy rulemaking process.¹³¹ Ultimately, the prolonged duration needed for the EPA promulgate a final regulation presents a significant limitation to this approach; this is particularly relevant because these services already have alternative forms of user-level data and because at least one service provides reports on its carbon emissions to a degree.¹³²

128. *Id.* The carbon emissions resulting from the use of the social media or streaming service will vary with the energy supply in the user's location, as reflected in the varying figures for different countries in this regard. Tiseo, *supra* note 51.

129. 47 C.F.R. pt. 8(a) (stating the broadband consumer label will "enable consumers to make informed choices regarding the purchase and use of such services and entrepreneurs and other small business to develop, market, and maintain internet offerings").

130. *Id.* ("Any person providing broadband internet access service shall publicly disclose accurate information regarding the network management practices, performance characteristics, and commercial terms of its broadband internet access services . . .").

131. For an example of their hefty lobbying powers, in the second quarter of 2022 alone, Amazon spent a record high of \$4.98 million on lobbying as Congress gained momentum to pass legislation to impose stricter antitrust restrictions on big tech. Alicia Diaz & Emily Birnbaum, *Amazon Breaks Lobbying Record Amid Antitrust Fight*, BLOOMBERG (July 20, 2022, 11:06 PM), <https://www.bloomberg.com/news/articles/2022-07-21/amazon-breaks-lobbying-record-amid-antitrust-fight> [perma.cc/32KK-HL5A]. Further, in 2019, Netflix joined the Motion Picture Association of America, which paid \$2.7 million for lobbying in 2018. *See* Steven Overly, *Netflix Joins Major Hollywood Lobbying Group*, POLITICO (Jan. 22, 2019, 11:09 AM), <https://www.politico.com/story/2019/01/22/netflix-in-advanced-talks-to-join-major-hollywood-lobbying-group-1101703> [perma.cc/8DLQ-L8CW]; Amy Watson, *Motion Picture Association of America: Lobbying Expense 1998–2018*, STATISTA (Apr. 17, 2020), <https://www.statista.com/statistics/992586/motion-picture-association-of-america-lobbying-expense/> [perma.cc/R89X-3EYG]. In 2021, Meta spent over \$20 million on lobbying efforts. On the same, Amazon spent about \$19 million, and Google spent about \$9.7 million. Cat Zakrewski, *Tech Companies Spent Almost \$70 Million Lobbying Washington in 2021 as Congress Sought to Rein in Their Power*, WASH. POST (Jan. 21, 2022, 2:51 PM), <https://www.washingtonpost.com/technology/2022/01/21/tech-lobbying-in-washington/> [perma.cc/5CM8-64QQ].

132. *Net Zero*, *supra* note 22; Our Progress on Sustainability: One Year In, *supra* note 23; NETFLIX, ENVIRONMENTAL SOCIAL GOVERNANCE REPORT 2021, *supra* note 96.

B. Impose a Carbon Tax on Companies That Engage in Large-Scale Data Processing

Given that social media and streaming services maintain millions of active users, these services engage in large-scale data processing for the content broadly available on the site and user-individual data such as likes, comments, or saved posts. Both forms of large-scale data processing require energy to operate and to analyze them for future improvements to the service.¹³³ One option for a public response to the environmental harms associated with this level of data is to impose a carbon tax on companies in this space to internalize said harms.¹³⁴ Given that there has been no major federal environmental legislation since the statutes that were enacted from 1970 until 1990, the political feasibility of such a tax is a current cause for concern.¹³⁵ Imposing a carbon tax on users' activities through public regulatory action may effectively reduce their resulting carbon emissions by making these services offset this externalized cost onto consumers.¹³⁶ That being so, social media and streaming services tend to have hefty

133. See *supra* Section III.

134. See Reuven Avi-Yonah & David M. Uhlmann, *Combating Global Climate Change: Why a Carbon Tax is a Better Response to Global Warming than Cap-and-Trade*, 28 STAN. ENV'T L.J. 3, 30, 32 (2009).

135. See Michael P. Vandenbergh & Jonathan A. Gilligan, *Beyond Gridlock*, 40 COLUM. J. ENV'T L. 217, 235 (2015); Alive Kaswan, *Climate Change, the Clean Air Act, and Industrial Pollution*, 30 UCLA J. ENV'T L. & POL'Y 51, 93 (2012) (implicating the greater political feasibility of cap-and-trade over a carbon tax to use the former as the model for a market-based method for applying co-pollutant consequences in developing climate policies); Jason Robert Hull, *Hey Now, Let's Be Social: The Social Cost of Carbon and the Case for Its Inclusion in the Government's Procurement of Electricity*, 7 GEO. WASH. J. ENERGY & ENV'T L. 18, 18–19, 36 (2016) (specifically referencing the limited feasibility of a proposed carbon tax as a reason for considering additional regulatory approaches in which the federal government targets a specific area with GHG implications to implement the figures based on the Social Cost of Carbon without applying that to the entire regulatory system to those figures). Some provisions of federal legislation have nonetheless at least touched on environmental issues since 1990, such as some portions of the Inflation Reduction Act of 2022. See Inflation Reduction Act of 2022, Pub. L. No. 117-169, 136 Stat. 1818 (2022). Instead of a pure cap-and-trade or carbon tax system, this legislation included substantial funds to begin the procurement of lower-carbon construction materials and other programs and tax incentives to reduce emissions in industrial sectors. See Press Release, White House, *What They Are Saying: Biden-Harris Administration's Federal Buy Clean Initiative Receives Praise from Labor Leaders, Industry, and Environmental Organizations* (Sept. 19, 2022), <https://www.whitehouse.gov/ceq/news-updates/2022/09/19/what-they-are-saying-biden-harris-administrations-federal-buy-clean-initiative-receives-praise-from-labor-leaders-industry-and-environmental-organizations/> [perma.cc/4N8M-RS2G].

136. See Avi-Yonah & Uhlmann, *supra* note 134 (observing that carbon emissions are a classic economic externality because the emitting facility incurs no cost for them, but they impose a hefty cost to society, and contending that a carbon tax would produce a predictable yet adjustable price signal that captures the true cost of the externality).

lobbying power and legislators generally disfavor risking political leverage, making this solution unlikely amidst the contemporary United States' political climate.¹³⁷ Additionally, while carbon taxes could become a potential avenue to reduce carbon emissions from social media and streaming companies in the future, public support for such a response would first need to arise, and an effective tax would require more detailed and accurate data on these emissions than are currently available.¹³⁸

137. Diaz & Birnbaum, *supra* note 131; Overly, *supra* note 131; Watson, *supra* note 131; Zakrewski, *supra* note 131. While two-thirds of registered voters support making fossil fuel companies pay a carbon tax, according to polling from 2020, voters in Washington, one of the largest Democratic strongholds in the nation, twice rejected proposals for these taxes in recent years. See Anthony Leiserowitz, *Politics & Global Warming, April 2020*, YALE PROGRAM ON CLIMATE CHANGE COMM'N (Apr. 2020), <https://climatecommunication.yale.edu/wp-content/uploads/2020/06/politics-global-warming-april-2020c.pdf> [perma.cc/8BEJ-7EQX]; Soren Anderson, Ioana Marinescu & Boris Shor, *Can Pigou at the Polls Stop Us Melting the Poles?*, NAT'L BUREAU ECON. RSCH. 1, 5–11, 35–36 (2022) (finding that political ideology is the biggest determiner of voter attitudes towards a carbon tax, voters give little weight to the benefits of such a tax, and well-organized opposition to it can erode existing support). On the federal level, even if there is public support for carbon taxes, that support must also align with those sentiments being embodied in the federal legislature for the enactment of such a measure. See Vandenberg & Gilligan, *supra* note 135, at 236 (stating that any legislation on a national carbon tax must gain the support of the President, both bodies of Congress, and sixty votes in the Senate to avoid a filibuster). Carbon taxes do not appear politically feasible in the United States, at least at this moment, but more than forty governments across the globe have adopted some form of carbon pricing, either through direct taxes on fossil fuels or through cap-and-trade programs, with Canada and Britain using a program more akin to a carbon tax. See Brad Plumer & Nadja Popovich, *These Countries Have Pricing on Carbon. Are They Working?*, N.Y. TIMES (Apr. 2, 2019), <https://www.nytimes.com/interactive/2019/04/02/climate/pricing-carbon-emissions.html> [perma.cc/BWFF-RFJ6]. Sweden and Finland have also successfully implemented a carbon tax, with both being one of the first in the world. Elke Asen, *Looking Back on 30 Years of Carbon Taxes in Sweden*, TAX FOUND. (Sept. 23, 2020), <https://taxfoundation.org/sweden-carbon-tax-revenue-greenhouse-gas-emissions/> [https://perma.cc/9LUR-YW3W].

138. Public support for a public regulatory measure, especially one such as a carbon tax with vast economic impacts is often a factor in an agency's analysis of adopting that measure, given that public support may signal fewer challenges to it in the future. Thus far, discussions of carbon taxes and public support for them in the United States have predominantly centered on reducing emissions tied to fossil fuel companies. See Jennifer Marlon, Emily Goddard, Peter Howe, Matto Mildenberger, Martial Jefferson, Eric Fine & Anthony Leiserowitz, *Yale Climate Opinion Maps 2023*, YALE PROGRAM ON CLIMATE CHANGE COMM'N (Dec. 13, 2023), <https://climatecommunication.yale.edu/visualizations-data/ycom-us/> [perma.cc/B9LY-WN89] (reporting that in 2023, 68 percent of US adults supported requiring fossil fuel companies to pay a carbon tax); Matthew J. Kotchen, Zachary M. Turk & Anthony A. Leiserowitz, *Public Willingness to Pay for a U.S. Carbon Tax and Preferences for Spending the Revenue*, 12 ENV'T RES. LETTERS 1, 3–4 (2017) (finding respondents would be willing to pay \$177 per year on carbon taxes per household if a tax on fossil fuels was imposed to help reduce global warming).

C. Avoid Addictive Algorithms and Constant Feedback Loops

One effective private solution to carbon emissions related to the widespread consumption of social media and streaming services is for these entities to voluntarily avoid designing addictive algorithms and feedback loops such as endless scrolling and auto-play features. Assuming there is not a massive increase in total users that would offset the reduction, this would decrease the energy required for usage of these platforms by limiting the total time spent on them, thereby reducing carbon emissions from the energy needed for these activities. Such a solution cuts against economic interests, however, as more time spent on the platforms results in more user data that they can then offer to third parties or a wider audience that they can promise to advertisers.¹³⁹

However, recently developed litigation suggests that these companies should at least consider the impact of prolonged usage on minors.¹⁴⁰ In October of 2022, the US District Court for the Northern District of California consolidated more than eighty cases into a multidistrict litigation, with all the cases alleging that TikTok, Instagram, Facebook, YouTube, Snapchat, and other sites are defectively designed because they are structured to maximize screen time, contending this results in addictive effects that harm young users.¹⁴¹

Given the sheer number of cases approved for multidistrict litigation in this action, social media and streaming companies should be motivated to minimize the addictive features of their sites at least to

139. See Adam Garcia, *Socially Private: Striking a Balance Between Social Media and Data Privacy*, 107 IOWA L. REV. 319, 340 (2021) (stating that data sharing agreements allow these platforms and data brokers to share information and develop a profile of a given user, with some of these brokers having complex analytical systems to examine the attributes of the population and sell their analysis to companies for use in marketing).

140. See *In re: Social Media Adolescent Addiction/Personal Injury Products Liability Litigation (MDL No. 3047)*, U.S. DIST. CT. N.D. CAL., <https://www.cand.uscourts.gov/in-re-social-media-adolescent-addiction-personal-injury-products-liability-litigation-mdl-no-3047> [perma.cc/X9TL-Y3AP] (last visited Feb. 23, 2024).

141. See *id.*; Barbara Grzincic, *Instagram, TikTok Teen Addiction Lawsuits Grouped in Northern California*, REUTERS (Oct. 7, 2022, 11:13 AM), <https://www.reuters.com/legal/litigation/instagram-tiktok-teen-addiction-lawsuits-grouped-northern-california-2022-10-07/> [https://perma.cc/6SWV-MLB9]; Cecilia Kang & Mike Isaac, *State Attorneys General Open an Inquiry into Instagram's Impact on Teens*, N.Y. TIMES (Dec. 3, 2021, 4:42 PM), <https://www.ny-times.com/live/2021/11/18/business/news-business-stock-market#meta-instagram-investigation-teens> [https://perma.cc/DT2N-R8ZA] (noting that a bipartisan group of state attorneys general from at least 11 states were involved in the investigation into the site's harmful effects on teens).

avoid potentially weighty settlements and prolonged appeals, even if doing so is antithetical to their economic interests.¹⁴²

D. Reduce Advertisements and Restore User Selection of Content

Social media platforms can make money by gathering user data that third parties then utilize to direct targeted advertisements to users.¹⁴³ Thus, while reducing daily usage time for an individual user would reduce the energy that individual user expends on the service and the resulting carbon emissions, it would also oppose these entities' economic interests by limiting the available data set of interests and other information that could be provided to a potential advertiser for profit.¹⁴⁴ It is unlikely that social media and streaming companies with such incentives will voluntarily and freely reduce the advertisements on their platforms as a way to compensate for the externalized environmental harm that they produce by clogging up feeds and therefore driving up total usage times.¹⁴⁵

As remuneration for lost advertising opportunities from reducing total usage time, which would decrease the required energy and resulting emissions, these services could consider offering a paid

142. Kang & Isaac, *supra* note 141; Chris Green, *Snapchat Settles Illinois Class-Action Lawsuit for \$35M. Here's How to File a Claim*, USA TODAY (Aug. 23, 2022, 3:01 PM), <https://www.usatoday.com/story/tech/2022/08/23/snapchat-illinois-class-action-lawsuit-settlement-35-million/7876602001/> [perma.cc/GD2F-YVK9].

143. Kalev Leetaru, *What Does It Mean for Social Media Platforms to "Sell" Our Data?*, FORBES (Dec. 15, 2018, 3:56 PM), <https://www.forbes.com/sites/kalevleetaru/2018/12/15/what-does-it-mean-for-social-media-platforms-to-sell-our-data/?sh=7a019c232d6c> [perma.cc/RAM6-ZNS3].

144. Ads are shown to Facebook users based on the pages they like, the pages their friends like, information on their Facebook and Instagram profiles, and places they check in using Facebook posts. Amy Gesenhues, *Has Instagram Increased Its Ad Load? Marketers Report as Many as 1 in 4 Posts are Ads*, MARTECH (July 26, 2019, 10:58 AM), <https://martech.org/has-instagram-increased-its-ad-load-marketers-report-as-many-as-1-in-4-posts-are-ads/> [perma.cc/KW84-G67D]. To put the magnitude of this interest in perspective, in 2021, social media advertising in the United States reached \$40 billion, and spending on advertising with video streaming reached \$55.34 billion in 2021. See Debra Aho Williamson, *US Social Media Advertising in 2021*, INSIDER INTEL (Nov. 24, 2020), <https://www.insiderintelligence.com/content/us-social-media-advertising-in-2021> [perma.cc/MC4V-WGZ6]; *Digital Video Advertising Spending in the U.S. 2019–2023*, STATISTA (Jan. 6, 2023), <https://www.statista.com/statistics/256272/digital-video-advertising-spending-in-the-us/> [perma.cc/U74H-DE2T].

145. As an example of how prolific advertisements are, some have reported that as many as one in four posts on Instagram are ads, and digital marketing experts estimate most Americans are exposed to around four to ten thousand ads per day. Gesenhues, *supra* note 144; see Jon Simpson, *Finding Brand Success in The Digital World*, FORBES (Aug. 25, 2017, 8:00 AM), <https://www.forbes.com/sites/forbesagencycouncil/2017/08/25/finding-brand-success-in-the-digital-world/?sh=3dddfdb8626e> [perma.cc/RQ5G-P92K].

version of their service that removes most or all advertisements.¹⁴⁶ Initial reactions to this approach might be negative, as users might believe that companies should internalize environmental harms facilitated by their platforms, but allowing users to pay for a system that minimizes these harms could be a viable solution consistent with a property rule or the beneficiary pays principle.¹⁴⁷ This paid option would accordingly streamline users' experiences by only showing them content from the accounts they follow on their feed or corollary landing page.¹⁴⁸ This would help the environmental harms from these sites in mass only if enough users opted for this paid version free of ads, and surveys report inconclusive results on user willingness to do so.¹⁴⁹ There is a slowly growing trend in social media companies experimenting with paid versions of their platforms, but since only a small portion of users

146. Among users, the most popular feature of a paid subscription for these sites is a version with no ads. Jason Cohen, *How Much Would You Pay to Make Social Media Ad-Free?*, PC MAG. (Sept. 3, 2021), <https://www.pcmag.com/news/how-much-would-you-pay-to-make-social-media-ad-free> [perma.cc/RNE9-9NSV].

147. See Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1115–16 (1972) (explaining that a situation where a polluter may continue at will and can only be stopped if another pays him off gives the polluter a property rule, as in this situation the beneficiary can only cease the pollution if he buys off the polluter at his demanded price, which would be the subscription price in the present issue). Under the beneficiary pays model, the actor is responsible for harmful environmental behavior, but the beneficiary to the cessation of the behavior must pay for any costs incurred by that actor as a result. See, e.g., *Spur Indus. v. Del E. Webb Dev.*, 494 P.2d 700 (Ariz. 1972) (affirming an injunction preventing the defendant from operating feedlots, holding they were a public and private nuisance, but requiring the plaintiff to indemnify the defendant for the damages the injunction caused him).

148. *Privacy for a Premium*, TWINGATE (May 19, 2020), <https://www.twingate.com/research/privacy-for-a-premium-exploring-peoples-sentiments-on-paying-for-social-media/> [https://perma.cc/BMY9-DR57] (stating that nearly 60 percent of respondents said they would be somewhat willing to pay for social media if the platforms also did not collect their data to sell to third parties, with those users being willing to spend between \$4.54 and \$5.29 per month for these services).

149. Compare Cohen, *supra* note 146 (reporting that 72.9 percent of survey respondents said they were fine with viewing ads for social media to remain free, and 27.1 percent of respondents said they would be willing to pay to get rid of them), and Greg Sterling, *Most Users Would Reject Opportunity to Pay to Avoid Mobile Ads*, MARTECH (July 10, 2015, 10:53 AM), <https://martech.org/most-users-would-reject-opportunity-to-pay-to-avoid-mobile-ads/> [perma.cc/E3SM-8BGG] (stating that it would cost roughly \$5 per month for social media sites to break even on those who declined to receive ads, but only 19 percent would pay that amount) [hereinafter Sterling, *Most Users Would Reject Opportunity to Pay to Avoid Mobile Ads*], and Greg Sterling, *Survey: Ten Percent Would Pay At Least \$10 Per Year to Remove Ads from Facebook*, MARTECH (Aug. 26, 2012), <https://martech.org/survey-ten-percent-would-pay-at-least-10-per-year-to-remove-ads-from-facebook/> [perma.cc/LMP9-RWKN] (finding that only 10 percent of Facebook users in an informal survey would pay at least \$9.99 annually to get rid of ads, but that 90 percent had no problem continuing with the free version with ads) [hereinafter Sterling, *Survey: Ten Percent Would Pay At Least \$10 Per Year to Remove Ads from Facebook*], with *Privacy for a Premium*, *supra* note 148.

might elect to pay for these versions, this is an insufficient solution to meaningfully reduce carbon emissions from social media and streaming use on its own.¹⁵⁰ Nonetheless, services may consider this as an option to decrease these emissions and increase user satisfaction with their platforms.¹⁵¹

E. Provide Users Estimates of Environmental Impacts Through Private Information Disclosure

The best solution—the one this Note suggests—is for streaming and social media services to implement private information disclosure in one of two forms: (1) either design a feature on their platforms’ main feeds or corollary landing pages that estimates the energy the user has expended on those platforms;¹⁵² or (2) maintain a web page where users can enter their usage time for a given day and get the same results.¹⁵³ Given the economic incentive to increase usage time to maintain high viewership for advertisers, these companies may prefer the latter option, as the former may have a more pronounced and negative effect on total usage times by allowing users to understand the carbon impact of their interaction with these sites on an individualized level that may

150. Ivan Mehta, *Here’s How Every Social Media Company is Adopting Subscriptions*, TECHCRUNCH (Feb. 27, 2023, 10:56 AM), <https://techcrunch.com/2023/02/27/social-media-apps-adopting-subscription-models/> [perma.cc/88RJ-PEY5] (reporting that paid iterations of these platforms include Twitter Blue, Meta Verified, Snapchat+, Reddit premium, and Tumblr ad-free); Cohen, *supra* note 146; Sterling, *Most Users Would Reject Opportunity to Pay to Avoid Mobile Ads*, *supra* note 149; Sterling, *Survey: Ten Percent Would Pay At Least \$10 Per Year to Remove Ads from Facebook*, *supra* note 149.

151. Since nearly 74 percent of users think there are too many ads on social media, with 78 percent of adults over 35 thinking the same, offering a version without them could improve user satisfaction rates. Jon Gitlin, *74% of People Are Tired of Social Media Ads – But They’re Effective*, SURVEY MONKEY, <https://www.surveymonkey.com/curiosity/74-of-people-are-tired-of-social-media-ads-but-theyre-effective/> [perma.cc/JM5N-K3CY] (last visited Feb. 23, 2024).

152. iPhones already have a Screen Time feature that tracks usage on various apps, so these firms would not be starting from scratch in internally implementing a similar feature. See Eric Ravenscraft, *How to Make Your Phone Limit Your Screen Time for You*, N.Y. TIMES (Apr. 1, 2019), <https://www.nytimes.com/2019/04/01/smarter-living/how-to-make-your-phone-limit-your-screen-time-for-you.html> [https://perma.cc/ST23-YZ3U].

153. While the energy used depends on the users’ location and the composition of their electric grid, there are already several online tools that roughly estimate these values these firms could look to as models. See *Greenhouse Gas Equivalencies Calculator*, *supra* note 54; *The Social Media Carbon Footprint Calculator*, WELL, THAT’S INTERESTING TECH!, <https://wellthatsinteresting.tech/social-media-carbon-footprint-calculator/> [perma.cc/5R38-WRLU] (last visited Feb. 23, 2024); *Social Media Footprint Calculator*, COMPARE MKT., <https://www.comparethemarket.com.au/energy/features/social-carbon-footprint-calculator/> [perma.cc/7SMP-54MR] (last visited Feb. 23, 2024).

more powerfully impact their usage trends.¹⁵⁴ Furthermore, while the share of usage time attributable to viewing these advertisements may promote commerce and help the US economy, users would likely be more intentional about the time they spend on these sites and may potentially use it for more activities they view as socially productive if they knew about the resulting carbon impacts.¹⁵⁵

Even seemingly small alterations in consumer behaviors have been shown to have important environmental benefits in the aggregate.¹⁵⁶ Changes in consumer behavior with positive environmental consequences include adaptations to transportation—like carpooling, maintaining tire pressure, and utilizing public transport—and household habits—like using fluorescent lightbulbs, unplugging electronics when not in use, and using dishwashers in place of handwashing.¹⁵⁷ While each of these behaviors accounted for a small percentage of aggregate emissions from individual behavior, changing any one of them could result in reductions of up to forty-one billion pounds of carbon dioxide—more than the emissions from some entire industry sectors.¹⁵⁸ By comparison, emissions from the energy required for social media and streaming usage accounts for approximately 3.7 percent of global greenhouse gas emissions, while the aviation industry accounts for 2.5 percent.¹⁵⁹ The scale of emissions reductions just from

154. Results from Apple’s Screen Time feature suggest that individual reports of usage times may not impact user behavior, but given that Gen Z and Millennials spend the most time per day on these platforms, and they tend to care about the environment more than other age groups, conveying the impact of their individual time on these apps might lead them to reduce their consumption and thereby reduce emissions from the energy required to power it. See Ian Bogost, *I Tried to Limit my Screen Time*, ATLANTIC (Sept. 5, 2019), <https://www.theatlantic.com/technology/archive/2019/09/why-apple-screen-time-mostly-makes-things-worse/597397/> [<https://perma.cc/KC6H-UV2V>]; Abramovich, *supra* note 3; Alec Tyson, Brian Kennedy & Cary Funk, *Gen Z, Millennials Stand Out for Climate Change Activism, Social Media Engagement with Issue*, PEW RSCH. CTR. (May 26, 2021), <https://www.pewresearch.org/science/2021/05/26/gen-z-millennials-stand-out-for-climate-change-activism-social-media-engagement-with-issue/> [perma.cc/26JB-V95Z].

155. See *supra* Section V.E.; *Digital Video Advertising Spending in the U.S. 2019–2023*, *supra* note 144. Studies suggest that environmental disclosure from key enterprise players can have significant environmental benefits. See Xiangyang Yang, Zheng Zhang, Siqu Rao, Bei Liu & Yueyue Li, *How Does Environmental Information Disclosure Affect Pollution Emissions: Firm-Level Evidence from China*, 6 INT’L J. ENV’T RSCH. & PUB. HEALTH 1, 18–20 (2022), <https://doi.org/10.3390/ijerph191912763> [<https://perma.cc/Y879-SPC8>] (comparing regions in China that adopted “environmental announcement” regulations with those that did not and finding the former system significantly suppressed corporate pollution emissions in those areas).

156. Michael P. Vandenberg & Anne C. Steinemann, *The Carbon-Neutral Individual*, 82 N.Y.U. L. REV. 1673, 1700–01 (2007).

157. *Id.*

158. *Id.*

159. See Tam, *supra* note 1.

the individual changes to transportation and household habits reflects that altering individual behaviors can substantially contribute to positive environmental impact when widely accepted.¹⁶⁰

People tend to view climate change as an all-or-nothing endeavor, but providing consumers with an easily accessible tool that allows them to see the individual carbon impact of their consumption would allow an opportunity for conscious, autonomous alteration of behavior that minimizes overall harm.¹⁶¹ Either methodology—a feature displayed on the primary page or separate transparency site—should also be coupled with clear reporting on the carbon impact of the overall consumption of these platforms. Users may act as free riders and fail to alter their behavior if they view their contributions as insignificant due to a lack of knowledge of the magnitude of the aggregate impact that could result if all users reduced their screen time accordingly.¹⁶² By designing tools for users to understand the carbon impact of their time on these platforms, and putting that in perspective by conjoining that with information on the aggregate carbon impact of all user time spent on them, individual users would have the necessary information to alter their digital habits in furtherance of environmental goals.

VI. CONCLUSION

With widespread recognition of environmental problems in the United States, but lack of consensus on desirable responses to them, coupled with the fact that high emissions industries remain economically essential, there is room for heightened focus on areas of energy demand and usage that may be largely insignificant by

160. See *supra* Section III.

161. Vandenberg & Steinemann, *supra* note 156.

162. See Frank B. Cross, *The Role of Lawyers in Positive Theories of Doctrinal Evolution*, 45 EMORY L.J. 523, 529 (1996) (detailing that the free rider problem occurs when one can receive the benefits of the collective good without contributing to its production, like with reductions in users' consumption of social media and streaming services, as any given user could benefit from the correlating reduction in carbon emissions if users on average limit their consumption without changing his behavior); Ryan Leagre, *Community-Based Tax Credits: Tax Credits That Reduce Consumer-Driven Pollution by Encouraging Collective Action*, 47 IND. L. REV. 791, 800 (2014) (describing emissions from consumer demand and consumption as a negative externality since it is a social cost that is not imposed by the producer or the individual consumer but by society as a whole, and encouraging environmental policymakers to pay attention to solutions that would deter environmentally harmful consumer behavior); Vandenberg & Steinemann, *supra* note 156, at 1709 ("Studies suggest that individuals respond to information not just about the harms arising from their specific activities but also about the harms arising from the aggregate activities of all individuals.").

comparison, such as social media and streaming services.¹⁶³ Moreover, as more consumers expect brands to address climate change through corporate action and accountability, service providers would be well served by informing their consumers of ways that their habits contribute to environmental harms, as this would respond to the view that their culpability for these harms is all-encompassing by confronting consumers with their contributions as well.¹⁶⁴ Imparting knowledge of the environmental consequences of their online behavior onto consumers may increase brand loyalty for companies that disclose this information, especially for younger generations.¹⁶⁵

163. Tyson et al., *supra* note 154 (noting that majorities find an array of actors from public to private entities are doing too little to reduce the effects of climate change and support efforts that would address it). Transportation and aviation are both high emissions industries that remain crucial to the economy. *FOTW #1247, July 18, 2022: Transportation Contributed 8% to U.S. Gross Domestic Product in 2020*, U.S. DEP'T ENERGY: OFF. ENERGY EFFICIENCY & RENEWABLE ENERGY (July 18, 2022), <https://www.energy.gov/eere/vehicles/articles/fotw-1247-july-18-2022-transportation-contributed-8-us-gross-domestic> [perma.cc/6FDD-MJH6] ("Transportation is the fourth-largest contributor (behind housing, healthcare, and food) to the national GDP[.]"); FED. AVIATION ADMIN., *THE ECONOMIC IMPACT OF CIVIL AVIATION ON THE U.S. ECONOMY 3* (Nov. 2020), https://www.faa.gov/sites/faa.gov/files/about/plans_reports/2020_nov_economic_impact_report.pdf [perma.cc/JJX5-WSEH] (noting that all aviation activity amounts to more than 5 percent of the national GDP, contributing to \$1.8 trillion in total economic activity and supporting nearly 11 million jobs). The United States is also still highly dependent on oil fossil fuels for energy, with them meeting about 80 percent of the national energy demand in 2020, and the nation ranking as the world's biggest producer of oil and gas in 2018. Drew Desilver, *Renewable Energy is Growing Fast in the U.S., But Fossil Fuels Still Dominate*, PEW RSCH. CTR. (Jan. 15, 2020), <https://www.pewresearch.org/fact-tank/2020/01/15/renewable-energy-is-growing-fast-in-the-u-s-but-fossil-fuels-still-dominate/> [perma.cc/GH89-E7PA]; see *The Economic Benefits of Oil and Gas*, U.S. DEP'T ENERGY (2020), <https://www.energy.gov/articles/economic-impact-oil-and-gas> [perma.cc/DA4M-EW4Z].

164. Tim Stobierski, *15 Eye-Opening Corporate Social Responsibility Statistics*, HARV. BUS. SCH. BLOG (June 15, 2021), <https://online.hbs.edu/blog/post/corporate-social-responsibility-statistics> [perma.cc/RAA4-34SV].

165. Mark Hutcheon, *Consumers Expect Brands to Address Climate Change*, WALL ST. J. (Apr. 20, 2021, 2:00 PM), <https://deloitte.wsj.com/articles/consumers-expect-brands-to-address-climate-change-01618945334> [perma.cc/J9LN-ZACP] (conveying that 23 percent of consumers said they would switch to buying products from an organization that shares their environmental concerns, 42 percent have changed consumption habits because of environmental stances, and 21 percent have encouraged others to switch to using products from environmentally-friendly companies). The pronounced effect for younger generations gives social media and streaming services a heightened imperative to convey this information to their users, as Gen Z and Millennials spend the most time on these platforms. *Id.* (stating that consumers eighteen to twenty-four years old are three times more likely to switch brands based on company values than those sixty-five years old and above); Greg Petro, *Consumers Demand Sustainable Products and Shopping Formats*, FORBES (Mar. 11, 2022, 1:01 PM), <https://www.forbes.com/sites/gregpetro/2022/03/11/consumers-demand-sustainable-products-and-shopping-formats/> [perma.cc/Z5PP-RY4W] (describing a study finding that Gen Z consumers outsized the impact of the Gen X and Boomer generations when it comes to sustainable shopping); Abramovich, *supra* note 3.

As an extension of the consumer-driven push for social and environmental accountability, many social media and streaming services already report emissions within their specific companies. These services also engage in proactive efforts like tagging potentially environmentally harmful searches with further information regarding their negative consequences and turning to more efficient data centers to power their facilities.¹⁶⁶ While these efforts are commendable steps forward, attention should be paid to this area of environmental impact that has gone largely undetected by consumer attention and corporate responsibility.¹⁶⁷ A variety of private actions may meaningfully respond to this impact of social media and streaming services.¹⁶⁸ Providing an internal or external tool for users to calculate the carbon impact from their daily usage of these platforms is consistent with this commitment.¹⁶⁹ As a global problem, carbon emissions require attention to contributions from global industries and individual responses from those engaged with them, especially where individual actions may seem insignificant but result in substantial environmental costs due to the scale of these industries.¹⁷⁰ Social media and streaming services are paradigmatic examples of such entities, and consequently, energy consumption from their users must be included in the broader discussion of carbon emissions.

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166. META, 2021 SUSTAINABILITY REPORT, *supra* note 99, at 11, 63 (stating that the data centers used for Meta's 80+ offices are run by eighteen data centers that used 100 percent renewable energy and describing a project that permanently blocked twenty-five hashtags related to endangered species and provided further information on the negative consequences of related searches); THE WALT DISNEY CO., 2021 CORPORATE SOCIAL RESPONSIBILITY, *supra* note 27, at 25; AMAZON, DELIVERING PROGRESS EVERYDAY, AMAZON'S 2021 SUSTAINABILITY REPORT, *supra* note 27, at 10.

167. *See supra* Section IV.C.

168. *See supra* Section V.C.–E.

169. *See supra* Section V.E.

170. Graham Mott, Carlos Razo & Robert Hamwey, *Carbon Emissions Anywhere Threaten Development Everywhere*, U.N. CONF. ON TRADE & DEV. (June 2, 2021), <https://unctad.org/news/carbon-emissions-anywhere-threaten-development-everywhere> [perma.cc/8J9D-3T6A]. Industries of this scope are of heightened focus because they are particularly susceptible to free rider problems. Cross, *supra* note 162, at 529; Leagre, *supra* note 162, at 804.

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