COST OF CO_2NVENIENCE

REVEALING THE HIDDEN CLIMATE AND HEALTH IMPACTS OF THE GLOBAL ECOMMERCE-DRIVEN PARCEL DELIVERY INDUSTRY THROUGH 2030

CLEAN Mobility Collective

STAND.earth RESEARCH GROUP

A joint investigation by
Clean Mobility Collective (CMC) and
Stand.earth Research Group
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About Clean Mobility Collective
Clean Mobility Collective (CMC) is a network working to address the growing emissions and public health crisis from the global transport sector. We are a worldwide movement of organisations united around a common vision to achieve fossil-free, healthy and safe cities for all.

About Stand.earth Research Group
Stand Research Group obtains crucial information to help build campaigns on critical issues. We specialise in chain of custody research, identifying and tracking raw materials as they move through complex supply chains. We trace environmental destruction and human rights violations to help hold corporate actors accountable and, ultimately, change corporate practices.

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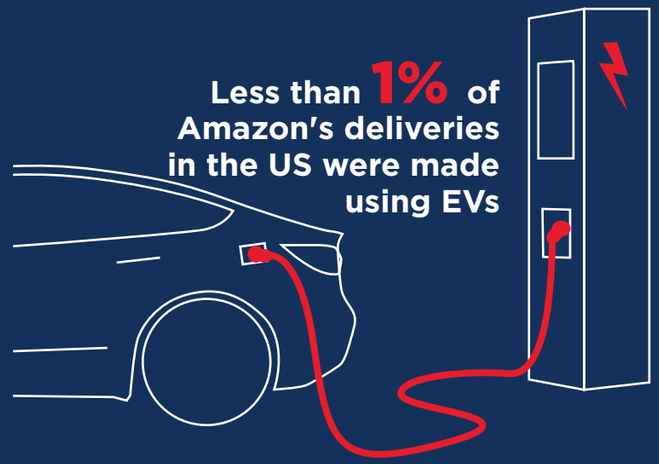
KEY FINDINGS

1 billion
trees to grow 10 years

Approximately one billion trees would need to be planted and allowed to grow for 10 years to sequester the emissions of a single year of current last mile parcel deliveries.

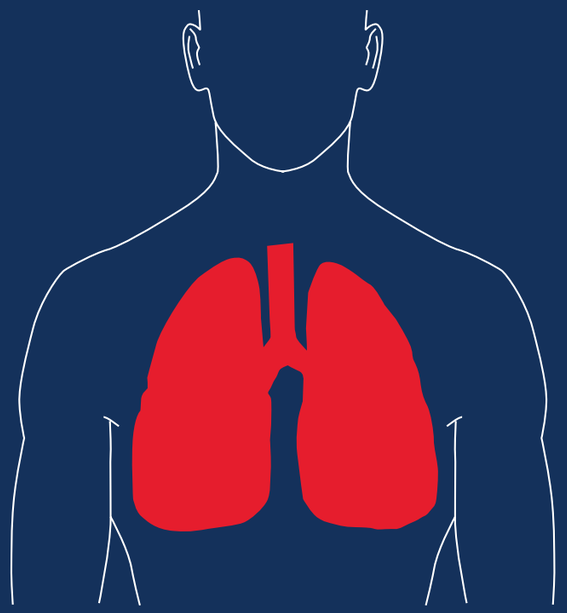


Less than 1% of Amazon's deliveries in the US were made using EVs

Based on data found in Amazon's 2021 Sustainability Report combined with parcel delivery estimates, less than 7% of all deliveries in Europe and less than 1% of deliveries in the US were made using EVs and other micro mobility modes. Furthermore, all of Amazon's existing zero-emission vehicle pledges are not even enough to account for their projected increase in annual deliveries by 2030.

20,000
incidents of respiratory symptoms in 2022

Last mile delivery also emits other pollutants including nitrogen oxides (NOx), particulate matter (PM), and carbon monoxide (CO). Globally, in 2022, these emissions likely contributed to approximately 12,000 incidents of exacerbated asthma and over 20,000 incidents of respiratory symptoms. These health impacts are not shared equally, with many communities of color and lower income communities at greater risk due to increased exposure to transportation pollution.



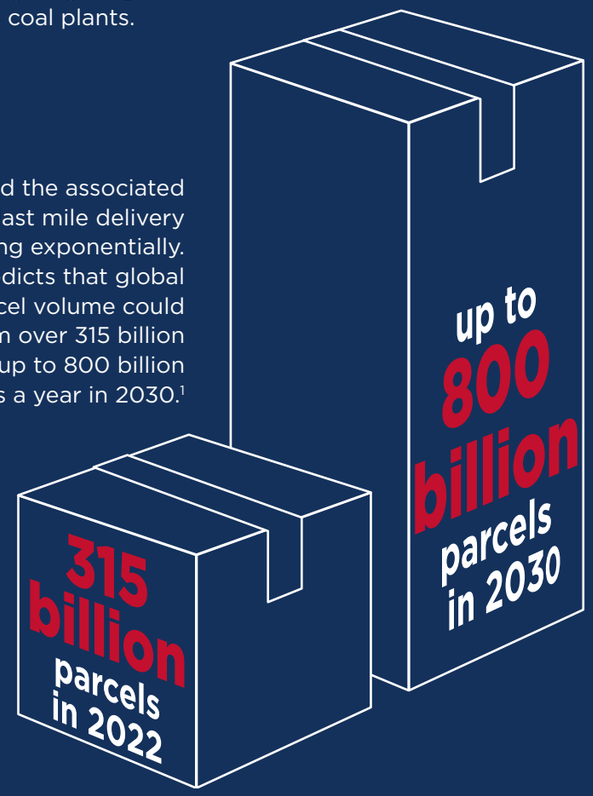
160
megatons of CO_2

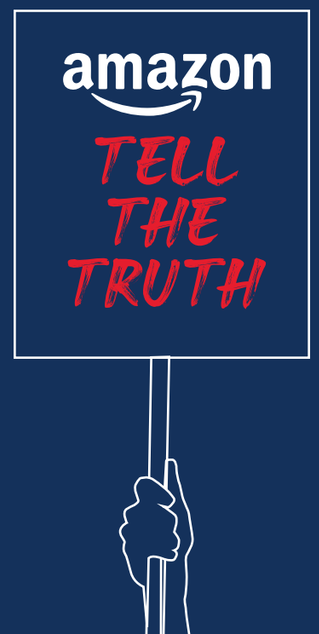
Without any changes in fleet makeup, global e-commerce deliveries could emit up to 160 megatons of CO_2/year by 2030, which is equivalent to yearly CO_2 emissions of up to 44 coal plants.

167,000
cumulative cases of asthma

Cumulatively from 2023 to 2030, without any substantial change in EV adoption, the total of all of the world's delivery companies' last mile emissions could contribute to 167,000 cases of asthma exacerbation up to 285,000 cumulative cases of respiratory symptoms, and up to 9,500 premature deaths globally.

E-commerce and the associated emissions from last mile delivery will continue growing exponentially. This study predicts that global annual parcel volume could increase from over 315 billion parcels in 2022 to up to 800 billion parcels a year in 2030.[1]





Compared to its peers (UPS, FedEx, DHL, and Geopost[2]), Amazon reports the least amount of information on its last mile deliveries. We were unable to find reliable information disclosed by the company about the total number of packages it delivers, its overall fleet size, or the current makeup of its fleet, all of which are critical in assessing progress towards zero emission deliveries.

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Background

Global e-commerce is expected to reach US $6.3 trillion in 2023, and continue growing to over US 8.1 trillion in 2026.[3] Millions of purchases mean millions of parcels. And that means millions of deliveries – millions of vehicles clogging up streets, our lungs and the environment. The damage these fossil fuel-powered fleets are doing to our health and climate is only just beginning to be understood.

The current sustainability commitments of five of the largest delivery companies - Amazon Logistics, DHL eCommerce Solutions, UPS, FedEx, Geopost - are insufficient to reach zero emission deliveries quickly. By comparison, the company Flipkart and its delivery company eKart has committed to a 100% zero emission fleet target by 2030 as part of EV100 - an initiative that works with companies to transition their vehicles – but they need to still map out and implement this commitment.

Commitments with 2040 and 2050 timelines are too late to avoid health and climate impacts. “Net-zero emissions” targets allow companies to offset emissions; however this cannot replace needed emissions reductions and fossil fuel phase-outs. A “zero emissions” target is the most ambitious, meaning companies must eliminate all greenhouse gas emissions.

We have built upon our July 2022 report, “Revealing the Secret Emissions of E-Commerce” with further projections about the negative consequences we can expect by 2030 if Amazon and other companies don’t make commitments to be making 100% zero emission deliveries by 2030.

Projected Growth

As discussed in “Revealing the Secret Emissions of E-Commerce,” parcel deliveries rose considerably throughout the Covid-19 pandemic, and this growth has resulted in more vehicles, increased local pollution, and, as calculated in detail in this current report, more carbon dioxide (CO_2) emissions. This study predicts that global annual parcel volume could increase from over 315 billion parcels in 2022 to up to 800 billion parcels a year in 2030.[4]

India is one of the world's fastest growing e-commerce markets, growing at a rate 2.2-5.5x faster than the global average.[5] Using this growth rate, we estimate the 2022 total of over 4 billion parcels delivered nationally to increase to about 40 billion parcels a year (range 33-46 billion) by 2030. Of this, three major delivery companies in India (Flipkart/eKart, Amazon logistics and DHL eCommerce Solutions) could contribute over 50% of the total, equalling 17-24 billion parcels per year by 2030.

Assuming Europe grows at the same global rate, five major delivery companies (Amazon Logistics, FedEx, UPS, DHL eCommerce Solutions, and Geopost) could deliver around 9-15 billion parcels per year by 2030, a considerable increase from 2022 levels of 6.5 billion parcels.

Assuming that the US market also grows at around the same global rate over the next few years, four major delivery companies (Amazon Logistics, FedEx, UPS, and DHL eCommerce Solutions) could deliver around 24-40 billion parcels annually by 2030, a considerable increase from 15.8 billion parcels in 2022.

2030 Impacts for Climate & Health

CLIMATE

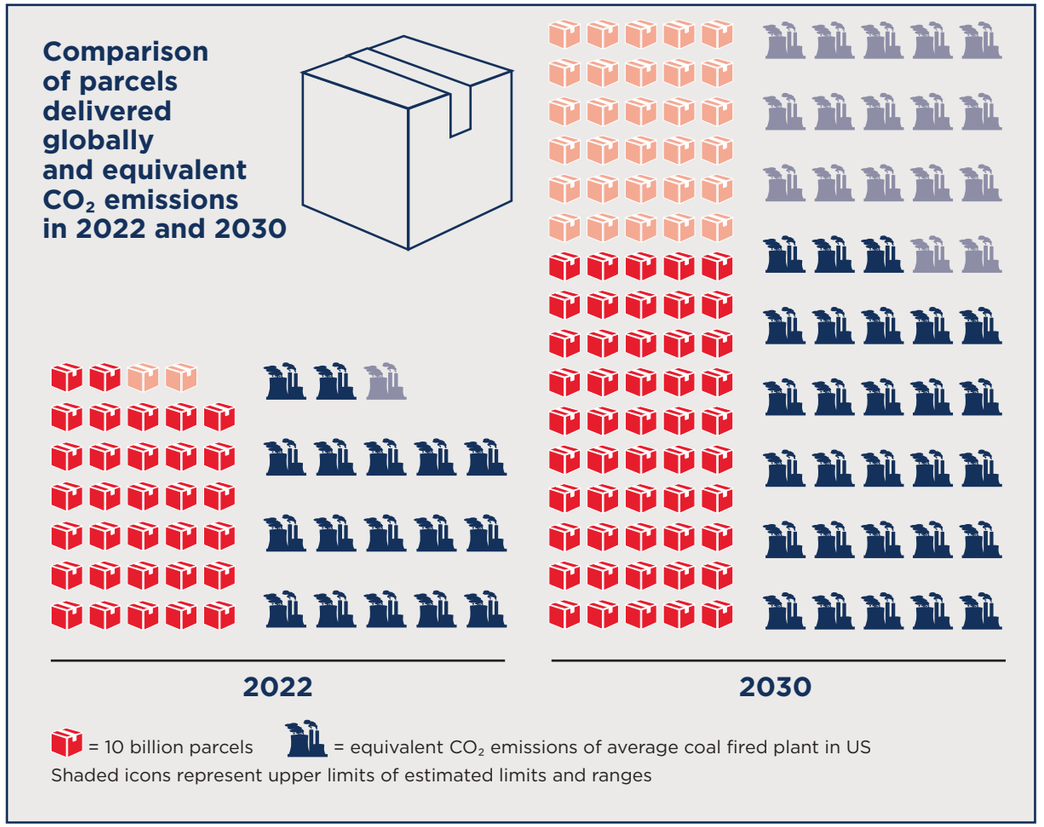
Transport is already the world's largest source of new greenhouse gas emissions that drive climate change, which threatens clean air progress and amplifies a wide range of health risks and disparities[6]. As the e-commerce sector grows, there is a huge opportunity for companies to mitigate anticipated impacts before 2030.

We estimate that the world's delivery companies shipped over 315 billion packages in 2022. The greenhouse gas emissions of the last mile delivery portion of these parcels is equivalent to the annual CO_2 emissions (over 65 mill. tonnes) of over 17 coal fired power plants in the US.[7]

To put it in further perspective, over 1 billion trees would need to be planted and allowed to grow for 10 years to sequester the emissions of a single year of last mile parcel deliveries based on our 2022 estimates.

Alternatively, over 77 million acres of US forests per year would be required to sequester the GHGs emitted from the single year of last mile deliveries - this is equal to forest land required bigger than the whole state of Arizona.[8] That translates to around 11% of carbon sequestered in 2020 by European forests.[9]

Global e-commerce deliveries could reach up to 800 billion packages a year by 2030. In a business-as-usual scenario, this is equivalent to yearly CO_2 emissions (100-160 mill. tonnes) of up to 44 average US coal plants. Over the next eight years from 2023-2030, without any changes in fleet makeup, the total of all delivery companies' last mile deliveries could cumulatively emit nearly a billion metric tons of CO_2.[10]



HEALTH

According to the American Lung Association May 2023 report Delivering Clean Air, "The burdens of unhealthy air include increased asthma attacks, heart attacks and strokes, lung cancer and premature death. These poor health outcomes are not shared equally, with many communities of color, class and lower income communities at greater risk due to increased exposure to transportation pollution."[11]

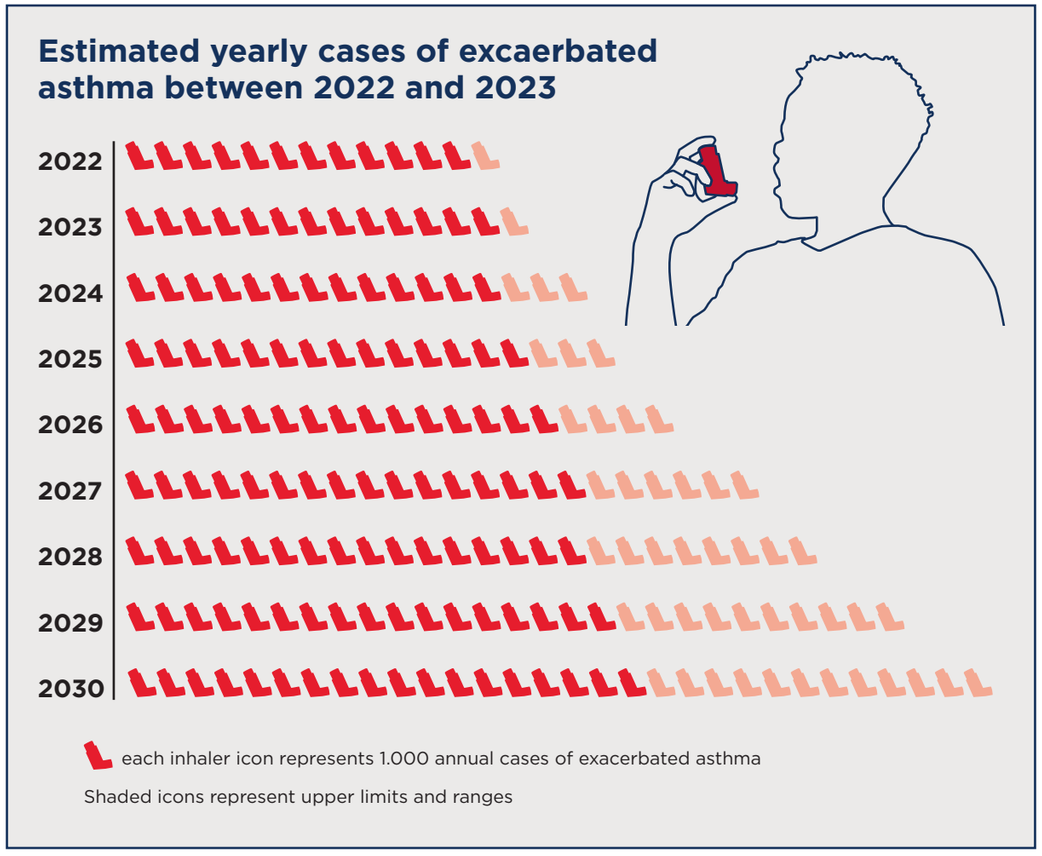
In addition to CO_2, last mile deliveries also emit pollutants including nitrogen oxides (NO_x), particulate matter (PM) and carbon monoxide (CO). Consequently, delivery and parcel vans add to regional air pollution burdens that can affect community health. These vehicles also exacerbate local impacts by creating health damaging diesel particle pollution that can be extremely concentrated in communities nearest warehouses and truck routes.[12]

Globally, in 2022, these emissions likely contributed to approximately 12,000 incidents of exacerbated asthma and over 20,000 incidents of respiratory symptoms.According to the World Health Organization, exposure to pollutants like nitrogen dioxide (NO_2) particulate

matter (PM) and carbon monoxide (CO) is associated with asthma, cardiovascular disease, respiratory conditions, difficulties breathing, exhaustion, dizziness, flu-like symptoms, and additional health impacts.[13]

The impacts of diesel particulate matter on the body cannot be underestimated. Communities already experiencing poor air quality are most at risk - and oftentimes workers are some of the ones most impacted. Diesel particulate matter causes significant respiratory impacts when it enters human airways and embeds in the lungs. Damage to the heart and other organs can occur If those particles make their way into the bloodstream.[14]

Cumulatively over the next eight years from 2023-2030, without any changes in fleet makeup, the total of all delivery companies' last mile emissions could contribute up to 167,000 cases of asthma exacerbation; up to 285,000 cases of respiratory symptoms; and up to 9,500 premature deaths.



Amazon Logistics[15], along with five other major delivery companies (**DHL eCommerce Solutions**[16]**, UPS, FedEx, Geopost**[17], and **Flipkart/eKart**[18]) currently deliver a combined total of over 25 billion parcels per year. We estimate this to grow to up to 64 billion parcels annually by 2030. Cumulatively from 2023-2030, without any changes in fleet makeup, the combined emissions from these six companies alone could account for up to 13,500 cases of exacerbated asthma; and up to 23,000 cases of respiratory symptoms.

In India, Flipkart/eKart, DHL (via its related company Blue Dart[19]) and Amazon Logistics currently deliver over 2 billion parcels per year combined, which could grow to 17-25 billion parcels by 2030. Cumulatively, from 2023-2030, without any changes in fleet makeup, last mile deliveries of these three companies in India could account for an additional 17 million metric tons of CO_2.

In Europe, the last mile deliveries of five major companies (Amazon Logistics, FedEx, UPS, DHL eCommerce, and Geopost), without any changes in fleet makeup, cumulatively from 2023-2030 could emit an additional 18 million metric tons of CO_2, and their other emissions of NO_X, PM and CO could contribute to up to 3,400 cases of exacerbated asthma and up to 5,800 cases of respiratory symptoms.

What is Amazon hiding?

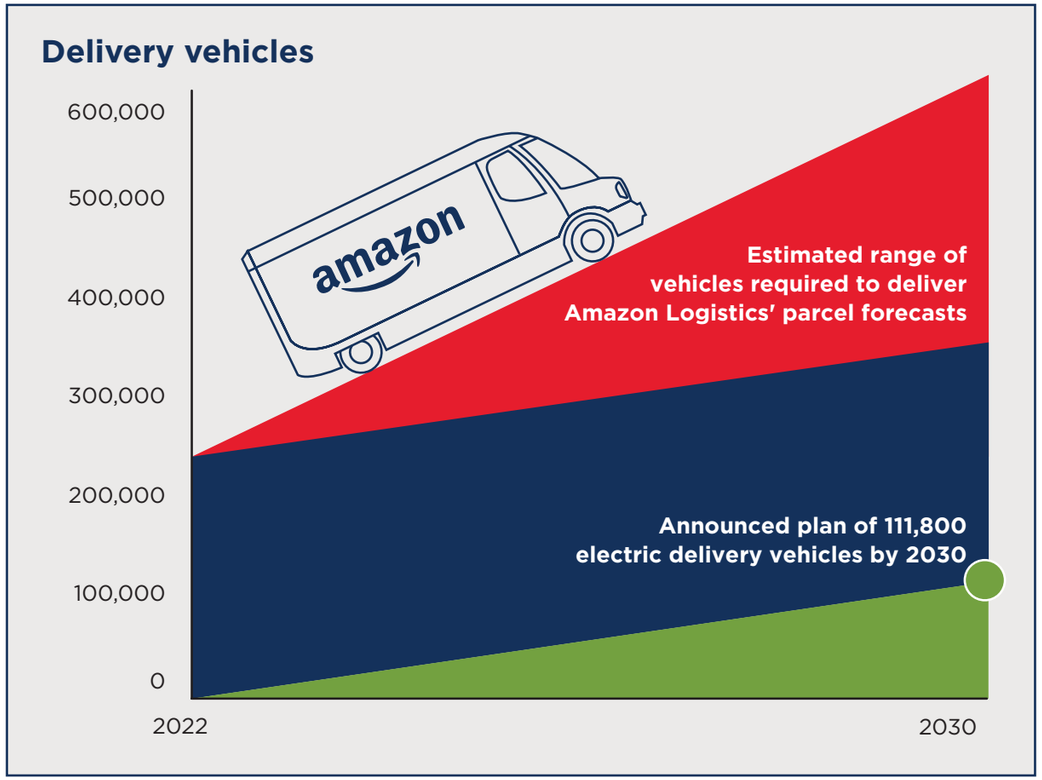
Amazon is not transparent about its overall fleet size, making it hard to directly measure the impact of its current plan to acquire 100,000 electric Rivian vans.

However, using other data found in Amazon's 2021 Sustainability Report, we estimate that deliveries using zero-emission vehicles and micro-mobility technologies made up only 6.8% of all its deliveries in Europe, and in the US this was less than 1%. Together all deliveries globally using ZEVs and micro-mobility made up just under 2% in 2021.

Amazon pledges to reach net zero carbon emission by 2040 as part of its "Climate Pledge by 2040" initiative. It also states that by 2030 they will have 100,000 Rivian electric vans, 1,800 from Mercedes-Benz in Europe, and 10,000 EV's in India on the road by 2030.[20] However, using their existing public EV pledges[21] (some of which have been pushed back to 2030[22]) it only adds up to about half of their current delivery volume.

Amazon fails to take into account that the e-commerce market is growing. Using best available data, their current EV commitments appear to be enough to account for only 20-30% of their projected parcel deliveries in 2030. In fact, these announced electric delivery vehicles don't even appear to be enough to handle the minimum projected increase in Amazon's annual deliveries from 2021 to 2030. This also begs another question: if Amazon is serious about its promises, then why all this secrecy about its last mile delivery fleet and associated emissions?

In particular, the subcontractor and gig work landscape across e-commerce is vast and extremely opaque. In "Revealing the Secret Emissions of E-Commerce," we found that Amazon



uses at least 2,000 companies of a few hundred drivers who are independent contractors, and Amazon leases delivery vans to these contractors. There is still no reliable information to date about Amazon's overall fleet makeup from their own vehicles, and similarly nothing to be found about the vehicles being used by the sub-contracted drivers.

Sub-contracted and gig workers often have limited social protections and pay bare minimum wages. A 2021 report for the US Guardian reported that Amazon drivers across the country were forced to work 14-hour days and urinate in bottles in their vehicles in order to keep up with delivery rates.[23]

Previously, Amazon's Shipment Zero goal committed the company to a near term target of having 50% of its shipments to be "net zero" by 2030, a goal it has recently eliminated, leaving only the company wide goal of "net zero" by 2040 remaining.[24] Given the projected climate and health impacts by 2030, this is far too late to mitigate anticipated emissions and the consequences.

Amazon.com made $514 billion U.S. dollars in 2022 – still seeing record profits since the start of the COVID-19 pandemic. Each year, Amazon's Prime Day sales increase, reaching US$12 billion in sales in 2022[25]. Amazon also saw record-breaking sales for Black Friday and Cyber Monday weekend in 2022, with Amazon announcing that it'd had the "biggest holiday shopping weekend ever."[26] The convenience of online shopping continues to benefit the company's revenue but comes at the price of climate, health and worker impacts. Amazon can afford to protect our climate, and the quality of life for communities and workers experiencing the negative health effects of truck pollution.[27]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Conclusion and Recommendations

Unabated growth of last-mile delivery will have significant climate and health impacts if not addressed at scale by 2030. We urgently need companies and governments to adopt sustainable solutions like fleet electrification, e-cargo bikes and other micro mobility strategies.

Major e-commerce companies like Amazon - should be at the forefront of adopting solutions to drastically reduce emissions. None of the companies researched, neither the big global delivery companies nor the sub-contractor logistics and delivery companies, disclose any data specifically about their last-mile emissions.[28] **Amazon in particular releases no information about the makeup of their delivery vehicles and shrouds the pollution and climate impact of their parcel delivery operations from the public and consumers**.

Greater transparency is required for companies' actions to be evaluated against the scale of the problem. Reporting should include Scope 1 and Scope 3 emissions and adequate time bound transition plans should be produced and announced for addressing them.

The vast presence of sub-contractors, both companies and gig workers, permits the bigger e-commerce companies to avoid audits and other oversight that would generate insight on their business practices. The lack of data, especially given the dependence and scale of subcontracting in the last-mile delivery ecosystem, is concerning because it makes it very difficult to hold companies accountable regarding CO_2 and criteria pollutant emissions, labor rights, and social protections.

RECOMMENDATIONS

1- Companies should publicly make commitments for 100% zero emissions last-mile deliveries by 2030, and to develop 2025-2030 implementation plans that include:

- Phasing out of fossil fuel vehicles and transition to 100% zero emissions last-mile deliveries, including deliveries made by contractors and subcontractors.
- Publicly sharing information on their emissions and fleet sizes, including detailed reporting on the emissions and vehicles of contractors and subcontractors, and progress on zero emission delivery on a country/regional basis.
- Ensuring the cost of transitioning from fossil fuel vehicles to electric vehicles, cargo bikes, and other zero emissions options is not passed on to contractors and subcontractors.
- Increasing the use of e-cargo bike deliveries, neighborhood delivery hubs, and other zero emissions options.
- Working with original equipment manufacturers and governments to track and source mined materials that have the least amount of environmental and health impacts for electric vehicle fleets.
- Prioritizing communities experiencing the highest levels of pollution and poor air quality first for the transition to electric vehicles and other zero emissions options.

2- To emphasize, subcontractors including gig workers must be supported. Companies must take responsibility for subcontractor zero emission transition and improved working conditions (living wages, hours, safety, benefits etc.). Companies must regularly report on use of subcontractors and make this information publicly available.

3- Governments and companies must work collaboratively to ensure electric vehicle and non-motorised transport (NMT) measures in the last-mile delivery sector via company commitments and policy or regulatory requirements, and that best practices are shared.

Appendix

ANNEX: METHODOLOGY AND DATA TABLES

Endnotes

1 See Methodology annex for details behind this calculation

2 Formerly DPD

3 Forbes, Feburary 8, 2023. “38 E-Commerce Statistics Of 2023”. www.forbes.com/advisor/business/ecommerce-statistics/

4 See Methodology annex for details behind this calculation

5 RedSeer, RedSeer shadowfax Logistics iIndex 2020 (30-35% CAGR by volume in India) compared to Pitney Bowes Parcel Shipping Index (5.5-11.5% CAGR by volume globally).

6 Ritchie, H. & Roser, M. (n.d.). Our world in data, “Emissions per sector”. https://ourworldindata.org/emissions-by-sector

7 As per EPA an average US plant emits ~3.7 million tonnes of CO_2 per year https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references#coalplant

8 EPA estimates that 0.84 metric ton CO_2/acre/year is sequestered annually by one acre of average U.S. forest; Arizona = ~73 million acres

9 Based on estimates from a Scientific study on European forests: European forests sequestered 155 million tonnes of carbon; 1g C = 3.67g CO_2; equals 569 million tonnes CO_2 in 2020; 65 million tonnes emitted in 2022 = 11% of forest CO_2 sequestration in 2020.

10 We estimate 660 to 920 million tonnes of CO_2 from 2023 to 2030

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12 Environmental Defense Fund, 2023. “Proximity Mapping: How Much Pollution Are People Near You Breathing?” https://globalcleanair.org/files/2023/04/EDF-Proximity-Mapping-2023.pdf

13 WHO, www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/health-impacts/types-of-pollutants

14 Mernit, Judith, 2022. “Free Shipping Isn’t Free for Everyone”, 2022. https://www.sierraclub.org/sierra/free-shipping-isn-t-free-for-everyone

15 The in-house courier division of Amazon.com

16 The express courier division of DHL, excluding the domestic postal deliveries within Germany

17 Formerly DPD

18 eKart is the in-house courier division of India-based Flipkart

19 Deutsche Post AG, the parent company to Deutsche Post DHL Group (DHL), owns 75% of Blue Dart Express Limited.

20 The Amazon sustainability page states its current commitment to purchase 100,000 Rivian electric vans by 2030 plus 1,800 from Mercedes-Benz in Europe and 10,000 EVs in India. The Climate Pledge by 2040 further states net zero carbon emissions by 2040.

21 100,000 electric vans from Rivian plus 1,800 from Mercedes-Benz in Europe and 10,000 EVs in India. Source: Amazon 2021 Sustainability Report.

22 The Verge, November 7, 2022. “Amazon says it has ‘over a thousand’ Rivian electric vans making deliveries in the US”. www.theverge.com/2022/11/7/23443995/amazon-rivian-electric-delivery-van-fleet-ev

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26 Businesswire, 2022. “Amazon Announces Biggest Holiday Shopping Weekend Ever”. www.businesswire.com/news/home/20221130005716/en/Amazon-Announces-%20Biggest-Holiday-Shopping-Weekend-Ever/?feedref=JjAwJuNHiystnCoBq_hl-fLcmYSZsqlD_%20XPbpIM8Ta6D8R-QU5o2AvY8bhI9uvWSD8DYIYv4TIC1g1u0AKcacnnViVjtb72bOP4-4nHK5iej_%20DoWrIhfD31cAxcB60aE.

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28 SOMO, “Parcel delivery on a warming planet”, 2021.

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A joint investigation by Clean Mobility Collective (CMC) and Stand.earth Research Group