From Net-Zero to Data Colonialism: Meta's Environmental Footprint and Community Consequences

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***Abstract*—This paper examines the efficacy of Meta's sustainability goals in decreasing their environmental and social impacts, with a particular emphasis on data centers (DCs) and resource extraction. It draws from the Artificial Intelligence Working Group's idea that most modern technologies don't have sustainable epistemologies implemented to illustrate how data colonialism is linked to Meta's environmental issues. The report begins with a discussion of Meta's Path-to-Net-Zero and then moves to investigate Meta's failure to keep its promise and the subsequent environmental and social consequences resulting from it.**

***Index Terms*—cloud computing, data centers, data colonialism, fibre-optic networks, scope 1 2 3 emissions, Life Cycle Assessments, low-latency, Paris Agreement, decarbonization, green information technology**

I. What's the Problem? The Environment.

Meta, which hosts numerous social platforms and services, has a history of data security scandals (such as the Cambridge Analytica scandal where Facebook nonconsensually harvested personal data from its users for targeted advertisements to influence the 2016 presidential election [1]), disregarding the privacy of users and ethics. However, that doesn't conclude Meta's involvement in data colonialism as most fail to acknowledge the sustainability issues that Meta creates. Those issues stem from cloud computing which is hosted in DCs. Cloud computing has heavy environmental impacts due to water usage and energy consumption [2]. DCs use up more than a country's worth of energy each year [2] and account for 3% of global electricity consumption and 2% of total greenhouse gas (GHG) emissions [3].

However, this view is challenged by Meta's recently published solution – the Path-to-Net-Zero – to reduce carbon emissions [4]. Despite the importance, few researchers have studied the correlation between Meta's Path-to-Net-Zero and the impact on surrounding communities. Since it is unclear whether Meta has achieved the goals it promised to reach [5], additional studies of Meta's environmental and social impacts are needed.

This paper aims to assess the efficiency of Meta's sustainability goals in reducing their environmental and social impact, with a focus on DCs, cloud computing, and resource extraction. This paper will argue that Meta has failed to meet its sustainability goals, and how it associates with environmental data colonialism.

II. How Is This Data Colonialism?

The correlation between being environmentally unsustainable and data colonialism lies in the lack of transparency and accountability of technology and data practices.

There is little to no transparency in the act of expanding digital infrastructure, including the construction of DCs, fiber-optic networks, and communication towers, which can lead to land-use changes and deforestation. This can disrupt ecosystems, fragment habitats, and lead to loss of biodiversity. In which, the consequences are endured by surrounding populations while the industry takes no accountability or responsibility for their actions and decisions.

Historically, the lack of transparency and accountability in colonial governance contributed to the exploitation, oppression, and marginalization of Indigenous communities. In modern discourse, it is crucial to address transparency and accountability in the environmental context of Meta, to acknowledge and stop its contribution to data colonialism. [6]

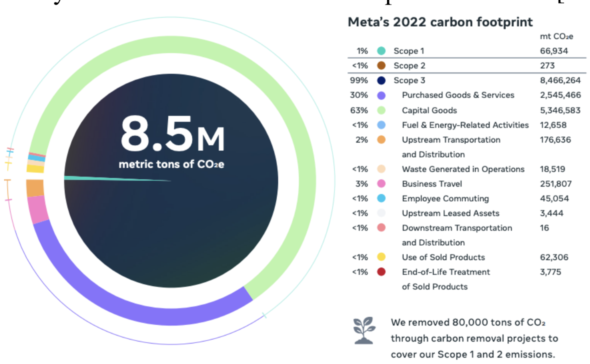
III. Why Do We Care?

It is vital to educate the masses on how environmental impacts are a part of Meta's (or just the tech industry in general) actions. Most only know of and therefore are against the ethical and social scandals and injustices of Meta, but fail to understand that the environment is also being heavily impacted. It is common knowledge that climate change is dangerous and irreversible, and only with an awareness of the factors behind climate change can viable solutions be proposed and actions taken to address the rudimentary issue.

Moreover, engineers must abide by sustainable development - Meeting the needs of the present without compromising the ability of future generations to meet their own needs - as engineering holds the safeguarding of the environment to paramount importance [7]. To adhere to these principles, one needs to understand the roots of the problem first, and then attempt resolution.

IV. Meta's Path to Net Zero

Since 2020, Meta has been able to maintain net zero emissions in their global operations (only because they buy renewable energy so it's technically net zero, but renewable energy isn't without environmental impact. For example, the manufacturing and installation of it, intermittency and backup power, end-of-life management, etc. [8]), and has been since announced to achieve net zero value chain emissions by 2030 to align with the Paris Agreement, proclaiming its commitment to sustainability by decarbonizing their footprint from server components, supplies manufacture, and employee commutes. [9] [10] [4]. The company is focusing on three pillars: understanding, reducing, and removing remaining emissions. Despite their claim of a 100% carbon footprint reduction, in their paper they only say that they hope to reduce Scope 1 (direct GHG emissions from sources that are owned or controlled by Meta) and Scope 2 (indirect emissions associated with the generation of purchased electricity, heat, or steam consumed by Meta) emissions by 42% by 2031 and not exceed their Scope 3 emissions (indirect emissions that result from Meta's actions but are not controlled by Meta themselves) in 2031 by a baseline of their 2021 Scope 3 emissions [11].



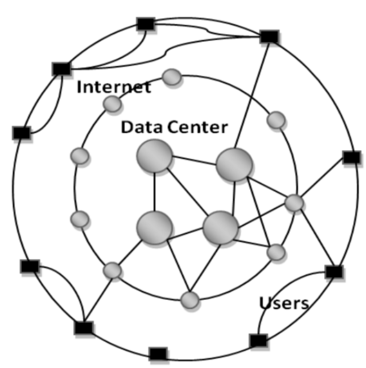
Thus, they know the challenges of a net zero plan but are still choosing to spread misinformation, having a contradictory net zero program to fool and lure in users. Nevertheless, they have plans to reduce emissions through a supplier engagement program where they will work to decarbonize at least two-thirds of their suppliers in their supply chain by 2026 [3]. They also plan to decarbonize their business decisions, including designing with less to reduce waste (such as having good designs to extend the lifespan of their hardware and making it easier to identify and repair hardware. For example, they've started to do Life Cycle assessments (LCAs) of their Reality Lab products (VRs and ARs) in 2021 with sustainability in mind), choosing better principles of circularity, and embracing low-carbon technology. As of 2023, Meta has contracted over 10,000MW of renewable energy across 6 different countries, making them the biggest buyer of renewable energy, but that only sets its Scope 1 and 2 emissions to 0, which amounts to less than 2% of its total emissions. Nevertheless, Meta is also currently on board with multiple carbon removal projects for removing remaining emissions (including value chain emission reduction projects) such as the Blue Creek Forest Project in California since 2021 (the project improves forest management which subsequently increases stored carbon, helping with Meta's GHGs), but naturally, they've been showing minimal effects since effective carbon removal technologies are nascent and not available at a large scale as of today. Thus, Meta has partnered with multiple companies (such as a $925 million commitment to accelerate carbon removal technologies alongside companies like Shopify) with the same goal of sustainability to invest in these technologies to ensure carbon removal will be viable in the future. Additionally, Meta is working on enabling emissions reduction by harnessing the power of their apps and services available to 3.8 billion users by promoting climate advocacy and fighting climate misinformation on their platforms through policy advocacy (for example, restricting and demonetizing accounts that frequently spread misinformation) [4].

V. Challenges in Achieving Net-Zero Emissions

Despite Meta's claim for net zero value chain emissions, in 2022, their emissions increased by 46% total due to Meta employees returning to offices, as Meta's Scope 3 emissions from their value chains massively outweigh the direct emissions from energy used, and a surge in business growth was also a contributing factor in the increased emissions [4] [5]. Although Meta claimed to want to reduce carbon footprint from employee commutes by 100%, this 2022 event was a major setback, and there is no present solution for it as more effective technologies (carbon capture and storage or afforestation and reforestation are not very effective) are too new and unable to be used at a large scale.

VI. Cloud Computing and Data Centers: Energy Consumption and Carbon Emissions

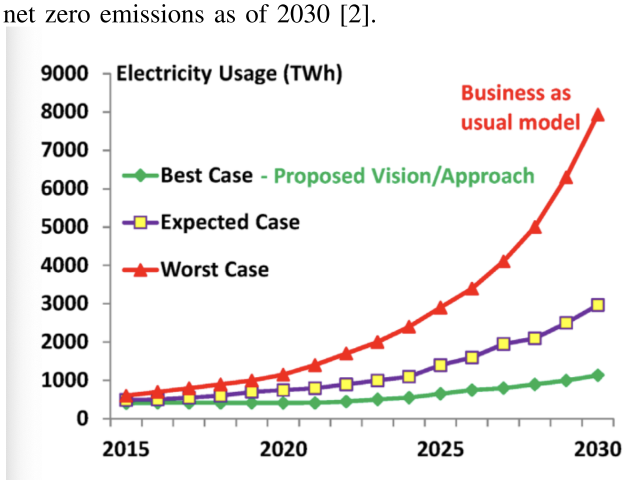
DCs are facilities that process and store bits, mainly composed of servers, cooling systems, and networks. It serves as a physical repository dedicated to storing, managing, and disseminating data and information. It is accountable for all user transactions and interactions.



DC architecture model

With the growing demand for low-latency (near real-time) services, the need for DCs increases since cloud computing relies on DCs as the physical infrastructure that houses the necessary servers and networking equipment.

A typical DC relies on brown energy (fossil fuel based) and consumes as much as 25,000 households of energy, with the 8 million active DCs worldwide consuming more energy than most countries, and they are expected to grow at 12% each year, resulting in extremely high and growing rates of GHG emissions. By 2025, DCs are expected to consume 20% of global electricity, which is one year before Meta's vision to decarbonize at least two-thirds of their suppliers, turning vision into delusion. By 2030, DCs could consume about 8000TWh of energy, which completely goes against Meta's envision for net zero emissions as of 2030 [2].



Electricity used by DCs worldwide

It is extremely hard to manually fine-tune DCs to be energy efficient due to the complex interactions between servers, the internet, and cooling systems across multiple hosted applications. If one were to have 50 pieces of equipment, there would be a total of 5050 possible configurations. [2]

The most carbon footprint comes from Meta's DC in Prineville, Oregon, amounting to 4,500 tonnes of CO2. The DC consuming the most water is also Meta's Clonee plant in Ireland, using 839,000 cubic meters of water [5]. Most of this is due to the 800 million users and 500 million active users that Facebook has, putting heavy pressure on its DCs, consuming network equipment and creating internet traffic. In total, Facebook's DCs use 532 million kilowatt-hours of energy and discharge a substantial 285,000 metric tonnes of CO2 equivalent of GHGs. Every Facebook user contributes an estimated 269 grams of carbon each month. This consequently crowns Meta as the biggest antagonist in current environmental data colonialism.

VII. Meta's Impact on Communities

Resource extraction is a major contributor to Meta's Scope 3 emissions, however, its impact exceeds the environment into areas of social ramifications.

Communities that are most affected by the consequences of resource extraction do not have access to technologies that could properly mitigate or address these issues, nor do they benefit from the economic gain of the extractive activities [12].

Vulnerable communities, especially in lower-income countries, frequently face the environmental consequences associated with environmental data colonialism, for example, the negative consequences of resource extraction, e-waste disposal, and energy consumption. For instance, Nigeria's abundance of oil did not bring them wealth nor stability, but poverty due to the "resource curse" [13].

A. Consequential Effects of Mining in Extraction Activities

The rising need for industrial value chains has accelerated the extraction of mineral resources in developing countries, intensifying the associated environmental and social issues. One of the main resource extraction methods is mining.

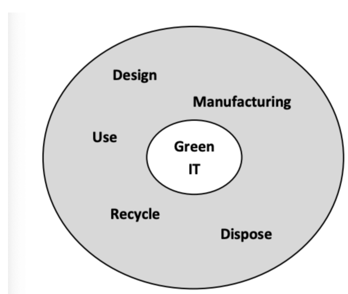
Mining leads to pollution of the soils and waters, damaging agriculture and thus impacting the health of local communities who are unable to migrate due to their economic status. In a Chinese village, Shiquan's data shows that mining causes 13.6% health loss, 18.5% income loss and a 33.9% increase in poverty incidence of residents 3-20 kilometers away from the mining activities [12].

In these resource-cursed communities, mining not only brings about pollution but also triggers issues such as speculation, competition for limited social services, land grabbing, food insecurity, and ethnic polarization, adversely affecting the health, well-being, and livelihoods of the surrounding community, with developing countries experiencing heightened challenges due to the absence of stable institutions, effective monitoring, and equitable distribution mechanisms [12].

Therefore, even with extensive challenges, just bringing about net zero emissions is not enough. Meta's value chains have rooted negative impacts way beyond just carbon emissions, heavily impacting the communities that surround its extraction activities, amplifying the mark of data colonialism.

VIII. How Meta Can Improve

The only recognizable change Meta has implemented is switching to renewable energy. However, Pandikumar states that renewable energy is not a good solution to CO2, nor does it compensate for technology or user growth. He suggests that Green Information Technology (Green IT) is the only solution to reduce carbon emissions, which advocates for adopting new or improving current technologies and materials while balancing the environment with economics [14].



Green IT components

For example, Meta can reduce Scope 3 emissions by employing green DCs. Cloud computing can be used to minimize the need for DCs (since in a cloud computing environment, multiple users and organizations can access computing resources over the internet from a centralized provider). Market research suggests that widespread adoption of cloud computing has the potential to slash global DC energy costs by 38% by 2020 [14].

Moreover, since CPUs, GPUs, and memory are managed by adjusting their clock frequencies and then changing to their according power states, Buyya also proposed to reduce power consumption by dynamic voltage and frequency scaling. He has already developed predictive models that learn the behaviour of different applications on different frequency configurations, therefore optimizing energy-efficient frequencies, and reducing power consumption [2]. This could also be a potential solution that Meta can consider to significantly reduce their Scope 3 carbon emissions.

IX. Conclusion

In conclusion, this paper highlights Meta's failure to meet sustainability goals and suggests potential solutions for it to achieve its proposed goals, focusing on the environmental and social impacts of DCs and resource extraction. The adverse environmental and social impacts of Meta underscore the concept of data colonialism through a lack of transparency and accountability.

Meta's environmental impact reveals significant carbon footprints in its value chains involving DCs and mining activities. Potential improvements include adopting Green IT, utilizing green DCs, and implementing dynamic voltage and frequency scaling to minimize energy usage.

In essence, the paper wishes to educate the public about Meta's environmental impacts in the context of data colonialism and urges Meta to adopt a more transparent and sustainable approach to technology development to mitigate environmental and social repercussions.

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