

**What Does
“Net-Zero” Mean?:
Unraveling Corporate
Climate Pledges**

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INTRODUCTION

Organizations around the world are making various pledges to reduce greenhouse gas (GHG) emissions. Amazon, Microsoft, Apple, and Google are, for example, among thousands of other companies committed to reducing their total greenhouse gas (GHG) emissions to zero by mid-century at the latest. Depending on the scopes and definitions employed, these commitments can play a key role in achieving the Paris Agreement, which aims to curb global emissions enough to cap global mean temperature increase to 1.5-2°C relative to the pre-industrial era.¹ As of September 2021, 120 countries, 733 cities, and over 3,200 businesses have committed to becoming net zero by 2050, making up 25% of global CO₂ emissions and over 50% of world GDP.^{1,2} These commitments would certainly help reduce global GHG emissions. But understanding precisely what these commitments mean is hampered by the varying scopes, timelines, and definitions used by them. In particular, net zero, carbon neutral, and carbon negative fill company pledges and sustainability reports often without explicitly stating what they mean. These terms, although they are still evolving, convey different nuances and meanings. With the caveat that there is room for further refinements and evolution, this article lays out our current understanding of how these terms are used in the literature and standards.



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DEFINITION

The term **Net Zero**, as defined by the IPCC, refers to balancing anthropogenic GHG emissions to the atmosphere with that taken out of the atmosphere.² The global economy is putting an unprecedented amount of GHG emissions into the atmosphere every year—equivalent to about 50 Gigatonnes (Gt) of CO₂ a year measured by the gases' ability to trap heat within 100-year timeframe.^{4,5}

Due to their persistence and stability, once emitted, many of these gases have a long residence time in the atmosphere and continue to retain heat.⁵ Therefore, the global mean temperature rise is expected to continue even if the global economy drastically reduces GHG emissions immediately.⁴ In order to stop the warming trend, global anthropogenic GHG emissions to the atmosphere should match the global removal of GHGs from the atmosphere through, e.g., the growth of biomass, absorption by the ocean, and carbon capture and storage or utilization.^{4,6} This equilibrium state, i.e., the rate at which anthropogenic GHGs enter the atmosphere is equal to that GHGs are removed from the atmosphere, is referred to as “balancing emissions and sinks” or “Net Zero” anthropogenic GHG emissions. Scientists determined the timeframe to reach net zero emissions to cap the global mean temperature rise to 1.5 - 2°C to be around mid-century.⁷

The net zero pledges by organizations are a scaled-down version of the global objective of achieving net zero emissions by mid-century. How is this implemented at an organizational level? Under a net zero pledge, an organization must reduce GHG emissions as much as possible and remove the equivalent amount of residual GHG emissions, if any, from the atmosphere.⁷

Another term often used interchangeably with net zero is **Carbon Neutral**. According to the PAS 2060, being carbon neutral is about reducing GHG emissions as much as possible and offsetting any remaining emissions using carbon offsets.⁸ These offsets must be high-quality, permanent, approved, and certified carbon offsets that are additional (meaning, the activity that led to the reduction in GHG emissions would not have happened anyway under a

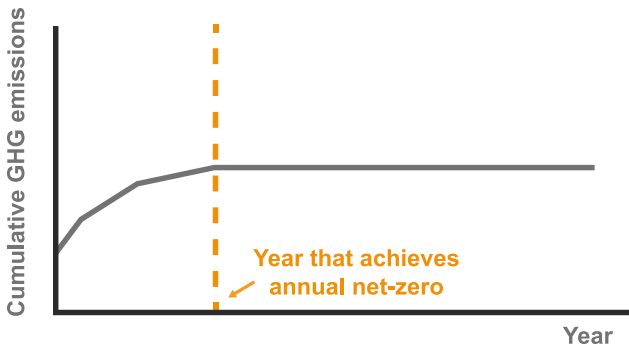
“Carbon offset does not necessarily mean removal of GHG emissions from the atmosphere or smokestack.”

normal course of business).⁹ However, at least under the current practice, carbon offset does not necessarily mean removal of GHG emissions from the atmosphere or smokestack, which is necessary to balance the emissions and sinks. Net zero offsets, on the other hand, require carbon removal, not just reduction.¹⁰

The use of offsets as a part of the justification for carbon neutrality claim raised concerns among scientists and environmental groups because, first, it may not incentivize the reduction of carbon emissions in the first place, and second, carbon offsets, as they are currently practiced, are prone to exaggeration and over-crediting. Green Peace, for example, argues that carbon offsets are largely an accounting trick and are used mainly for green washing.¹¹ Studies have shown that carbon offset credits have been systematically exaggerated.^{12,13} As such, some organizations also interpret carbon neutrality as an intermediate step of stabilizing emissions instead of reducing them.⁷

Finally, **Carbon Negative** refers to the sequestration or removal of more GHGs than emitted into the atmosphere.¹⁴ Organizations aiming to remove historic emissions need to have annual net negative emissions to achieve their goals. Achieving carbon negative status can be done by storing or removing more GHG than an organization emits for an extended timeframe.¹⁴ Although the definition of Net Negative is deemed to suggest the use of carbon removal, some organizations are using carbon offsets such as those from clean energy for net negative emission claims, while others are investing in carbon removal technologies such as CO₂ biostorage.¹⁵ Google and Microsoft are just a few examples of companies striving to become carbon negative and remove historical emissions. There is no single right technology to support net negative emissions, as long as it achieves credible and permanent reduction of GHG emissions in the atmosphere throughout their operation and supply chain.

a) Without accounting for historical emissions



b) With accounting for historical emissions

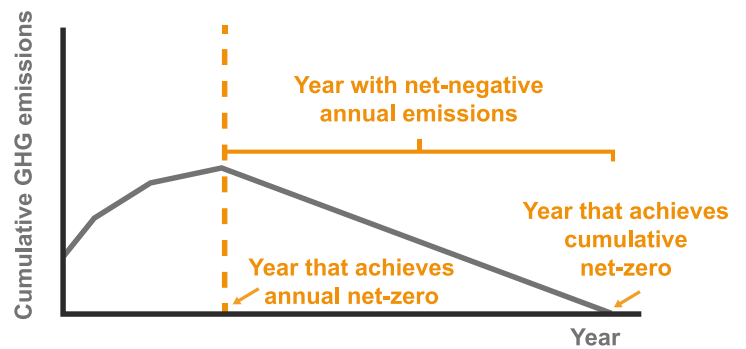


Figure 1. Cumulative emissions over time with and without neutralizing historical emissions.

TIMELINE

The use of different timelines is another source of confusion in understanding corporate pledges. Net zero pledges are set sometime before or at mid-century to meet the 2021 IPCC projection of having at least a 50% chance of limiting global temperature rise to 1.5°C ('1.5 DS target' hereafter).¹⁶ The 2050 deadline comes from the IPCC scenarios, where 25-75 percentile of the scenarios examined show that the globe should achieve net zero GHG emissions by around 2035-2075 (5-95 percentile range) to meet the 1.5 DS target (no or limited overshoot case).¹⁶ Therefore, achieving net zero by around 2050 is crucial if we are serious about avoiding catastrophic consequences of climate change.¹⁷ Some net zero goals are set as early as 2025, while many companies are aiming for 2030.^{2,18}

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There is another temporal dimension to carbon pledges. Carbon neutral and net zero goals tend to focus on annual emissions. But some argue that organizations should also neutralize historical emissions. Figure 1 illustrates the effect of accounting for historical emissions in a net zero pledge. For any organization that produced net positive GHG emissions at one point of its operation, achieving net zero annual emissions is insufficient to reach cumulative net

“Carbon neutral and net zero goals tend to focus on annual emissions. But some argue that organizations should also neutralize historical emissions.”

zero; achieving net negative annual emissions would be needed to cancel out historical emissions.

SCOPE OF EMISSIONS

Last, but not least, corporate climate pledges may use different coverage or scope of emissions, adding to the complexity of understanding their meanings. According to PAS 2050, carbon neutrality requires organizations to include only their operational emissions, namely Scopes 1 (direct emissions) and 2 (indirect emissions from purchased electricity and steam).¹⁹ For most organizations, however, operational emissions are only a minor part of the overall emissions. According to the Comprehensive Environmental Data Archive (CEDA) that covers all industrial activities and their GHG emissions throughout the supply chain, Scope 3 (value chain emissions) contributes 50-90% of industrial emissions.

Needless to say, the goal of achieving net zero by mid-century cannot care less about to which scope certain emissions at one point of its operation, achieving net zero annual emissions is insufficient to reach cumulative net emissions or sinks belong; all anthropogenic emissions should converge to nil. Some organizations include all

scopes in their net zero pledges, while some are including only operational emissions. In some cases, we also find a mixture of the two in net zero pledges (e.g., operational emissions plus scope 1 & 2 emissions of their tier 1 suppliers). The challenge is that scope 3 is often time and resource-intensive to measure. According to the GHG Protocol standard, there are 15 subcategories under scope 3.¹⁹ Organizations are not required to report on all 15 categories but are encouraged to report on the most relevant categories to the organization’s value chain.²⁰ Furthermore, many organizations perceive that some scope 3 emissions are out of their direct control. That explains why many of the climate pledges do not address scope 3. Table 1 shows the scope of emissions covered by selected corporate climate pledges.

RACE TO NET ZERO: 4 P’s

With climate commitments increasingly becoming the norm, the pressure is shifting to how organizations deliver results to keep their words. The Race to Net Zero campaign creates a path and alliance for organizations to achieve net zero.¹ This global campaign was established by the UN Framework Convention on Climate Change to encourage decarbonization of the economy ahead of the COP26.¹ The campaign officially launched in June 2020, aligning with the Paris Agreement roadmap.²¹ As the race enters its second phase, the “Breakthrough”, it is more important than ever to provide organizations the guidance they need to work towards net zero. The goal is to provide organizations with the proper framework to address net zero goals and offer them a space to be held accountable for their commitments.

The Race to Net Zero has created criteria to help organizations that have committed to reaching net zero. The requirements include the Four P’s; Pledge, Plan, Proceed and Publish.¹ The first P is the public Pledge and commitment made by an organization to accomplish net zero by 2050. Many organizations have pledged to achieve this goal sooner to support the drastic change necessary to prevent global temperature increase under 2°C.¹

Although pledges are the first step in the process, it comes with little accountability or tangible actions. Organizations must have an action plan to achieve this lofty goal. After pledging, organizations have up to 12 months to establish short-term or long-term Plans, to achieve the net zero goal.¹ This is a crucial phase in which Science Based Target initiatives (SBTi) set incremental goals to reach net zero. The first step in SBTi is to assess a baseline year of emissions, which involves collecting and calculating the impacts across the organization’s different scopes. Organizations should use the most recent year to assess current emissions accurately. With a baseline calculated, companies can identify hot spots, areas for immediate action, and areas that need long-term reduction plans.

The third P, Proceed, encourages organizations to take immediate action on SBTs. Organizations need to take timely and direct action on the plans they have laid out. Proceeding with the set plan is crucial if organizations hope to stay within the timeline set to achieve net zero. Many have held themselves to less than a ten-year timeframe, so quick action is necessary to keep on track.

Table 1. Corporate Climate Pledges and their coverages.

Scope Coverage	Temporal Coverage (Annual Emissions)	Temporal Coverage (Annual + Historical Emissions)
Scope 1 & 2	Exxon, FedEx, J&J, Disney	Toyota
Scopes 1, 2, & 3 - Partial Categories	Ford Motors, PG&E, BP, Chanel, Levi's	Google, Velux
Scope 1, 2, & 3 - All Categories	Amazon, Pepsi Co, American Airlines, Nike	Microsoft, Apple

The final P, Publish, encourages organizations to publish their goals, reports, targets, and actions. Net zero is working towards a collective goal, and organizations must publish plans and activities so others may learn from successes and hold them accountable for failures. The Race to Net Zero is entering the “Breakthrough” phase, which requires coordination within and across sectors to achieve genuine progress.²² To reach a 2050 net zero goal, changes need to be accelerated. The speed of change will require collaboration across economic sectors such as suppliers, financiers, organizations, and civil society.²² Publishing plans can help other organizations reach net zero faster, ultimately reducing the risk of missing the 1.5 DC goal.

HOW ARE COMPANIES ACHIEVING THEIR GOALS?

In this section, we will review the actions that a number of leading companies are taking to meet their climate pledges.



FedEx is one of the US’s largest shipping and delivery services and is ranked in the top 50 most responsible companies.^{23,24} They announced earlier this year their commitment to becoming carbon neutral for all operational emissions by 2040.²⁵ FedEx is specifically focusing on emissions reduction at their facilities and within their aviation and vehicle fleets.²⁶ They have established a three-step strategy to achieve carbon neutrality through reduction, replacement, and revolutionization. FedEx’s main reduction strategies include reducing energy and fossil fuel emissions. At the facility level, these reductions will be achieved through energy efficiency of lighting and building operations. Reductions within the aviation fleet will come from jet fuel consumption, with a goal of cutting emissions by 30%.²⁶ Replacement strategies focus mainly on FedEx’s fleets. The aviation fleet is set to replace older aircrafts with newer, more efficient ones, while FedEx Express will replace 100% of its fleet with electric vehicles by 2030.²⁶ FedEx’s revolutionization aims to use technology

to address emissions. Some projects include alternative jet fuel, electric vehicle infrastructure, last-mile innovations, and clean energy implementation.²⁶ To offset remaining emissions, they have pledged \$100 million to carbon sequestration programs through the Yale Center for Natural Carbon Capture.²⁶ Through these initiatives, FedEx hopes to reach carbon neutrality by 2040.

FedEx is a great example of what most carbon neutral commitments currently entail. The plans seem ambitious but many emissions remain even when they meet their carbon neutral goal. Currently, FedEx does not have plans to offset historical emissions or neutralize value chain emissions. Commitments like these are moving companies in the right direction but will fall far short of what is necessary to achieve the overall goal of slowing climate change.



Google is one of the leaders in carbon neutrality, becoming carbon neutral almost a decade before the Paris Agreement was signed.²⁷ Google achieved carbon neutral annual operational emissions in 2007, went net negative since then, and eventually neutralized its historic operational emission in September, 2020.²⁸ Google uses a combination of mitigation and offset. Google has now set a new goal to align with 2030 benchmarks, focusing on operating carbon-free by achieving 24/7 renewable energy for all of its operations.²⁹

In 2016 they expanded their operational reporting and offsets to include two categories of Scope 3 emissions: (1) business travel and (2) employee commuting.³⁰ This expansion has allowed Google to continue to be carbon neutral within their operational emissions while working towards net zero. In 2018, Google expanded its emissions tracking to include more Scope 3 categories to align with industry best practices, including tier 1 suppliers, use-of-sold products, and end-of-life treatment.³⁰ Although these emissions are now being accounted for, Google does not currently offset the total emissions produced throughout their value chain, which are almost double the emissions from operations.³⁰

Table 2. Corporate Climate Pledges broken down by Goal, Scope, and Timeline.

Company	Goal	Scope	Annual Emissions Deadline	Historical Emissions Deadline
FedEx	Carbon Neutral	Scope 1 & 2	2040	N/A
Google	Carbon Neutral	Scope 1, 2, & 3 (Business Travel & Commuting)	2007	2020
Microsoft	Net Zero	Scope 1, 2, & 3 (All values chain emissions)	2030	2050

Renewable energy investments are the primary way Google has achieved carbon neutrality, negating their Scope 1 and 2 emissions for over a decade. Google has invested both domestically and abroad to support a carbon-free energy source near all facilities. In addition, with the new goal of achieving 24/7 clean energy, Google has invested over \$5 billion in sustainable bonds for environmental projects, focusing on green energy projects.²⁷ Like many other companies, Google recognizes how vital a clean energy source is to carbon neutrality and is investing heavily to make 24/7 clean energy a reality at all of their facilities.

Along with clean energy, Google also focuses on reducing emissions in Scope 3 associated with waste, packaging, and transportation. Clean energy can not eliminate all of Google’s emissions, so reducing where it can is extremely important. For example, Google has diverted 90% of e-waste from landfills since 2019.²⁷ Although their products still inherently create emissions, by repurposing, refurbishing, and recycling products, the emissions associated with the products drop significantly. In addition, product packaging has reduced dramatically, becoming 100% plastic-free by 2025.²⁷ Google also hopes to eliminate transportation emissions through low carbon transportation, shipping directly to consumers, and increasing freight capacity.²⁷ Google’s commitment to reducing emissions throughout its organization is an excellent example to other organizations, who are striving to become carbon neutral.



Microsoft is one of the largest and most influential tech companies in the world. They are leaders not only in tech but for businesses across many different industries. Microsoft has pledged to be not only net zero by 2030 but also carbon negative.³¹ They have also pledged to remove all historical emissions by 2050.³¹ The key to accomplishing this is to eliminate direct and indirect emissions through clean energy and reduce Scope 3 emissions by 50%.³² Additionally, Microsoft is investing in clean energy, carbon capture and reforestation projects to offset remaining and historical carbon.

Microsoft is taking steps towards eliminating Scope 1 and 2 emissions by creating net zero campuses and office spaces. These buildings are highly energy-efficient, run on low-carbon or clean energy, and waste diversion programs. Since Microsoft has offices worldwide, they have chosen to invest in making these offices as emission-free as possible. In addition, they have invested in on-site solar electricity, water reuse and reduction programs, and better waste management programs.³³ The goal is to reduce emissions and waste as much as possible from Microsoft’s facilities to reduce Scope 1 and 2 as much as possible.

To reduce Scope 3 emissions in half by 2030, Microsoft is investing in supplier relations, product recycling, and clean energy sources. Microsoft recognizes how important emissions tracking is at the supplier level to reduce

embedded supply chain emissions. As a result, they are helping suppliers track and report their GHGs to CDP. Microsoft is also pushing to obtain 24/7 clean energy across the entire supply chain by 2030. In addition to reducing Scope 3 emissions, they invest in carbon removal programs, such as reforestation, soil carbon storage, and direct capture technologies.³¹ These investments will help Microsoft become net zero by 2030 and help to remove historical emissions.

FedEx, Google, and Microsoft are three companies trying to address climate change. FedEx is in its early stages and represents the broader way companies are attempting to mitigate impacts. Google is an excellent example of how achieving carbon neutrality is possible, while also demonstrating there is still more to be done. Microsoft is one of the best examples of how to reach net zero by 2050. Not only does Microsoft show a commitment to reducing emissions across their entire value chain by 2030, but they also are working towards eliminating historical emissions by mid-century. These three companies represent different ways that companies around the world are trying to achieve climate pledges. Some are more comprehensive than others, with only proper net zero goals and action plans aligning with the Paris Agreement goals.

OFFSET OPTIONS

As organizations turn to meaningful offsets to meet environmental commitments, many invest in clean energy. By investing in clean energy, they hope to eliminate direct and indirect emissions, as well as those throughout their supply chain. Organizations have direct control over Scope 1 and 2 emissions and find it the most accessible place to reduce emissions. Not only is clean energy investment significant for eliminating direct and indirect emissions, but it can be a way to reduce embedded emissions in Scope 3. Value chain emissions are still largely intertwined with fossil fuel energy sources, such as transportation, purchased goods and services, and employee commuting. These emissions come from fossil fuel-based energy sources like natural gas, coal power plants, and other carbon-intensive energy sources. Clean energy is key to powering a carbon-free economy and requires investments from organizations in renewable energies such as solar and wind farms.³⁴

These energy sources are not widely available and may not support operations 24/7 like Google and Microsoft are experiencing. With more organizations investing in the renewable energy sector, the shift away from fossil fuels can happen at the pace necessary to meet net zero goals.

While clean energy investing has been the most prominent offset option, companies that are striving to reach net zero will need to invest in direct carbon capture and storage technologies. The balancing of emissions in net zero requires that carbon be removed from the atmosphere if there are any emissions remaining after reductions. As a result, investment in Direct Air Capture (DAC) technologies will be necessary to remove carbon on a larger scale.³⁵ DAC uses chemical reactions to remove carbon dioxide from the atmosphere to be stored permanently underground.³⁶ This technology provides ample carbon removal with smaller land use than other carbon sequestration technologies. DAC can uptake the same amount of carbon as a forest with 2% of the land-use.³⁶ Although DAC currently has a higher cost per CO₂ removal than other offsets, increased investment in the technology can feasibly cause costs to drop over 75% in the next 5-10 years.³⁶ Investing in DAC and other carbon capture technologies are crucial to achieving net zero emissions for organizations and the planet.

Although investing in DAC and other carbon removal technologies and activities are the only way to meet net zero goals, there are offsets that can be purchased to meet carbon neutral goals. The key to choosing a program is to ensure it is additional, permanent, and accredited.³⁷ On additionality, it is essential to find offset programs that would not be installed if the organization does not invest. Steps must be taken to ensure that projects like reforestation and implemented from deforestation are truly additional, so as to prevent double-counting of offset emissions.³⁸ Organizations must also make sure that projects are permanent. Permanent carbon storage allows organizations to claim carbon capture, as it has been removed from the atmosphere and will stay stored for the foreseeable future. Lastly, organizations should make sure the offset is accredited by a third party to guarantee the storage accuracy and longevity of the program. Some projects include reforestation and deforestation prevention, cookstove, soil sequestration, and agriculture mix-use and storage programs.³⁹

CONCLUSION

Increasingly more organizations are pledging net zero and carbon neutral goals, which can help achieve the 1.5°C climate target. However, the same terms used in these pledges often convey different meanings. In particular, we find that the emissions scope, temporal coverage, timeline, and the use of offset v.s. carbon removal for residual emissions are the four major areas that need to be examined carefully in order to understand what a climate pledge truly means. We believe that it would be important for organizations to transparently and clearly communicate these four aspects when publicizing their pledges. Furthermore, guidelines and standards on net zero and carbon neutrality will need to be developed or refined to ensure that these four elements are clearly defined and communicated in corporate climate pledges.

Furthermore, in order to achieve the 1.5°C climate target, it is crucial for organizations to reduce GHG emissions across all three scopes and continue to monitor and report the progress toward net zero. With the Race to Net Zero moving into the “breakthrough” phase, it is more important than ever to disclose and coordinate across industry sectors to create the exponential change necessary to meet the net zero goal.²²



REFERENCES

1. Race To Zero Campaign | UNFCCC. (n.d.). Retrieved June 29, 2021, from <https://unfccc.int/climate-action/race-to-zero-campaign#eq-3>
2. More than 200 companies joined a pledge to hit net zero carbon by 2040 or sooner—CNN. (n.d.). Retrieved September 22, 2021, from <https://www.cnn.com/2021/09/20/business/amazon-climate-pledge/index.html>
3. Glossary—Global Warming of 1.5 oC. (n.d.). Retrieved August 2, 2021, from <https://www.ipcc.ch/sr15/chapter/glossary/>
4. SR15_Full_Report_High_Res.pdf. (n.d.). Retrieved July 29, 2021, from https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf
5. Intergovernmental Panel on Climate Change, & Edenhofer, O. (Eds.). (2014). *Climate change 2014: Mitigation of climate change: Working Group III contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.
6. English_paris_agreement.pdf. (n.d.). Retrieved July 29, 2021, from https://unfccc.int/sites/default/files/english_paris_agreement.pdf
7. Levin, K., Song, J., & Morgan, J. (2015). COP21 Glossary of Terms Guiding the Long-term Emissions-Reduction Goal. <https://www.wri.org/insights/cop21-glossary-terms-guiding-long-term-emissions-reduction-goal>
8. Why does carbon neutrality matter? | Benefits of PAS 2060. (n.d.). Retrieved July 29, 2021, from <https://www.bsigroup.com/en-GB/pas-2060-carbon-neutrality/>
9. PAS 2060 factsheet EN.pdf. (n.d.). Retrieved July 29, 2021, from <https://info.eco-act.com/hubfs/0%20-%20Downloads/PAS%202060/PAS%202060%20factsheet%20EN.pdf>
10. How to Sell ‘Carbon Neutral’ Fossil Fuel That Doesn’t Exist. (2021, August 11). Bloomberg.Com. <https://www.bloomberg.com/news/features/2021-08-11/the-fictitious-world-of-carbon-neutral-fossil-fuel>
11. The biggest problem with carbon offsetting is that it doesn’t really work. (2020, May 26). Greenpeace UK. <https://www.greenpeace.org.uk/news/the-biggest-problem-with-carbon-offsetting-is-that-it-doesnt-really-work/>
12. Landowners are earning millions for carbon cuts that may not occur. (n.d.). MIT Technology Review. Retrieved August 20, 2021, from <https://www.technologyreview.com/2019/04/18/65883/californias-cap-and-trade-program-may-vastly-overestimate-emissions-cuts/>
13. Badgley, G., Freeman, J., Hamman, J. J., Haya, B., Trugman, A. T., Anderegg, W. R. L., & Cullenward, D. (2021). Systematic over-crediting in California’s forest carbon offsets program (p. 2021.04.28.441870). <https://doi.org/10.1101/2021.04.28.441870>
14. Allen, J. (n.d.). Net-zero, carbon-neutral, carbon-negative ... confused by all the carbon jargon? Then read this. The Conversation. Retrieved July 12, 2021, from <http://theconversation.com/net-zero-carbon-neutral-carbon-negative-confused-by-all-the-carbon-jargon-then-read-this-151382>
15. Going carbon negative: What are the technology options? – Analysis. (n.d.). IEA. Retrieved August 24, 2021, from <https://www.iea.org/commentaries/going-carbon-negative-what-are-the-technology-options>
16. Summary for Policymakers—Global Warming of 1.5 oC. (n.d.). Retrieved August 9, 2021, from <https://www.ipcc.ch/sr15/chapter/spm/>
17. Net Zero by 2050 – Analysis. (n.d.). IEA. Retrieved July 2, 2021, from <https://www.iea.org/reports/net-zero-by-2050>
18. Content, S. (2021, June 8). Race to Net Zero: Carbon Neutral Goals by Country. Visual Capitalist. <https://www.visualcapitalist.com/race-to-net-zero-carbon-neutral-goals-by-country/>
19. Carbon neutral certification. (2020, January 13). <https://www.carbontrust.com/What-We-Do/Assurance-and-Certification/Carbon-Neutral-Certification>. <https://www.carbontrust.com/what-we-do/assurance-and-certification/carbon-neutral-certification>

20. SBT_Value_Chain_Report-1.pdf. (n.d.). Retrieved August 2, 2021, from https://sciencebasedtargets.org/resources/files/SBT_Value_Chain_Report-1.pdf
21. Race to Zero FAQs. (n.d.). Retrieved August 23, 2021, from <https://eu.eventscloud.com/website/3981/race-to-zero-faqs/>
22. 2030-Breakthroughs-Upgrading-Our-Systems-Together.pdf. (n.d.). Retrieved August 6, 2021, from <https://racetozero.unfccc.int/wp-content/uploads/2021/07/2030-Breakthroughs-Upgrading-Our-Systems-Together.pdf>
23. America's Most Responsible Companies—2021 (Newsweek) | Ranking The Brands. (n.d.). Retrieved August 23, 2021, from <https://www.rankingthebrands.com/The-Brand-Rankings.aspx?rankingID=448&year=1351>
24. FedEx | 2021 Fortune 500. (n.d.). Fortune. Retrieved August 23, 2021, from <https://fortune.com/company/fedex/fortune500/>
25. FedEx Sets 2040 Carbon Neutral Target | FedEx Cares. (n.d.). Retrieved August 23, 2021, from <https://fedexcares.com/stories/sustainable-logistics/fedex-sets-2040-carbon-neutral-targetbest-carbon-offset-programs-2650926204.html>
26. FedEx_2021_ESG_Report.pdf. (n.d.). Retrieved August 23, 2021, from https://www.fedex.com/content/dam/fedex/us-united-states/sustainability/gcrs/FedEx_2021_ESG_Report.pdf
27. Google Environmental Report 2020. (2020). 82.
28. Our Commitments. (n.d.). Google Sustainability. Retrieved July 30, 2021, from <https://sustainability.google/commitments/>
29. Our third decade of climate action: Realizing a carbon-free future. (2020, September 14). Google. <https://blog.google/outreach-initiatives/sustainability/our-third-decade-climate-action-realizing-carbon-free-future/>
30. Google Environmental Report 2020. (2020). 82.
31. Microsoft 2020 Environmental Sustainability Report | Microsoft CSR. (n.d.). Microsoft Sustainability. Retrieved July 14, 2021, from <https://www.microsoft.com/en-us/corporate-responsibility/sustainability/report>
32. 2020 Environmental Sustainability Report. (n.d.). 96.
33. Microsoft_Sustainability_Smart_Buildings_eGuide (1).pdf. (n.d.).
34. The race to zero emissions, and why the world depends on it. (2020, November 30). UN News. <https://news.un.org/en/story/2020/12/1078612>
35. Lebling, K., McQueen, N., Pisciotta, M., & Wilcox, J. (2021). Direct Air Capture: Resource Considerations and Costs for Carbon Removal. <https://www.wri.org/insights/direct-air-capture-resource-considerations-and-costs-carbon-removal>
36. Lebling, K., McQueen, N., Pisciotta, M., & Wilcox, J. (2021). Direct Air Capture: Resource Considerations and Costs for Carbon Removal. <https://www.wri.org/insights/direct-air-capture-resource-considerations-and-costs-carbon-removal>
37. A Complete Guide To Choosing The Right Carbon Offset Provider. (2017, December 20). Native. <https://native.eco/2017/12/choosing-the-right-offset-provider/>
38. Choosing the Best Carbon Offset Programs of 2021. (2021, May 27). EcoWatch. <https://www.ecowatch.com/best-carbon-offset-programs-2650926204.html>
39. carbonfootprint.com—Carbon Offset Projects. (n.d.). Retrieved July 15, 2021, from <https://www.carbonfootprint.com/carbonoffsetprojects.html#2060>.