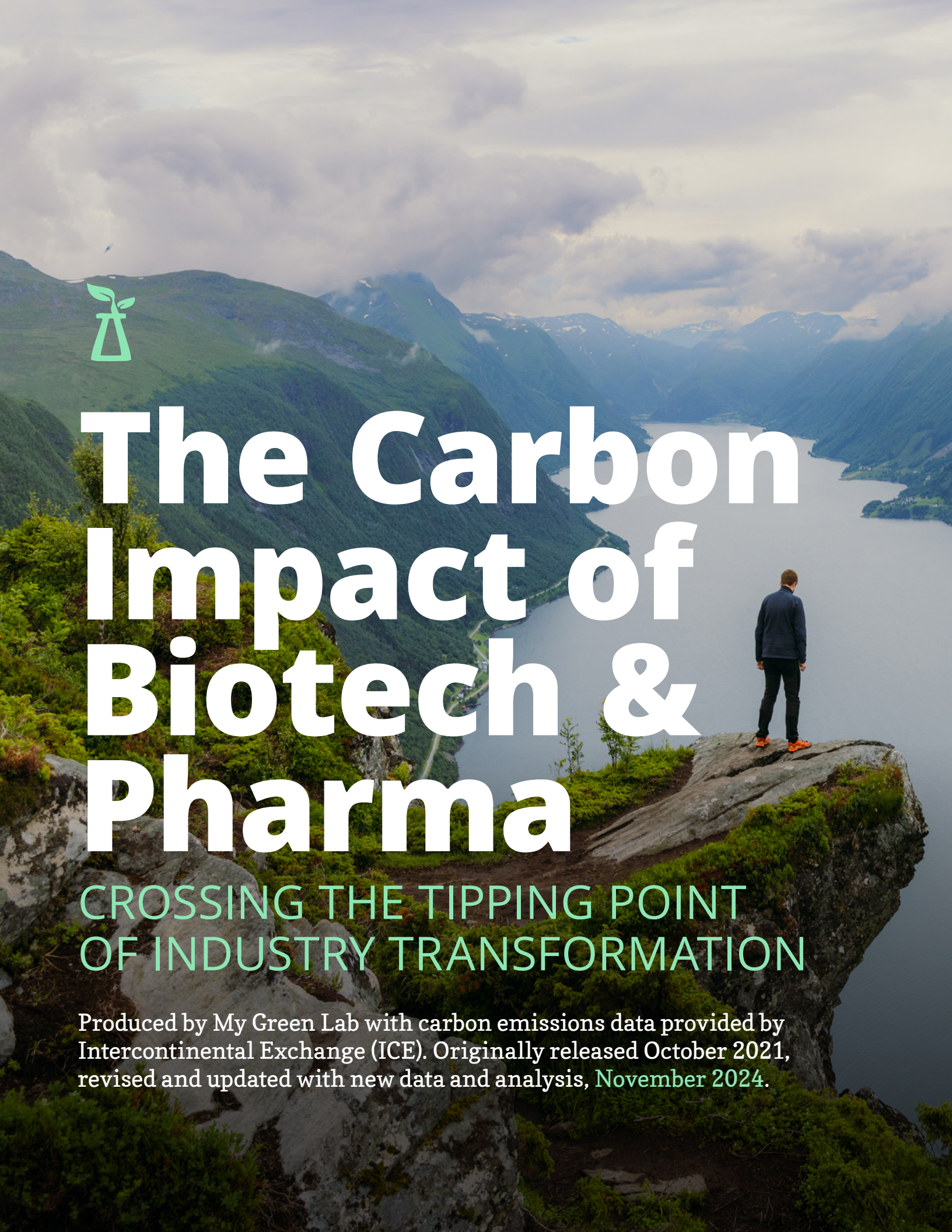


The Carbon Impact of Biotech & Pharma

CROSSING THE TIPPING POINT OF INDUSTRY TRANSFORMATION

Produced by My Green Lab with carbon emissions data provided by Intercontinental Exchange (ICE). Originally released October 2021, revised and updated with new data and analysis, November 2024.

Executive Summary

The following study is based on data and analysis from Intercontinental Exchange (ICE) and is published by My Green Lab, the leading non-profit organization promoting sustainability in science. This is an update to the 2021 study, which was the first to quantify Scope 1 and 2 as well as Scope 3 emissions across the full value chain of the biotechnology and pharmaceutical (biotech and pharma) industry. The study leverages data from 638 publicly-listed companies and 290 privately-held companies to produce a comprehensive profile of the carbon emissions of the biotech and pharma industry, including a comparison of this emissions profile to other industry sectors. The report tracks the industry's progress since 2015 and evaluates alignment with achieving the goals of the Paris Climate Agreement. Data and analysis presented for a given year refers to emissions occurring in the previous year.

The biotech and pharma industry is a significant contributor to global climate change and must therefore be part of the global climate solution. This year's report indicates we are approaching a tipping point for industry transformation, with more than 25% of companies setting medium-term Scope 1 and 2 targets (2026–2035) aligned with a 1.5°C pathway. There have been notable successes, particularly among the largest companies, in achieving year-on-year intensity reductions. However, the pace of reductions and the scope of long-term targets, including Scope 3, are still insufficient over the longer time horizon needed to align with a 1.5°C world.

Summary of Key Findings

01

Of the 149 biotech and pharma companies analyzed, 31% have medium-term (2026–2035) Scope 1 and 2 targets aligned with a 1.5°C pathway. Expanding these targets to include Scope 3 emissions is necessary to align with a 1.5°C goal.

02

Based on an expanded dataset of public and private companies, the total carbon emissions in the biotech and pharma sectors (Scopes 1, 2, and 3) reached 397 million tCO_2-e in 2023—comprising 259 million tCO_2-e from public companies and 138 million tCO_2-e from private companies.

03

Scope 3 emissions in biotech and pharma are significantly higher than Scope 1 and 2 combined—5.4 times greater for public companies and 6.5 times greater for private companies—primarily driven by purchased goods and services. In response, the industry has initiated a series of collective supply chain initiatives, achieving notable progress over the past year. However, these efforts must be accelerated for Scope 3 targets and emissions reductions to align with a 1.5 world.

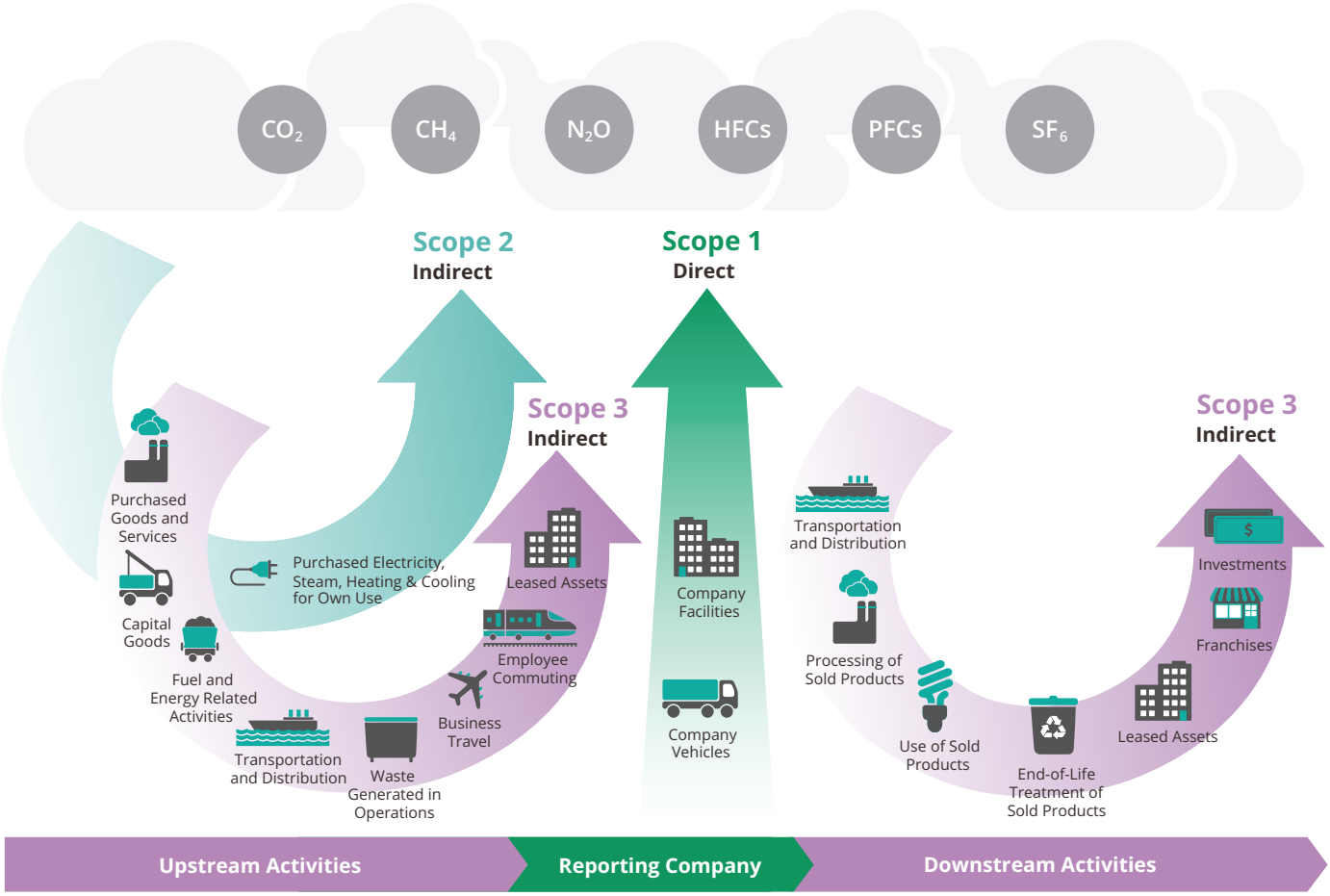
04

The largest companies by revenue are making rapid progress in adopting the UN Race to Zero. 36 companies, representing 56% of the sector by revenue, have committed to the campaign, up from 28 companies (46% by revenue) at this time last year. Progress towards the Breakthrough Outcome has also been swift, with 61% of Pharma and Med Tech companies in the campaign having started a My Green Lab Certification, and 68% of those programs operating at a global scale.

The GHG Protocol Corporate Accounting and Reporting Standard[1] classifies carbon emissions into three different Scopes, divided by direct and indirect emissions:

Direct Emissions:
Scope 1 includes direct emissions from owned or controlled sources

Indirect Emissions:
Scope 2 includes carbon emissions from purchased energy consumed by the reporting company
Scope 3 includes all other indirect emissions upstream or downstream in a company's value chain



Credit: Greenhouse Gas Protocol — Corporate Value Chain (Scope 3) Accounting and Reporting Standard

For most industries Scope 3 emissions are significantly larger than Scopes 1 and 2 combined. This study found the biotech and pharma industry is no exception. To understand the true carbon impact of an industry, it is therefore critical to evaluate the entire carbon footprint, including Scope 3 emissions in the upstream and downstream value chain.

1 Corporate Value Chain (Scope 3) Accounting and Reporting Standard https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf

About My Green Lab

My Green Lab is a non-profit environmental organization with a mission to build a global culture of sustainability in science. The organization is the world leader in developing internationally recognized sustainability standards for laboratories and laboratory products, bringing sustainability to the community responsible for life-changing medical and technical innovations. Laboratories are one of the most resource-intensive spaces in any industry, but by introducing a new perspective and proven best practices within a carefully crafted framework, My Green Lab has inspired tens of thousands of scientists to make positive changes in their labs and reduce the environmental impact of their work.

My Green Lab Certification is the world's most trusted green lab certification and the cornerstone of the My Green Lab mission to build a global culture of sustainability in science. Selected as a key indicator of progress for the UNFCCC High-Level Climate Champion's 2030 Breakthrough campaign, the program covers fourteen topics related to energy, water, waste, chemistry/materials, and engagement, and provides scientists and laboratory personnel with actionable strategies to make real and impactful environmental changes. To date, My Green Lab Certification has supported over 3,400 labs worldwide, engaging over 40,000 scientists from 50 different countries. In October 2024, My Green Lab completed a 3-year expert stakeholder update process and released a new version of the standard, My Green Lab Certification 2.0. The new program includes a user-friendly software platform, an impact estimator to track carbon and other resource reductions as well as financial ROI, and introduces third-party verification from Impact Laboratories,[2] aligning with international best practices for high quality environmental certifications.

The **My Green Lab ACT Ecolabel** is the world's premier ecolabel for laboratory products. The program ensures Accountability, Consistency, and Transparency in the reporting of environmental impact data to enable sustainable laboratory procurement. Designed for scientists and procurement specialists, it provides clear, third-party verified information about the sustainability profile of laboratory products. By offering transparency around manufacturing, product content, energy and water use, packaging, and end-of-life impacts, ACT makes it easier to choose environmentally preferable products and reduce the carbon impact of laboratory supply chains. In October 2024, My Green Lab released a new pilot version, ACT 2.0, which improves the scalability of the certification, aligns scoring with the largest life-cycle impact factors, and introduces carbon reporting.

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Acknowledgments

This paper was produced with support from the UN High Level Climate Champions team.

2 https://www.impactlaboratories.com/

Intercontinental Exchange Inc.

Intercontinental Exchange, Inc. (NYSE: ICE) is a Fortune 500 company that designs, builds and operates digital networks to connect people to opportunity. We provide financial technology and data services across major asset classes that offer our customers access to mission-critical workflow tools that increase transparency and operational efficiencies.

We operate exchanges, including the New York Stock Exchange, and clearing houses that help people invest, raise capital and manage risk across multiple asset classes. Our comprehensive data services provide mission-critical information and analytics that help our customers capitalize on opportunities and operate more efficiently. At ICE Mortgage Technology, we are transforming and digitizing the U.S. residential mortgage process, from consumer engagement through loan registration. Together, we transform, streamline and automate industries to connect our customers to opportunity.

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Introduction

The global biotechnology and pharmaceutical industry (Biotech and Pharma) play a crucial role in developing the medical and technical innovations necessary to advance our society. However, the industry also has a significant carbon footprint. There are likely millions of laboratories in the world, consuming up to ten times the energy and four times the water of a typical office space.[3]

The total carbon impact of the healthcare industry is even larger. A 2019 study found that the climate footprint of healthcare was two gigatons of carbon dioxide equivalent, representing 4.4% of total global emissions.[4] Of that, 71% of emissions were derived from the healthcare supply chain, which includes the biotech and pharma industry, highlighting the importance of carbon reductions for this specific industry sector.

Meanwhile, the biotech and pharma market is experiencing rapid growth. The global biotechnology market was valued at $1.55 trillion in 2023 and is projected to expand at a compound annual growth rate (CAGR) of 13.96%, reaching $3.9 trillion by 2030.[5] Pharmaceutical manufacturing, valued at $516.48 billion in 2022, is expected to grow at a CAGR of 7.63%, reaching $930 billion by 2030.[6]

Given the carbon intensity and rapid growth of the biotechnology and pharmaceutical industry, it is critical and timely to examine the industry's carbon profile as well as key opportunities to improve it. This study evaluates a robust dataset of 638 publicly-listed and 290 privately traded companies, provided by ICE, to compare its intensity and total emissions to other carbon-intensive industry sectors.[7] This evaluation excludes the substantial impact of government labs, universities, and healthcare systems, so the total carbon emissions of the full healthcare and scientific research industry are in fact much higher than what is included and analyzed within the scope of this study.

This study was the first to evaluate the upstream and downstream value chain of biotech and pharma by quantifying Scope 3 emissions for both public and private companies. This analysis then identifies critical hotspots that are opportunities for positive change while charting industry progress towards the UNFCCC Race to Zero and the UNFCCC 2030 Breakthrough Outcomes campaign.

The conclusions are clear: the fast-growing global biotech and pharmaceutical industry is a significant contributor to climate change. However, carbon intensity is now beginning to decline among the largest companies, offering hope for decoupling industry growth from an increasing carbon impact. Over the past year, overall carbon intensity reductions have been observed, with the top 25 companies driving significant decreases. Additionally, a growing number of companies are adopting Scope 1 and 2 zero-carbon targets aligned with a 1.5°C pathway. However, targets must be expanded to include

3 Laboratories for the 21st Century: An Introduction to Low-Energy Design (2008) https://www.nrel.gov/docs/fy08osti/29413.pdf

4 Healthcare Without Harm and ARUP (2019) Health Care's Climate Footprint – How the Health Sector Contributes to the Global Climate Crisis and Opportunities for Action (2019) https://noharm-global.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_090619.pdf

5 Biotechnology Market Size, Share & Trends Analysis by Technology https://www.grandviewresearch.com/industry-analysis/biotechnology-market

6 Pharmaceutical Manufacturing Market Size, Share & Trend Analysis Report https://www.grandviewresearch.com/industry-analysis/pharmaceutical-manufacturing-market

7 This study used publicly reported and inferred data, outlined in the methodology section, for 638 public companies classified as Biotechnology and Pharmaceutical by the Sustainable Accounting Standards Board (SASB) Standard Industry Classification System (SICS) sub-category.

Scope 3 and impact reductions must be accelerated. Currently, 56% of actors in the sector by revenue have joined the UN Race to Zero, with most of these members achieving My Green Lab Certification for their labs, signaling rapid adoption and alignment with the 2030 Breakthrough Outcome.[8]

While these are important leading indicators of progress, Scope 3 emissions continue to dominate. Companies in the Asia-Pacific region, which are often included in the Scope 3 emission of large US and European companies, have the most carbon-intensive operations and have been slow to adopt zero carbon targets. Fortunately, the largest companies are now engaging in an ambitious suite of collective action programs to drive Scope 3 reductions through supplier standards, renewable energy purchasing, Active Pharmaceutical Ingredient (API) manufacturing and green labs that have shown significant progress in their first year. While this is very encouraging progress, these efforts must be accelerated and dramatically scaled up for the industry to prevent warming above a global average of 1.5˚C degrees, which the United Nations IPCC warns we must not cross if we hope to prevent the permanent and cascading effects of climate change.

Biotech and pharma make incredible contributions to the advancement of health and the progress of our society. Like few other industry sectors, these fields have ambitious and mission-focused companies, a culture of innovation, and the resources to lead the global fight against climate change. It is becoming increasingly clear that, through collective action, the largest companies can effectively influence their shared value chain and accelerate progress on Scope 3 reductions, which are the most challenging carbon reductions to address.

We are now seeing early signals that the biotech and pharma industry is crossing a tipping point of transformation and becoming a leader among the world's industries. The biotech and pharma industry has the potential to become a global leader in addressing climate change and serve as a model for others.

8 2030 Breakthroughs: Upgrading Our Systems Together https://climatechampions.unfccc.int/upgrading-our-systems-together/

KEY FINDINGS

01

Of the 149 biotech and pharma companies analyzed, 31% have medium-term (2026–2035) Scope 1 and 2 targets aligned with a 1.5°C pathway. Expanding these targets to include Scope 3 emissions is necessary to align with a 1.5°C pathway.

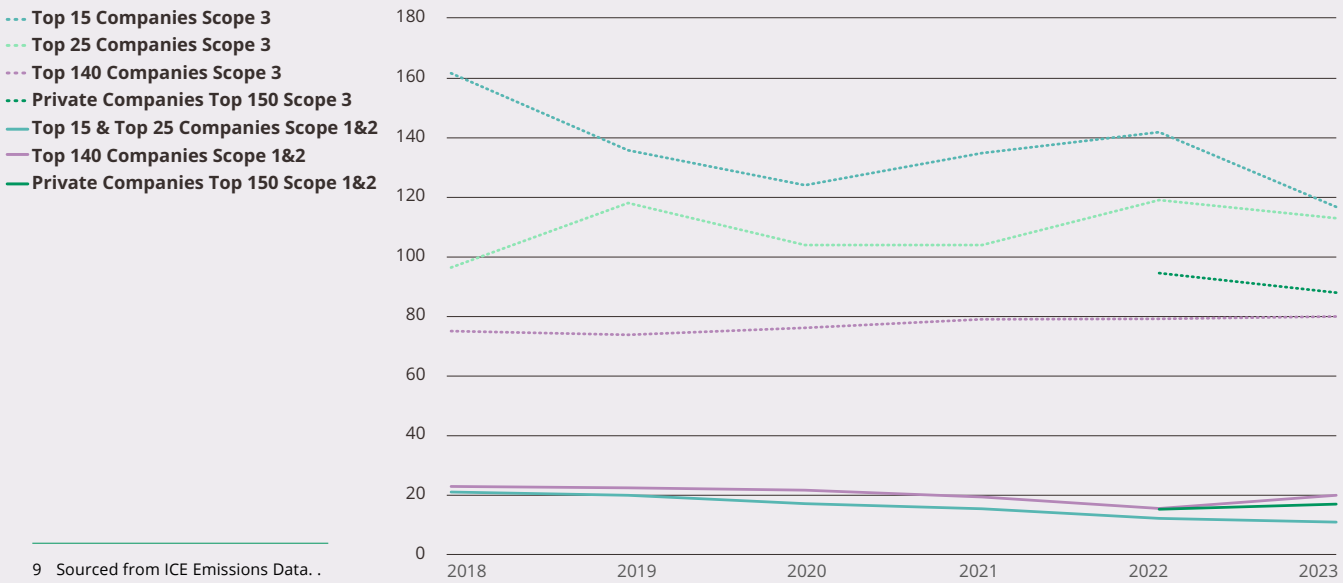
While the biotechnology and pharmaceutical industry sector has a significant global impact and is carbon intensive, some trends over the last six years show signs of progress. This is particularly true for the largest biotech and pharma companies by revenue, a finding that holds true for each version of this report from 2021-2024.

Scope 1 and 2 Emissions

This year's study finds that the top 25 and top 15 public companies have continued to reduce their annual Scope 1 and 2 carbon intensity by an average of 12% per year since 2018. When evaluating a broader cross section of the industry made up of 140 companies with the best quality data available for the last 6 years, emission

Figure 1: 6-Year Industry Carbon Intensity Trends[9]

Biotech and Pharma: Carbon Intensity (tCO_2e/$M Rev.), 2018-2023



9 Sourced from ICE Emissions Data. .

intensity decreased slightly (2% on average). Less encouragingly, private companies, have seen an 11% rise in Scope 1 and 2 emission over the past year.[10]

Scope 3 Emission

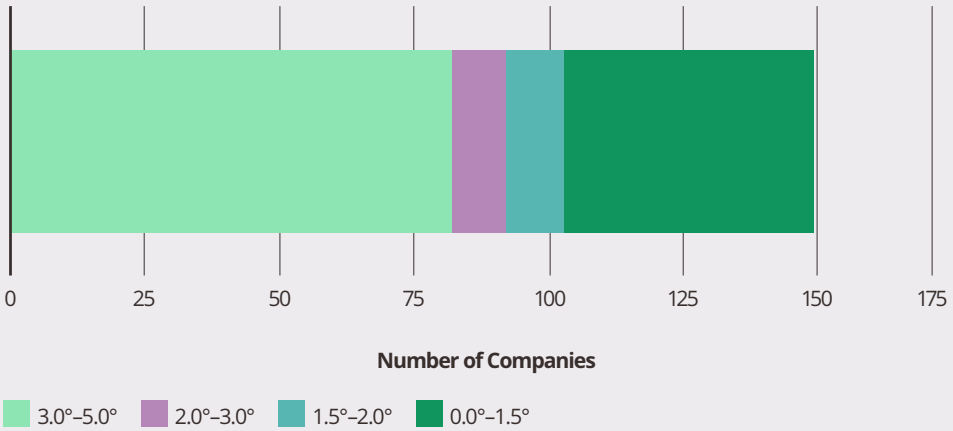
Looking over this same time period for Scope 3 emissions, Figure 1 shows that the top 25 public companies have slightly increased carbon emissions (4% annually on average) while the top 15 have decreased (5.7% annually on average). For the broader dataset (140 public companies), Scope 3 intensity has continued to rise slightly by an average of 1% annually. Private companies, on the other hand, have seen a 7% decrease in Scope 3 emission over the last year. Next year's report will crucial to understand if scope 3 reductions from the top 15 and top 25 public companies as well as private companies are one off or represent an ongoing trend.

While the largest companies are leading with ambitious carbon targets, and we are starting to see some year-on-year reductions, the rest of the industry is lagging. Of the 149 companies in our dataset for which the best data is available in 2023, 58% have set medium-term (2026-2036) targets for Scope 1+2 emission reduction.

Of that same group, 31% of the companies analyzed—46 out of 149—have set medium-term targets for Scope 1 and 2 emissions that are aligned with a 1.5°C world. This marks a significant milestone, as social science research indicates that when 25% of a population adopts a new behavior, it tends to spread rapidly throughout the rest of the cohort.[11] While this improvement is significant compared to last year, when only 10 companies had targets aligned with a 1.5°C pathway, the remaining companies either have not set any targets or are less ambitious than 1.5°C, which is insufficient to avoid the most devastating impacts of global climate change.

Figure 2: Scope 1+2 Medium Term Target Temperature Alignment (2026-2036)[12]

Ambition Coverage and Targets Coverage



While greater adoption of more ambitious targets is needed, commitments must also be backed up by tangible and measurable progress through action. To align with the Network for Greening the Financial System (NGFS Phase 4) Net Zero 2050 Scenario in 2030, the biotechnology and pharmaceutical industry must achieve a 19% carbon

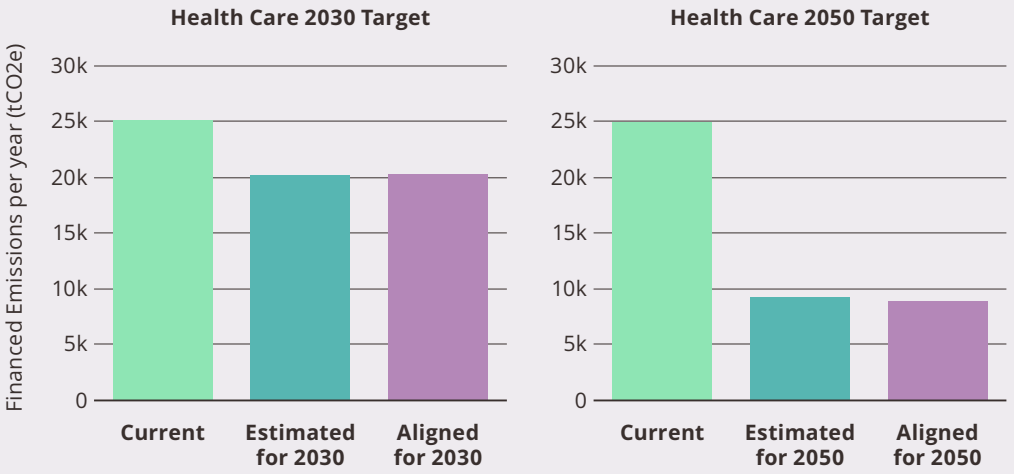
10 Only 140 public companies analyzed have historical data for the past 6 years.

11 Experimental evidence for tipping points in social convention https://www.science.org/doi/10.1126/science.aas8827

12 Sourced from ICE Climate Transition Analytics Platform and underlying analysis of ICE Emissions and Targets Data.

reduction in Scope 1 and 2 emissions compared to 2022 levels. In order to be aligned with the scenario in 2050, the industry will need to achieve a 64% reduction compared to 2022 emissions.[13] Encouragingly, the estimated Scope 1+2 emissions trajectories for the portfolio of 149 companies assessed (incorporating historical emissions and emission reduction targets), is currently on track with the NGFS Net Zero 2050 Scenario-aligned emissions levels for 2030 and 2050. In fact, the implied temperature rise (ITR) score for Scope 1 and 2 emissions of the companies analyzed is 1.18 degrees Celsius.[14] This indicates that not only are Scope 1 and 2 emissions reducing year-on-year, but as we project into the future, current targets are in fact aligned with a 1.5-degree world in 2100.

Figure 3: NGFS Net Zero 2050 Scenario (Phase 4) Scope 1 and 2 Reductions needed by 2030 and 2050[15]



Implied Temperature Rise Score based on NGFS Scenarios

Scope 1+2 Implied Temperature Rise: 1.18 °C

The MGL 2023 portfolio has an overall temperature score of 1.67°C (S1,2). This score is based on the cumulative estimated emissions of the portfolio to the year 2100. This is calculated using company- level emissions reduction targets and the historical emissions of companies within the portfolio, i.e. it includes actions to date and as well as commitments.

13 This chart evaluates financed emissions (Scope 1,2,3) and (Scope 1,2,) for 149 biotechnology and pharmaceutical companies with the best quality data (Category 1 and 2), for a representative portfolio value of US$ 1 billion. The estimated emissions highlight the expected annual financed emissions for the two target years (2030 and 2050), factoring in emission reduction targets set by the constituent companies. The aligned emissions display the level of annual financed emissions permissible, in order for the selected companies to be aligned to the sector-specific Net Zero 2050 scenario in the respective year (2030 or 2050)

14 This score is based on the cumulative estimated emissions of a representative equally weighted portfolio of 149 biotech and pharma companies, to the year 2100. This is calculated using company- level emissions reduction targets and the historical emissions of companies within the portfolio, i.e. it includes actions to date and as well as commitments. The selected Market Value metric for the portfolio ITR score calculation was Market Capitalization.

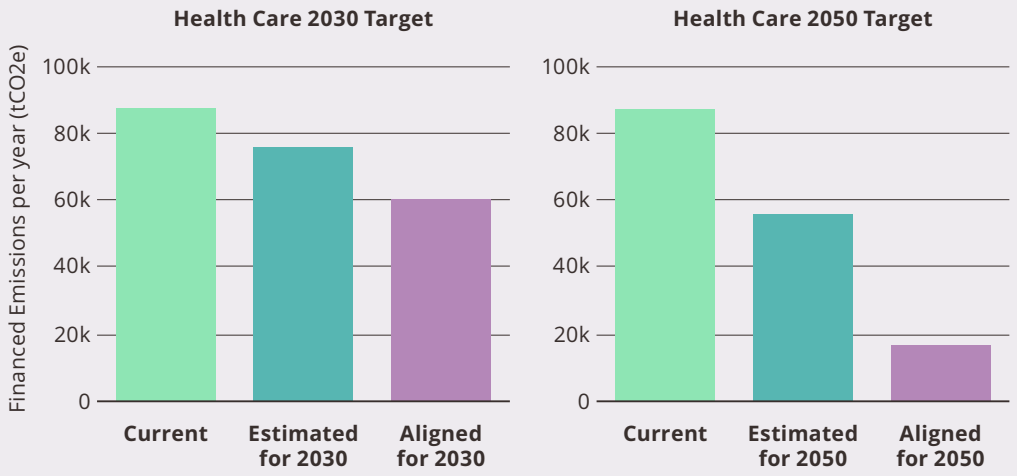
15 Sourced from ICE Climate Transition Analytics Platform and underlying analysis of ICE Emissions and Targets Data. This chart evaluates financed emissions (Scope 1,2,3) and (Scope 1,2,) for 149 biotechnology and pharmaceutical companies with the best quality data (Category 1 and 2), for a representative portfolio value of US$ 1 billion. The estimated emissions highlight the expected annual financed emissions for the two target years (2030 and 2050), factoring in emission reduction targets set by the constituent companies. The aligned emissions display the level of annual financed emissions permissible, in order for the selected companies to be aligned to the sector-specific Net Zero 2050 scenario in the respective year (2030 or 2050).

16 Definition Provided by ICE Climate https://www.ice.com/insights/sustainable-finance/temperature-alignment-whos-on-track-and-whos-come-off-the-rails

The Implied Temperature Rise (ITR) metric measures the alignment of decarbonization targets to a global temperature outcome under a set of forward-looking scenarios. The ITR metric can be applied to individual companies and to portfolios. First, ICE calculate the expected trajectory of the company's emissions (or financed emissions of a portfolio) and the corresponding scenario-aligned pathways using all the scenarios within the scenario database. By comparing the cumulative emissions of the expected trajectory to those of the scenario-aligned pathways, we can calculate the ITR of the company or portfolio. This calculation makes use of the approximately linear relationship between cumulative emissions and global mean temperature, described by the Transient Climate Response to cumulative Emissions (TCRE). ICE offer ITR scores for emission scopes 1+2 and for scopes 1+2+3, including consideration of the company's (or portfolio's) past emission performance. The temperature corresponds to end-of-century temperature, which is in line with the goals of the Paris Agreement.[16]

However, if Scope 3 emissions are included, the picture is less positive. The Net Zero 2050 NGFS scenario will require a 31% reduction from the current baseline by 2030 and an 81% reduction by 2050. When examining all three scopes, the emission reduction targets set by the 149 companies analyzed, are not sufficient to be aligned with NGFS Net Zero 2050 Scenario in 2030 or 2050. More aggressive targets across all three scopes must be adopted rapidly, as delays will only make emission reduction targets steeper and more challenging. The total implied temperature rise for Scope 1, 2, and 3 emissions for the biotech and pharma companies analyzed is 2.07°C—a relatively low figure compared to some global portfolio averages, but still insufficient to prevent the industry from contributing to global temperature rise beyond safe limits by the end of the century.

Figure 4: NGFS Net Zero 2050 (Phase 4) Scenario Reductions Scope 1, 2 & 3 needed by 2030 and 2050[17]



Implied Temperature Rise Score based on NGFS Scenarios

Scope 1+2+3 Implied Temperature Rise: 2.07 °C

The MGL 2023 portfolio has an overall temperature score of 2.07°C (S1,2,3). This score is based on the cumulative estimated emissions of the portfolio to the year 2100. This is calculated using company- level emissions reduction targets and the historical emissions of companies within the portfolio, i.e. it includes actions to date and as well as commitments.

17 Sourced from ICE Climate Transition Analytics Platform and underlying analysis of ICE Emissions and Targets Data. This chart evaluates financed emissions (Scope 1,2,3) and (Scope 1,2,) for 149 biotechnology and pharmaceutical companies with the best quality data (Category 1 and 2), for a representative portfolio value of US$ 1 billion. The estimated emissions highlight the expected annual financed emissions for the two target years (2030 and 2050), factoring in emission reduction targets set by the constituent companies. The aligned emissions display the level of annual financed emissions permissible, in order for the selected companies to be aligned to the sector-specific Net Zero 2050 scenario in the respective year (2030 or 2050).

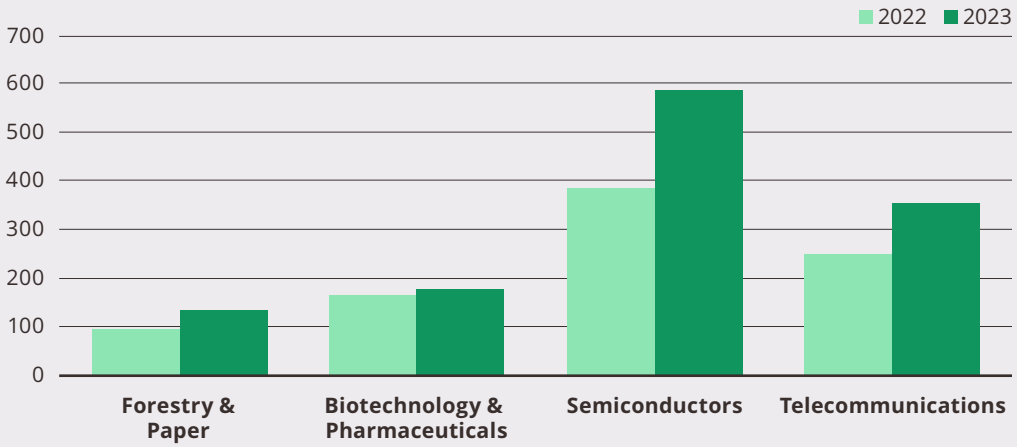
02

Based on an expanded dataset of public and private companies, the total carbon emissions in the biotech and pharma sectors (Scopes 1, 2, and 3) reached 397 million tCO_2-e in 2023—comprising 259 million tCO_2-e from public companies and 138 million tCO_2-e from private companies.

The 2022 version of this report found that the total absolute emissions (Scope 1, 2, and 3) for the biotech and pharma industry were lower than those of both the telecommunications and semiconductors industries, and this finding is consistent with this year's report. It is important to note that the biotech and pharmaceutical sectors are rapidly adopting artificial intelligence and machine learning,[18] which contribute significantly to an increasing carbon footprint due to the data centers needed for complex computations.[19] Additionally, while growth trends between sectors be easily compared, since we used the same companies within each sector for both 2022 and 2023, absolute emissions between sectors are more difficult to compare, as the number of companies considered in calculating each industry's total emissions is not the same. The dataset does also not necessarily include all companies in the respective sectors, only those directly analyzed by ICE

Considering only Scope 1 and 2, for category 1 and 2 data (the best quality data) the biotechnology and pharmaceutical industry is relatively carbon intensive, ranking 24th of 38 industries in 2023, remaining the same position as in 2022. While the industry needs to evaluate and address the entire value chain, emissions from Scope 1 and 2 remain crucial opportunities for carbon savings. To continue achieving meaningful emissions reductions, Biotech and Pharma must not ignore the impact of their operations. However, while substantial, Scope 1 and 2 are only a small portion of the industry's overall carbon footprint.

Figure 5: Total Sector Annual Carbon Output Comparison
Total Annual Emissions (tCO_2e) in Millions



18 Generative AI in the Pharmaceutical Industry https://www.mckinsey.com/industries/life-sciences/our-insights/generative-ai-in-the-pharmaceutical-industry-moving-from-hype-to-reality

19 Generative AI's environmental costs are soaring — and mostly secret https://www.nature.com/articles/d41586-024-00478-x

03

Absolute Scope 3 emissions in biotech and pharma are significantly higher than Scope 1 and 2 combined—5.4 times greater for public companies (with the highest quality data) and 6.5 times greater for private companies—primarily driven by purchased goods and services. In response, the industry has initiated a series of collective supply chain initiatives, achieving notable progress over the past year. However, these efforts must be accelerated for Scope 3 targets and emissions reductions to align with a 1.5 world.

The carbon impact of indirect emissions in a company's value chain is generally higher than emissions captured in Scope 1 and 2. Absolute Scope 3 emissions are 5.4 times larger than Scope 1 and 2 emissions combined for publicly-listed companies and 6.5 times larger for privately-owned companies.[20] While this may seem like a high ratio, in fact it is lower in comparison to other industry sectors, with a median ratio of 8.7. Companies with more accurate reporting, including AstraZeneca, show Scope 3 to be more than 19-fold that of Scope 1 and 2.[21]

Therefore, when factoring in Scope 3 emissions, and looking at the best quality data, the biotechnology and pharmaceutical industry appears less carbon intensive as compared to other intensive industries, ranking only 34th, out of 38, with a slight improvement compared to last year where the industry ranked 33rd. This is in contrast to the ranking above, excluding Scope 3, where the biotechnology and pharmaceutical industry ranked 24th out of 38.

This difference may be the result of inconsistent approaches taken for evaluating Scope 3 emissions throughout this industry, or that Scope 3 plays a more significant role in driving overall emissions for certain sectors compared to others. Additionally, Scope 3 measurements and accounting are generally more complex and diverse across sectors compared to Scope 1 and 2. Determining exactly how biotech and pharma compares on Scope 3 to other industry sectors will require additional research and engagement from companies in the sector. Based upon an evaluation of 149 companies with the best quality data, emissions are highly variable from one company to the next: total Scope 1, 2 and 3 emission intensities range from 2.7 million metric tons CO2 equivalent per million USD in revenue (tCO2-e/$m) to 1,826.1 tCO2-e/$m.

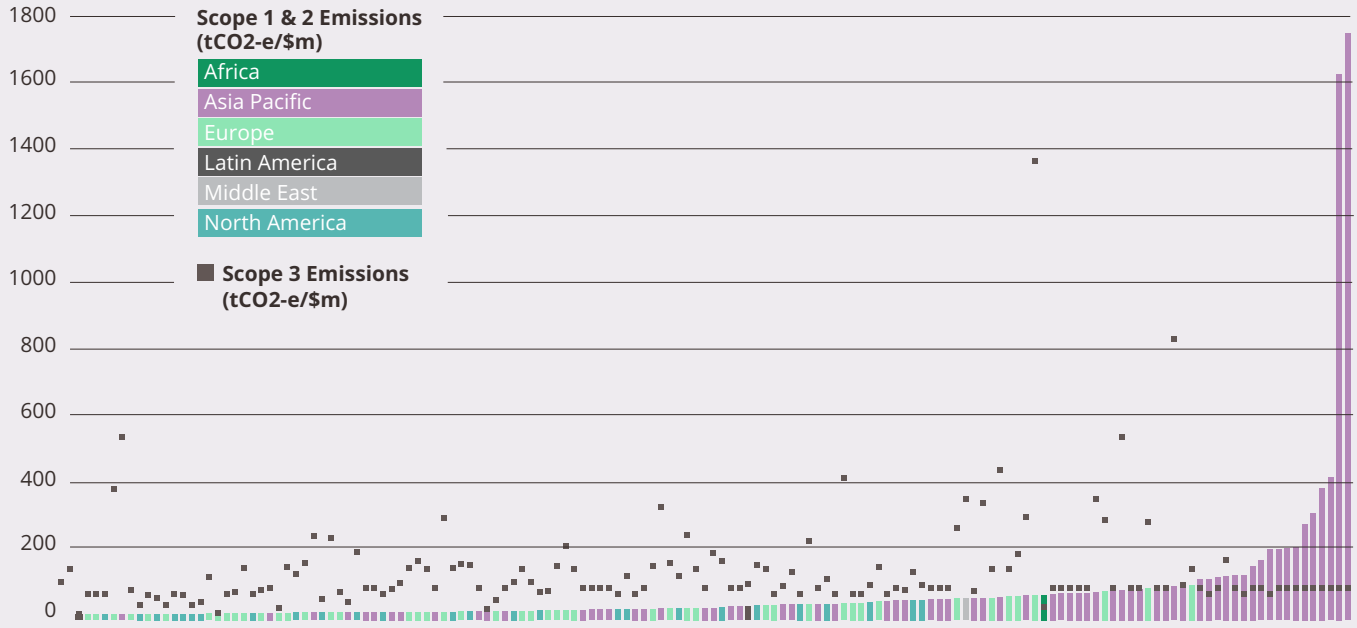
The variability may be attributed to several factors, including the methodology used for calculating Scope 3 emissions, the company's location, the type of research and manufacturing activities it engages in, and the frequency and manner in which it utilizes contract manufacturing organizations and contract research organizations, which is a growing trend.[22] Outsourcing research and manufacturing allows for increased capacity and specialization without adding to the company's operational overhead or Scope 1 and 2 carbon footprint. This underscores the importance of evaluating total emissions across a company's entire supply chain, not just the direct emissions.

20 Scope 3 reporting standards are still relatively immature, many companies still do not fully report against all scopes or have incomplete disclosures. Further, it is difficult to quantify the carbo impact of the extensive value chain in this industry and many others. It is likely that the proportion of reported Scope 3 in this and other industries will continue to rise as companies more accurately report.

21 Net Zero Case Study AstraZeneca, Science Based Targets Initiative https://sciencebasedtargets.org/companies-taking-action/case-studies/net-zero-case-study-astrazeneca

22 Current Trends and Strategic Options in the Pharma CDMO Market (2019): https://www.pwc.de/de/gesundheitswesen-und-pharma/studie-pharma-cdmo-market.pdf

Figure 6: Company Level Comparison of Scope 1, 2 and Scope 3
Sourced from ICE Emissions Data



Based on the past six years of reported and inferred emissions data, Scope 3 emissions increased significantly from 2018 onwards as the largest companies by revenue began to include scope 3 in their reporting. Meanwhile the rest of the industry is catching up to these reporting trends. Overall, there remains a high degree of variability between the intensity of Scope 3 emission data, ranging from 2.6 tCO2-e/$m at the lowest end to 1,361.92 tCO2-e/$m at the high end.

Similar to the findings in last year's report, there is strong correlation between region and carbon intensity. North American and European-based companies tend to have much lower carbon intensities for Scope 1 and 2 (18.23 tCO2-e/$m, on average) than their Asia-Pacific counterparts (122.62 tCO2-e/$m, on average). The regional difference may in part be explained by the tendency of North American and European-headquartered companies to focus on research and development in-house while outsourcing manufacturing to the Asia-Pacific region, particularly for Active Pharmaceutical Ingredients (APIs).[23] Companies with headquarters in the Asia-Pacific region also tend to have more carbon-intensive energy grids, particularly in China and India, though this is improving.[24] It appears that the quality of the data reporting is influencing Scope 3 industry impacts, as currently only the largest European and US biotech and pharmaceutical companies report their Scope 3 data. For most of the companies headquartered in Asia-Pacific and the Middle East, Scope 3 data has been inferred, illustrated by the straight line up of Scope 3 emission data across the right side of Figure 6.[25]

Ultimately, sector-level reporting standardization that guides this industry's carbon disclosure practices, particularly of Scope 3 emissions, are necessary to better inform comparisons between companies and enable performance benchmarking. The

23 Decarbonising Healthcare Supply Chains, Recommendations on how to drive emissions reductions across healthcare supply chains (2022) https://a.storyblok.com/f/109506/x/c8d17852a1/smi-hstf-supply-chains-whitepaper.pdf

24 Assessing China's Energy and Climate Goals (2021) https://www.americanprogress.org/issues/security/reports/2021/05/06/499096/assessing-chinas-energy-climate-goals/

25 Please see Carbon Accounting Methodology Section for details on how Scope 3 has been inferred

Pharmaceutical Environmental Group has made progress on standardizing Scope 3 reporting through a guidance document published in 2020, though companies still have considerable flexibility in how they report and use the guidance.[26] A common calculation methodology using Environmentally-Extended Input Output (EEIO) emission factors based on national GHG data can only generate a rough estimate. Product-level emissions would be more accurate and could be shared between companies that have similar supply chains.

In pursuit of more accurate product-level reporting, the Pharmaceutical Environmental Group and the Pharmaceutical Supply Chain Initiative formally launched a Pharma LCA Consortium to create a common approach for assessing the environmental impact of pharmaceuticals. In March, they published a report outlining the key technical work necessary for developing a universal, consensus-led standard to consistently report product impacts.[27]

Further up the value chain, My Green Lab is currently producing generic carbon footprint data on the 20 most purchased lab supplies in order to set the technical foundation for Product Category Rules (PCR) for laboratory supplies. As Product Carbon Footprints (PCFs) and Life Cycle Analysis (LCA) becomes more widely adopted, common PCRs will be necessary to maintain consistency and comparability between evaluations, enable purchasers to calculate carbon footprints effectively and reduce their impact through preferential selection of lower carbon products.

The high variability in emissions between companies cited above demonstrates the importance of more consistent reporting. However, the primary contributors to Scope 3 emissions across biotechnology and pharmaceutical companies with the highest quality data are clear, with an even greater percentage focused on Category 1, 'Purchased Goods and Services' than last year's report. Purchased Goods and Services account for 79%, while Category 2, 'Capital Goods', comes in second, at 10%, and category 4 ''Upstream Transportation and Distribution' at 5%.

26 Scope 3 greenhouse gas emissions calculation: guidance for the pharmaceutical industry (2020) https://pscinitiative.org/resource?resource=779

27 A Collaborative Approach to Develop Product Category Rules for Pharmaceutical Products https://peghub.org/lca

28 https://www.environdec.com/product-category-rules-pcr/the-pcr

A Product Category Rule (PCR) is a standardized set of guidelines for conducting Life Cycle Assessments (LCAs) and producing Environmental Product Declarations (EPDs) within a specific product category. PCRs define the methodology, data sources, and environmental impact categories to focus on, such as carbon footprint or water use. By establishing these rules, PCRs ensure that LCAs for similar products are consistent and comparable, allowing for fair and accurate comparisons between products within the same category.

PCRs are essential for transparency, credibility, and informed decision-making. They enable consumers, companies, and regulators to evaluate products' environmental impacts with confidence, supporting sustainable procurement practices. Additionally, PCRs help industries align with regulatory requirements and market expectations for sustainability, while enabling companies to track and reduce their carbon footprints. This consistency not only supports environmental responsibility but also fosters a more sustainable market by promoting emissions reduction across entire product categories.[28]

Figure 7: Scope 3 Sector Materiality Assessment

Scope 3 Sector Profile		Biotechnology & Pharmaceuticals (Private)	Biotechnology & Pharmaceuticals	Forestry & Paper	Semi-conductors	Telecommunications
1	Purchased Goods and Services	83%	79%	48%	84%	48%
2	Capital Goods	7%	10%	2%	9%	28%
3	Fuel- and Energy-Related Activities	3%	3%	12%	3%	7%
4	Upstream Transportation and Distribution	4%	5%	9%	2%	1%
5	Waste Generated in Operations	1%	1%	1%	0%	0%
6	Business Travel	1%	1%	0%	0%	0%
7	Employee Commuting	1%	1%	0%	1%	1%
8	Upstream Leased Assets	0%	0%	0%	0%	0%
9	Downstream Transportation and Distribution	1%	1%	11%	0%	0%
10	Processing of Sold Products	0%	0%	15%	0%	0%
11	Use of Sold Products	0%	0%	0%	0%	14%
12	End-of-Life Treatment of Sold Products	1%	0%	2%	0%	0%
13	Downstream Leased Assets	0%	0%	0%	0%	0%
14	Franchises	0%	0%	0%	0%	0%
15	Investments	0%	0%	0%	0%	0%

Based on the highest quality data from 2023, biotech and pharma has a much greater impact from their 'Purchased Goods and Services' than other similar industries, where a greater proportion comes from Category 11 'Use of Sold Goods and Services'. Therefore, consistent with last year's findings, Scope 3 reductions in biotech and pharma should be primarily focused on the supply chain of purchased goods and services.

Decarbonizing Scope 3 emissions will require companies to engage their customers and suppliers to reduce their emissions through energy efficiency, waste reduction, and resource efficiency, while encouraging the purchase of renewable energy and/or carbon offsets.[29] Fortunately, there are a number of collective action initiatives now championed by the largest pharma companies that are focused on supplier requirements, renewable energy purchasing, API manufacturing, and promoting green labs and purchasing green products through My Green Lab Certification and ACT. Together these initiatives should work to drive emissions reductions across the pharma and biotech value chain, with a particular focus on Asia-Pacific-based companies that have the highest carbon intensity and have largely not set zero carbon targets. A full description of these initiatives is outlined in the Collective Action section later in this report.

29 Decarbonising Healthcare Supply Chains, Recommendations on how to drive emissions reductions across healthcare supply chains (2022) https://a.storyblok.com/f/109506/x/c8d17852a1/smi-hstf-supply-chains-whitepaper.pdf

04

The largest companies by revenue are making rapid progress in adopting the UN Race to Zero. 36 companies (56% of the sector by revenue) have committed to the campaign, an increase from 28 companies (46% by revenue) at this time last year. Progress towards the Breakthrough Outcome has also been swift, with 61% of Pharma and Med Tech companies in the campaign having started a My Green Lab Certification, and 68% of those programs at global scale.

Another positive trend is the growing number of companies in the industry that are committing to science-based targets and joining the UN Race to Zero campaign.[30] The High-Level Climate Champions 2030 Breakthrough report outlined three measurable and achievable goals for the short, medium, and long term to drive industry decarbonization. These goals included:

- The 'Breakthrough Ambition', when at least 20% by revenue of sector-specific key actors must join the Race to Zero by 2021
- The 'Breakthrough Outcome' that indicates a key, measurable leverage point to drive system changes by 2030
- Sector net zero by 2050

At the time this report was published, 56% of the largest companies by revenue in Pharma and Med Tech have committed to the Race to Zero,[31] up from 46% last year.[32] These companies have pledged to cut total carbon emissions by 50% by 2030 and reach net zero emissions by 2050 or sooner.

30 https://racetozero.unfccc.int/

31 This study uses the SASB SICS sub-category of Biotechnology and Pharmaceutical, while the UN Race to Zero defines the sector as any company in Pharma and Medtech over $1 billion in revenue. While there is considerable overlap, this study excludes medical technology and supplies to avoid double counting the supply chain in the total sector evaluation.

32 Pharma & Medtech announce critical climate breakthrough (2021) https://racetozero.unfccc.int/ pharma-med-tech-announce-critical-climate-breakthrough/

Figure 8: UNFCCC Race to Zero Systems Transformation Model

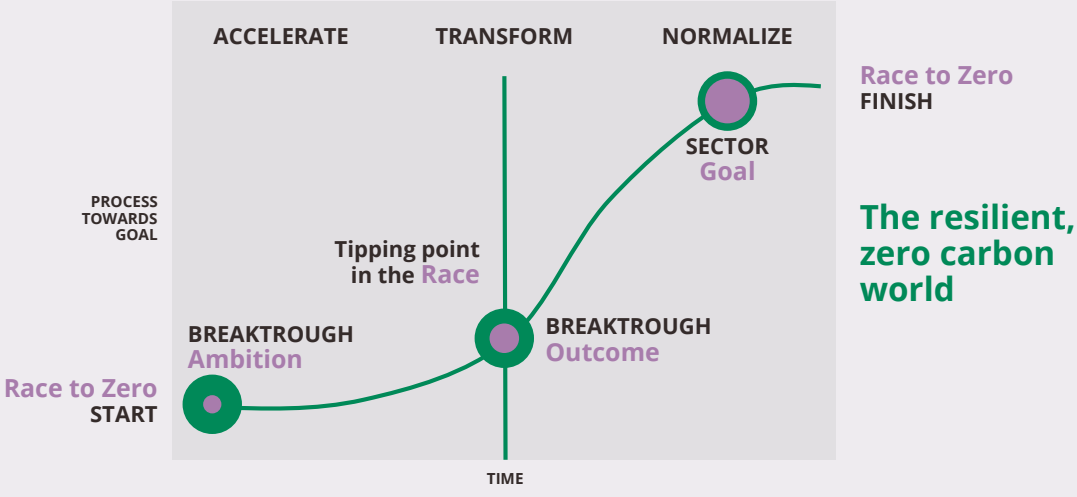
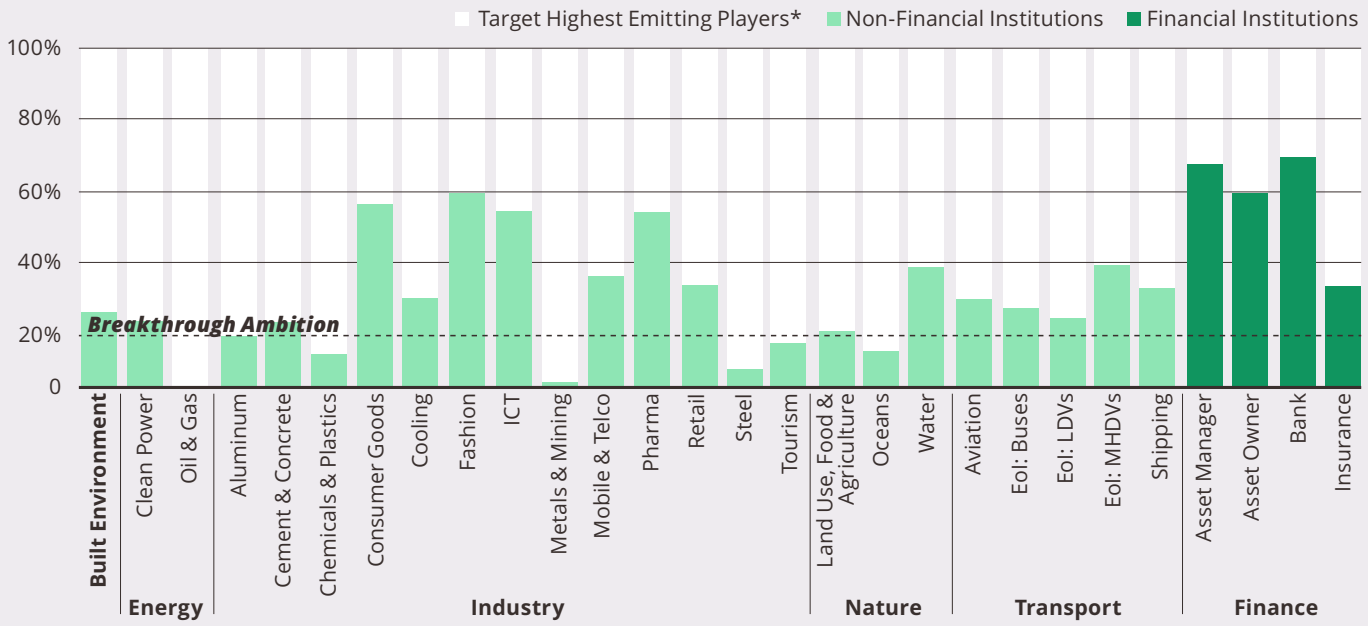


Figure 9: Tracking Corporate Breakthrough Ambitions



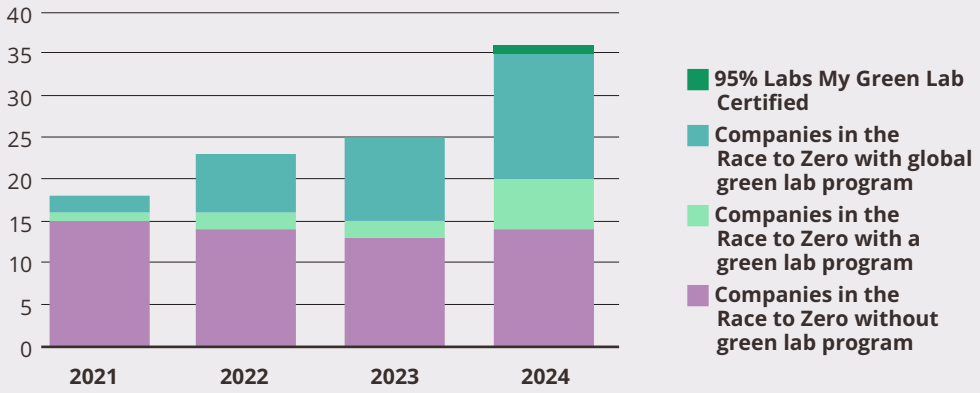
The sector achieved the 'Breakthrough Ambition' in 2021 when over 20% of major companies by revenue committed to the Race to Zero. At the point of the Breakthrough Ambition, "sufficient momentum is generated among a critical mass of key actors, enabling them to break away from the business-as-usual path and together deliver breakthrough outcomes at pace." Biotech and Pharma now has the most major companies committed to the Race to Zero of any industry sector other than financial services, consumer goods, fashion, and Information and Communication Technology (ICT).[33]

Due to its focus on key leverage points and the potential to drive measurable change, My Green Lab Certification was selected in 2021 as a key indicator of progress for the UNFCCC High-Level Climate Champions' 2030 Breakthroughs, setting a goal that "95% of labs across major Pharma and Med Tech companies are My Green Lab Certified at the highest level by 2030."[34] Achieving that 'Breakthrough Outcome,' along with other decarbonization strategies, will be a crucial action to ensure the industry progresses to a net zero future. In addition, developing a robust green lab program at every company will help instill a culture of sustainability within the organization, which has benefits that go well beyond energy, water, and waste reductions. For example, a positive culture of sustainability can influence better purchasing decisions, a key target for Scope 3 carbon savings.

33 https://racetozero.unfccc.int/join-the-race/whos-in/

34 Upgrading Our Systems Together: A global challenge to accelerate sectors breakthroughs for COP26 — and beyond (2021)

Figure 10: Sector Progress to Race to Zero and Breakthrough Outcome



Since first publishing this report in November 2022, companies have made significant progress towards the Breakthrough Outcome. 61% of companies in the Race to Zero sector have started a green lab program, with nearly 68% of those now achieving the My Green Lab Certification at a global scale, including 1 company, Biogen that has certified 100% of their labs, achieving the breakthrough outcome target.[35]

35 Global programs include program with at least 10 labs in multiple countries.

Turning Commitment Into Action

To meet the targets of the Paris Climate Agreement, the industry must continue to improve the quality and comparability of reporting, while taking rapid and measurable actions on industry carbon footprinting and supply chain engagement.

Accurate reporting will provide a clear baseline from which to measure improvements and identify key hotspots for change. After targets are aligned with a 1.5 degree pathway, practical action plans must be put in place to reduce emissions within the most direct control of each company (Scope 1 and 2) and encourage suppliers and customers to measure and reduce their own emissions. Sharing data on a pre-competitive basis across the industry will improve the quality and actionability of reporting, as will the adoption of common industry-wide sustainability frameworks.

Progress in understanding the healthcare supply chain and identifying opportunities for impact is crucial. A 2021 report from the Sustainable Markets Initiative identified barriers and opportunities for healthcare supply chain changes, including biotech and pharma.[36] They have also released a study identifying opportunities to reduce the carbon impact of clinical trials.[37]

In advance of COP 29, Accenture and the Pharmaceutical Supply Chain Initiative released a playbook serving as a strategic guide for pharmaceutical companies aiming to achieve net-zero emissions. Designed as a "solutions-first" document, it provides 24 targeted interventions tailored to the pharmaceutical industry's specific needs. The interventions cover critical areas like emissions reduction potential, costs, and regulatory complexity. Together they are intended to aid companies in actively addressing carbon emissions within a structured framework. In the "Taking Action" section, practical solutions are mapped across the drug development cycle, including product design & development, sustainable R&D, production and manufacturing, supply chain and logistics, energy and infrastructure, green IT, marketing, and outreach. Specific actions range from implementing sustainable clinical trial design and green lab practices to upgrading energy systems and adopting low-carbon IT solutions. These actions offer a comprehensive roadmap for companies to integrate sustainability into all facets of healthcare operations, ensuring a holistic approach to achieving net-zero goals.[38]

My Green Lab Certification and the ACT Label are examples of common, industry-wide sustainability frameworks that are crucial tools for turning commitments into measurable impact. They provide a roadmap of practical opportunities for companies, scientists, and their suppliers to take positive, meaningful action. Among other impact categories, My Green Lab Certification focuses on reducing energy consumption for Scope 1 and Scope 2

36 Decarbonising Healthcare Supply Chains: Recommendations on how to drive emissions reductions across healthcare supply chains, (2022) https://a.storyblok.com/f/109506/x/c8d17852a1/smi-hstf-supply-chains-whitepaper.pdf

37 The Digital Solution for Sustainability in Clinical Research (2022) https://a.storyblok.com/f/109506/x/42119be232/smi-hstf-digital-health-whitepaper.pdf

38 Decarbonization Playbook for the Pharmaceutical Industry https://pscinitiative.org/resource?resource=2573

emissions both through direct laboratory operations and from contract laboratories within the research and development value chain. The new 2.0 version of the program includes an impact estimator that will allow organization to track their carbon and other impact reductions across multiple certifications as well as calculate financial ROI.

The ACT Label helps companies reduce the impact of lab supplies and suppliers by providing necessary transparency and third-party verification of the environmental impact of lab products to facilitate the selection of lower-emission products. Additionally, the ACT Label Program evaluation framework ensures manufacturers make products with a focus on sustainability, and operate efficiently. The addition of carbon footprinting in the ACT 2.0 version of the program will help to provide better Scope 3 data for lab supply chains reporting and encourage preferential purchase of lower carbon products.

Collective Action to Transform Supply Chains

Recent efforts to align and harmonize supply chain requests across the largest pharma companies are starting to accelerate and transform supply chain actions. While many companies have individually been establishing strong supplier requirements and requests to help drive Scope 3 reductions, different and at times conflicting requirements have led many suppliers to wait until the set of requirements becomes clear. Harmonization of supplier requirements by the Sustainable Markets Initiative and forums such as the Pharmaceutical Supply Chain Initiative are helping to create industry alignment. To tackle the challenge of addressing Scope 3, the industry has launched a suite of collective action programs to align requests and support suppliers in measuring and implementing supply chain reductions. A selection of these initiatives outlined below are beginning to have a powerful impact on suppliers with great potential for rapid and effective action.

Sustainable Markets Initiative: Health Systems Task Force

The Health Systems Task Force[39] is taking joint, scalable action to accelerate the delivery of net zero healthcare—to improve individual, societal, and planetary health. The task force is convened by AstraZeneca CEO Sir Pascal Soriot, and was launched at COP 26. Members include CEOs and other leaders from AstraZeneca, GSK, Merck KGaA, Novo Nordisk, Roche, Samsung Biologics, Sanofi, Karolinska Institutet, National Health Service England, the Sustainable Healthcare Coalition, UNICEF, the University of Pavia, and the World Health Organization (WHO). Last year ahead of COP27 the task force launched sector-first commitments, actions, and recommendations to deliver near-term targets and support the transition to net zero, sustainable healthcare. These actions focus on three priority areas: Supply Chain and Patient Care Pathways, Decarbonization, and the use of Digital Innovation in Clinical Research. The specific supply chain requirements were codified in a letter listing minimum requirements.[40]

39 Healthcare Systems Task Force Website https://www.sustainable-markets.org/taskforces/health-systems-taskforce/

40 Open Letter to Suppliers, Health Care Systems Task Force https://a.storyblok.com/f/109506/x/5388424c6e/joint-ceo-letter_final_200723.pdf?cv=1689688147120

These joint, minimum supplier targets are as follows:

- Assess and disclose Scope 1, 2, and 3 emissions by 2025.
- By 2025, commit to set near-term targets aligned with the 1.5-degree pathway (SBTi)
- By 2025, set targets to reduce waste (including solvents) and energy, and reuse materials in manufacturing.
- Commit to switching to at least 80% renewable power by 2030 and make the commitment public.
- By 2030, explore options to source green heat.
- Transport suppliers to make SBTi-aligned commitments by 2025 and include green transportation solutions in their core offering by 2030.
- Commit to setting standards for their own suppliers.
- Set targets to increase water efficiency and commit to adopting water stewardship standards.

The aligned targets are already having a significant impact on the industry, although many suppliers that are based in the Asia-Pacific Region and have the largest carbon intensity are lagging. Fortunately, in January 2024 AstraZeneca, Lonza, Novartis, Novo Nordisk and Roche sign agreement in China with green technology company Envision Energy to unlock access to renewable power, resulting in potential annual carbon dioxide equivalent savings of around 120,000 tonnes.[41]

Energize

Energize is a pioneering program powered by Schneider Electric's NEO Network™ in collaboration with the Pharmaceutical Supply Chain Initiative (PSCI). It is designed to drive decarbonization across the pharmaceutical and healthcare supply chains, targeting substantial Scope 3 emissions produced by healthcare systems through join renewable energy purchasing agreements.

In September 2024, Energize celebrated a major milestone with the launch of its first multi-buyer Power Purchase Agreement (PPA). Through this PPA, eight companies are collectively procuring renewable energy from seven new solar projects in Spain, developed by Zelestra and Bruc. The agreement represents an annual purchase of 563.7 GWh of renewable electricity, avoiding approximately 393,795 metric tons of CO2 emissions each year, equivalent to the annual energy consumption of over 51,000 households.

41 https://a.storyblok.com/f/109506/x/2ccbe00700/240116-smi-renewable-power-china-announcement.pdf

The initiative has recently welcomed new sponsors—Almirall, Bayer, Kenvue, Sandoz, and Schott—and extended its commitment until 2028 to ensure sustained impact. These accomplishments exemplify Energize's mission to expand renewable electricity access within the pharmaceutical and healthcare supply chain, demonstrating the power of collective action in achieving meaningful environmental impact.

MANUFACTURE 2030

Activate

Activate,[42] a program run by Manufacture 2030, is designed to leverage the collective purchasing power of Large Pharma to gather data on Active Pharmaceutical Ingredient (API) to enable environmental impact reductions of the healthcare sector by gathering data on Active Pharmaceutical Ingredient (API) manufacturers, strengthening relationships, and helping align towards science-based decarbonization targets. Manufacture 2030 provides a decarbonization software platform for data collection and provides suppliers with best practice with recommendations for operational and resource efficiency including calculators for carbon benefit and return on investment.

Participating pharmaceutical companies gain access to projections of the decarbonization pathway for API suppliers. This increased visibility can aid climate risk assessment and empower supply chain owners to support suppliers in meeting their climate targets. As this report noted, the most carbon-intensive companies within the pharma value chain are based in China and India and often do not have mature carbon reduction measurements or goals, so this program holds promise for supporting companies that may not yet have been engaged.

Rolling out across more than 20 countries, the Activate program's immediate focus includes onboarding API suppliers, capturing footprint data, establishing a reference point baseline, and tackling the most prominent areas of environmental impact. The second phase of Activate is planned to launch in April 2024 and will see M2030 bring participants together to explore solutions to more complex challenges.

These will include support for building product carbon footprints (PCFs) at scale; deploying new tools and technologies collaboratively; and promoting access to green finance for decarbonization projects via independent financial partners.

converge
my green lab supplier initiative

Converge

Converge, launched at COP 28 in Dubai by My Green Lab, aims to harness the collective power of the pharmaceutical industry to encourage suppliers to reduce the environmental impact of their lab operations through My Green Lab Certification.[43] This program engages large pharmaceutical companies with at least 10 labs enrolled in My Green Lab Certification, urging them to motivate their suppliers, including CROs and CDMOs with significant

42 Activate Program Website https://manufacture2030.com/how-we-work/activate-program

43 https://www.mygreenlab.org/converge.html

laboratory operations, to certify their labs. This effort aligns with the 2030 Breakthrough Outcome target of having 95% of all labs certified at the highest level.

The vision of Converge includes:

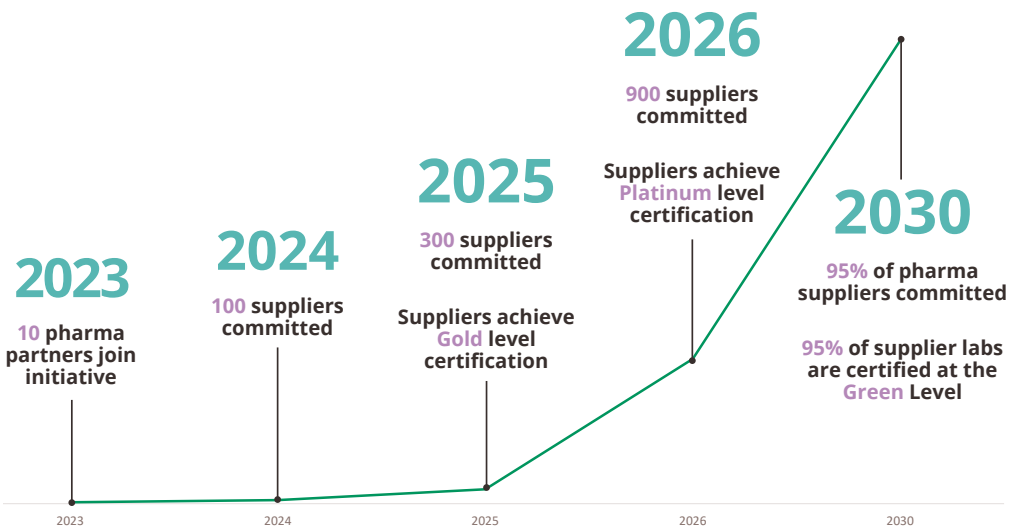
- Every supplier lab fostering a thriving culture of sustainability.
- Every scientist within the pharma supply chain understanding how their actions contribute to lab sustainability.
- The pharmaceutical sector leading the world in supply chain engagement and inspiring other sectors to enhance their engagement.

Converge—Year 1 Progress

Launched in November 2023 at COP 28 in Dubai, My Green Lab and our Converge Founding Sponsors (Amgen, AstraZeneca, BMS, GSK, Merck KGaA) set out a bold vision to address the growing role of Scope 3 emissions within Pharma's value chain. The goal for the first year is to secure commitments from 100 unique suppliers and onboard five additional pharma partners to drive the adoption of My Green Lab Certification towards the UN Race to Zero's breakthrough outcome of certifying 95% of labs.
At the time of this writing, Converge is well on track, with 72 suppliers committed—30 of which have already initiated pilot certification projects—and two suppliers achieving 95% lab certification.

In 2024, Takeda and UBC joined as new sponsors, further extending the initiative's reach and influence. Looking ahead to 2025, Converge's goal is to have 300 suppliers on the platform, with all enrolled suppliers achieving "Gold" level certification or higher. To drive engagement, My Green Lab will host a series of education and training programs supported by our partners.

Figure 10: Target Setting for the Converge Program



Conclusion

Biotech and pharmaceutical companies are well-positioned to be a leader on environmental sustainability due to their technical expertise, culture of innovation, and financial resources. With a shared supply chain and collaborative industry organizations, these companies can align requirements and drive Scope 3 reductions effectively. Few industries have more experience making long-term capital investments to address complex societal challenges.

Over the past year, the industry has reached a tipping point of transformation, with 33% of the 149 companies analyzed setting Scope 1 and 2 targets aligned with a net-zero pathway. The largest companies in the sector have shown significant progress, achieving year-over-year carbon reductions, enhancing reporting practices, and driving collective action programs to decarbonize their Scope 3 supply chain. However, ambitious target-must be expanded to include Scope 3: pilot programs need to be scaled up, and industry-wide reporting standards should be harmonized to achieve our zero carbon goals.

Biotech and pharma have the potential to lead the global race to zero carbon, setting an example for the world. The industry is now at a tipping point of transformation, poised to make rapid strides toward decarbonization.

Opportunities for Continued Research

More research will be needed into the drivers of Scope 1 and 2 emissions and the distribution of those emissions between research and manufacturing.

Case studies on the specific carbon reduction benefits of interventions like Activate and Converge described in this paper will need to be tracked over time. My Green Lab will be charting the industry's progress relevant to the crucial activities identified in this report, including consistent and standardized reporting of Scope 1, 2, and 3 emissions, and encouraging industry-wide Scope 3 emissions reporting that allows meaningful comparison between companies and the sharing of data. My Green Lab will also examine areas that remain poorly quantified, such as the overall carbon impact of laboratories and lab supply chains, transportation of products that must be stored at specific temperatures and the disposal of regulated medical waste. This study will be updated regularly for the UN Conference of Parties to continue measuring progress in the Race to Zero campaign and Breakthrough Outcome goal and provide consistent monitoring of the industry's progress towards a zero-carbon future.

Carbon Accounting Methodology Note

This report leverages ICE's Emissions and GHG Emissions Reduction Target datasets.

ICE's coverage of emissions data includes both directly reported and estimated emissions (where data is not reported). ICE conducts quality assurance on reported data and, where data is reported as incomplete or misreported, ICE uses statistical models to fill the gap. The model used to produce the estimated emissions is built on a robust statistical methodology, which utilizes ICE's reported emissions dataset of over 9,000 companies to understand emissions hotspots, in combination with other methodology requirements. Emissions hotspots are typical emissions intensities for certain industries and company sizes. This subsequently underpins the estimation of Scope 3 emissions across the individual categories at an entity level or Scope 3 category level, where data is not reported or available.

ICE has updated its estimation model to improve robustness and granularity since My Green Lab's 2023 report. Some of the key updates, among others include:

- Expanded coverage: ICE's 2023 emissions dataset directly analysed over 9,000 companies, compared to 5,500 companies in 2022.
- Use of median instead of mean as the preferred metric for analysis of sector emissions, sector rankings and sector trends analysis. Median is a more robust metric to conduct average analysis, particularly when the data range has expanded. Median is also not affected by outliers.
- Reported Scope 3, in addition to Scope 1 and 2, data was not winsorized. This change is driven by increased and improved emissions reporting by companies.

As a result, last year's analysis should not be directly compared to this year's study due to methodology changes. Any historical and year-on-year analyses discussed in the report include analysis of previous emissions datasets under the new methodology. ICE's historical GHG Emissions Reduction Targets data remains unchanged.

Scope 3 emissions represent more than

85%

of the world's overall footprint

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