



# The Carbon Impact of Biotech & Pharma

COLLECTIVE ACTION ACCELERATING  
PROGRESS TO THE UN-BACKED  
RACE TO ZERO

Produced by My Green Lab with contribution from Intercontinental Exchange (ICE). Originally released October 2021, revised and updated with new data and analysis, December 2023.



# Executive Summary

The following study is based on emissions and emission-reduction targets 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 226 publicly-listed companies and 147 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 therefore must be part of the global climate solution. While this year's report shows great progress with more companies joining the Race to Zero, and some notable successes in the largest companies making year-on-year intensity reductions, the pace of accomplishments must be greatly accelerated for the industry to remain below the 1.5°C threshold that the UN's Intergovernmental Panel on Climate Change (IPCC) warns our planet should not cross.

## Summary of Key Findings

01

While the largest companies by revenue have established zero carbon goals and work to reduce Scope 1, 2 and 3 emissions, 90% of the 91 public companies analyzed in the sector still do not have targets (for Scope 1 and 2) in the short-term (2021 - 2025) that are aligned with a 1.5°C increase world.

02

The total carbon impact of the industry has continued to increase annually, from 3.9% in 2021 to 5% in 2022. An update to the ICE emissions inference methodology has contributed to revised carbon emissions (Scope 1, 2 and 3), amounting to 163 million tCO<sub>2</sub>e for public companies and 30 million tCO<sub>2</sub>e for private companies for a total of 193 million tCO<sub>2</sub>e in 2022.

03

Scope 3 emissions are 4.6-fold Scope 1 and 2 combined, with the vast majority of Scope 3 emissions coming from purchased goods and services. In response, the industry has launched a suite of collective initiatives that show great promise in reducing Scope 3.

04

The largest companies by revenue are making rapid progress in adopting the UN-backed Race to Zero. Thirty five (35) companies (53% of the sector by revenue) have committed to the campaign, an increase from 30 companies (46% by revenue) at this time last year. Progress towards the Breakthrough Outcome has also been swift, with 63% of Pharma and Med Tech companies in the campaign having started a My Green Lab Certification, and nearly half of those programs at global scale.





## The GHG Protocol Corporate Accounting and Reporting Standard<sup>1</sup> classifies carbon emissions into three different scopes, divided by direct and indirect emissions:

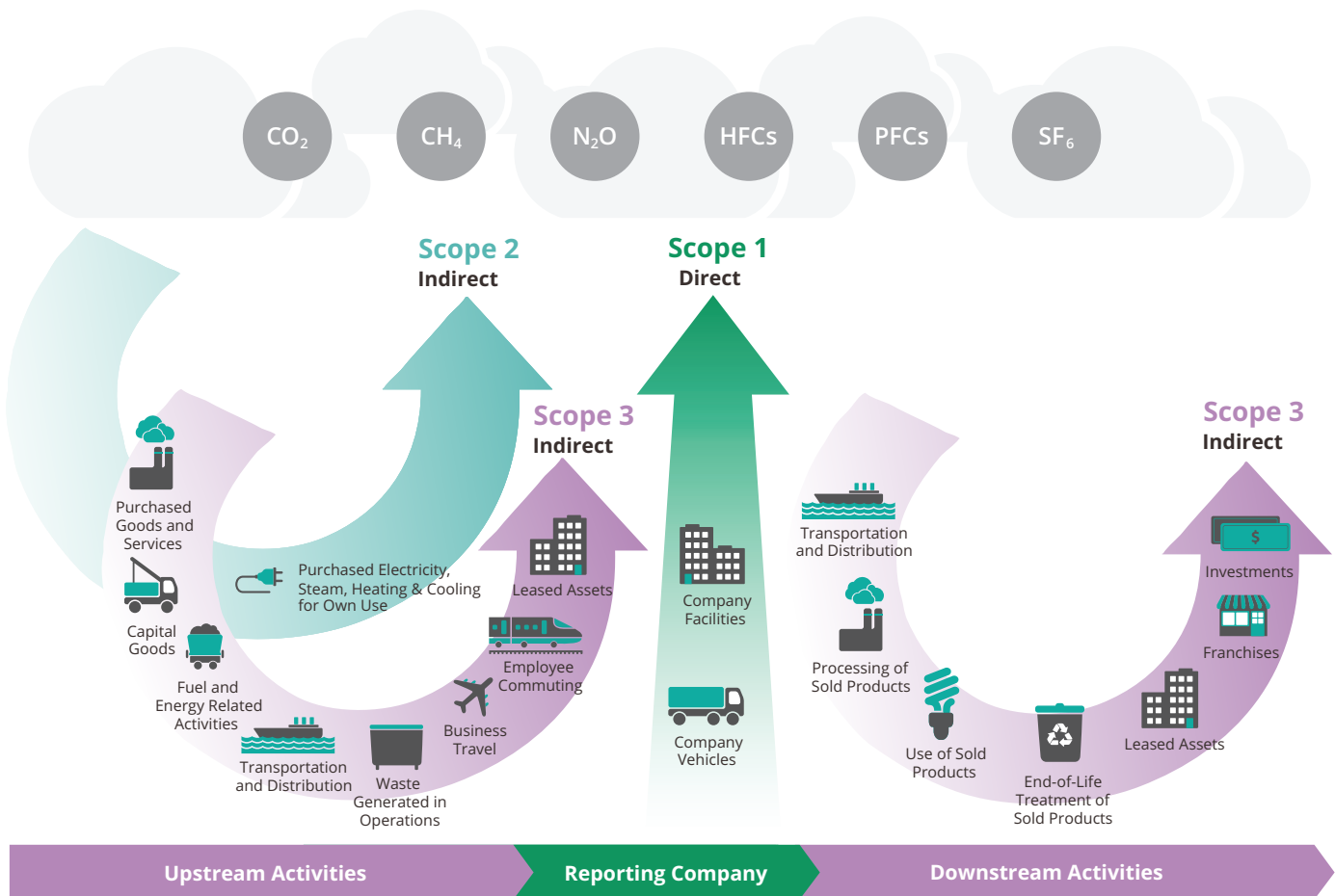
### Direct Emissions:

**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.

<sup>1</sup> Corporate Value Chain (Scope 3) Accounting and Reporting Standard [https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard\\_041613\\_2.pdf](https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-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 global gold standard for laboratory sustainability best practices 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 the personnel that support laboratories with actionable strategies to make real and impactful environmental changes. To date, My Green Lab has supported over 2,000 labs worldwide, engaging over 26,000 scientists from 45 different countries.

The **ACT Environmental Impact Factor Label** 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. It was designed by scientists and procurement specialists to provide clear, third-party verified information about the sustainability profile of laboratory products. By providing needed 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 to reduce the carbon impact of laboratory supply chains.

## About Intercontinental Exchange Inc. (ICE)

Intercontinental Exchange, Inc. (NYSE: ICE) is a Fortune 500 company that designs, builds, and operates digital networks to connect people to opportunity. ICE provides financial technology and data services across major asset classes that offer customers access to mission-critical workflow tools that increase transparency and operational efficiencies. ICE's climate and ESG data solutions help clients more accurately price and value assets, invest, manage risk, and meet regulatory requirements.

In addition to its data services, ICE operates exchanges, including the New York Stock Exchange, and clearing houses that help people invest, raise capital, and manage risk across multiple asset classes. ICE's Mortgage Technology business is transforming and digitizing the U.S. residential mortgage process, from consumer engagement through loan registration.

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# Introduction

The global Biotechnology and Pharmaceutical industry (Biotech and Pharma) play a crucial role in advancing medical and technical innovations. 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.<sup>2</sup>

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.<sup>3</sup> 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.

Further, the Biotech and Pharma market continues to grow. The global biotechnology market size was estimated at USD \$1.0 trillion in 2021 and is expected to grow at a compound annual growth rate (CAGR) of 13.9% from 2022 to 2030, reaching \$3.9 trillion by 2030.<sup>4</sup>

Pharmaceutical manufacturing was estimated at \$459 billion in 2021 and is expected to grow at CAGR of 15.9% from 2022 to 2030, reaching \$1.59 trillion by 2030.<sup>5</sup> 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 226 publicly-listed and 147 privately traded companies, provided by ICE, to compare its intensity and total emissions to other carbon-intensive industry sectors.<sup>6</sup>

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. The Sustainable Healthcare Coalition estimates the total carbon emissions of clinical research alone are 100 million tCO<sub>2</sub>e.<sup>7</sup> 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 starting to decline for the largest public companies, holding the promise of decoupling continued industry growth from a growing carbon impact. In the past year we have seen overall carbon intensity reductions, with the largest companies, the top 25 driving significant carbon reductions, particularly in the last year. There are a growing number

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- 2 Laboratories for the 21st Century: An Introduction to Low-Energy Design (2008) <https://www.nrel.gov/docs/fy08osti/29413.pdf>
  - 3 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](https://noharm-global.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_090619.pdf)
  - 4 Biotechnology Market Size, Share & Trends Analysis by Technology <https://www.grandviewresearch.com/industry-analysis/biotechnology-market>
  - 5 Pharmaceutical Manufacturing Market Size Will Achieve USD 1,599.9 Billion by 2030 growing at 15.9% CAGR <https://www.acumenresearchandconsulting.com/pharmaceutical-manufacturing-market>
  - 6 This study used publicly reported and inferred data, outlined in the methodology section, for 234 companies classified as Biotechnology and Pharmaceutical by the Sustainable Accounting Standards Board (SASB) Standard Industry Classification System (SICS) sub-category.
  - 7 Clinical trials, health and climate change, Sustainable Healthcare Coalition <https://shcoalition.org/clinical-trials/>



of companies adopting zero carbon targets that are aligned with a 1.5°C increase world. 53% of actors in the sector by revenue have joined the UN-backed Race to Zero, with the majority of Race to Zero members achieving My Green Lab certifications, signaling rapid adoption and convergence around this 2030 Breakthrough Outcome.<sup>8</sup>

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. 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, 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 society. Like few other industry sectors, science has the ambitious and mission-focused companies, culture of innovation, and 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-accelerating progress on Scope 3, the most difficult to tackle Scope for carbon reductions. The Biotech and Pharma industry can become a global leader on addressing climate change by starting with its own footprint and uniting on driving sustainability within their value chain, inspiring other industry sectors to follow.

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





# KEY FINDINGS

01

While the largest companies by revenue have established zero carbon goals and work to reduce Scope 1, 2 and 3 emissions, 90% of the 91 public companies analyzed in the sector still do not have targets (for Scope 1 and 2) in the short-term (2021 - 2025) that are aligned with a 1.5°C increase world.

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 was also highlighted in the 2021 and 2022 release of the Carbon Impact of Biotech and Pharma report.

## Scope 1 and 2 Emissions

This year's study finds that the top 25 public companies (by revenue) have continued to reduce their annual Scope 1 and 2 carbon intensity by an average of 5.31% per year since 2015. The top 15 public companies have performed

**Figure 1: 6-Year Industry Carbon Intensity Trends<sup>9</sup>**

Biotech and Pharma: Carbon Intensity (tCO<sub>2</sub>e/\$M Rev.), 2017-2022



<sup>9</sup> Sourced from ICE Emissions Data (as of October 2023).





even better, reducing carbon emissions by an average of 8.06% year-on-year. When evaluating a broader cross section of the industry made up of 84 public companies with the best quality data available for the last 6 years, emission intensity has essentially remained flat. Even more encouraging, this past year has seen reductions across all categories for Scope 1 and 2, including private companies.<sup>10</sup>

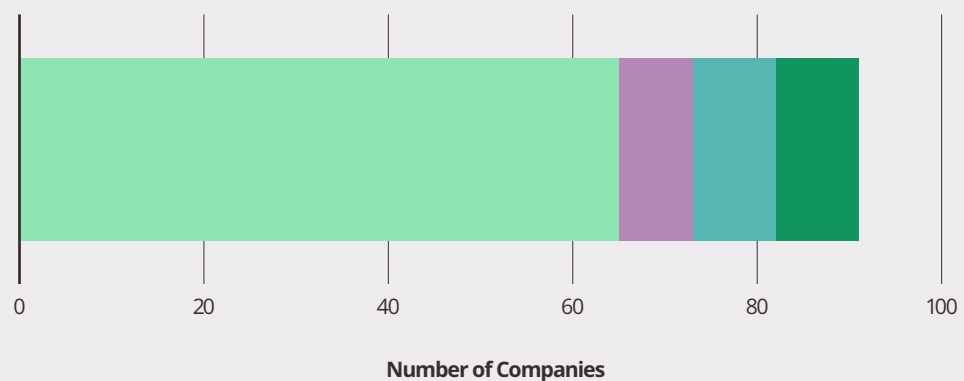
### Scope 3 Emission

Looking over this same time period for Scope 3 emissions you can see that the top 25 companies have slightly increased carbon emissions (1.49% annually) while the top 15 have decreased slightly (1.09% annually). This is most likely due to an increase in reporting in 2016 and 2017. Since then, emissions have begun to decline for the top 15 but increase slightly for the top 25. For the broader dataset, Scope 3 intensity has continued to rise slightly. Private companies, represented by the purple line in the graph, have gone up in the last year significantly, which may be due to more accurate reporting. Next year's report will be telling to understand private company trends.

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 91 companies in our dataset for which the best data is available in 2022, only 10% have set Scope 1 and 2 short-term targets (2021-2025) to be aligned with a 1.5°C world, as per the SBTi Temperature Rating methodology.<sup>11</sup> The remaining companies with targets are aligned with 2-3°C warming or 3-5°C warming, which is simply insufficient to avoid the most devastating impacts of global climate change.

### Figure 2: 2030 Target Temperature Alignment<sup>12</sup>

Ambition Coverage and Targets Coverage



<sup>10</sup> Only 84 companies analyzed have historical data for the past 6 years.

<sup>11</sup> SBTi Temperature Rating Methodology <https://sciencebasedtargets.org/resources/legacy/2020/09/Temperature-Rating-Methodology-V1.pdf>

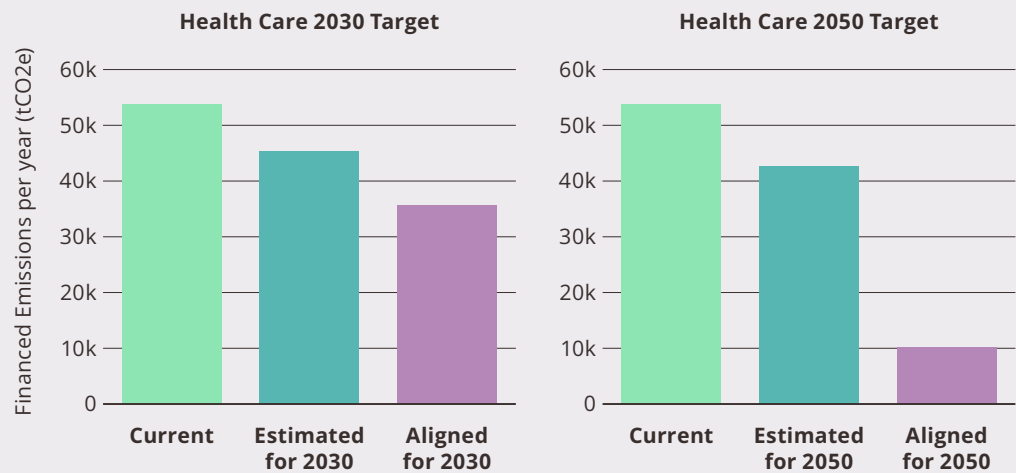
<sup>12</sup> Sourced from ICE Climate Transition Analytics Platform and underlying analysis of ICE Emissions Data (as of October 2023)The chart and underlying data refer to Scope 1+2 targets only. Companies that have not set eligible targets as per the SBTi methodology are given a SBTi recommended default score of 3.2C.

While greater adoption of more ambitious targets is needed, commitments must also be backed up by tangible and measurable progress through action. To meet the Network for Greening the Financial System (NGFS) Net Zero 2050 Scenario, the Biotechnology



and Pharmaceutical industry must achieve a 34% carbon reduction, including Scope 3 emissions by 2030, compared to 2021 emissions. In order to be aligned to the scenario in 2050, the industry will need to achieve an 81% reduction compared to 2021 emissions, a tough challenge given this year's total emissions intensity was essentially flat. The longer companies wait to begin reducing emissions, the steeper their annual reductions must be to reach net zero by 2050. Meanwhile, with each passing year, irreversible and cascading climate change impacts are locked in.

**Figure 3: NGFS Net Zero 2050 Scenario Reductions needed by 2030 and 2050<sup>13</sup>**



<sup>13</sup> Sourced from ICE Climate Transition Analytics Platform and ICE Emissions Data (as of October 2023). This chart evaluates financed emissions (Scope 1,2,3) and (Scope 1,2,) for 91 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 scenario in the respective year (2030 or 2050).

**Implied Temperature Rise Score based on NGFS Scenarios**

**Scope 1+2** Implied Temperature Rise: 1.67 °C

**Scope 1+2+3** Implied Temperature Rise: 2.11 °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.



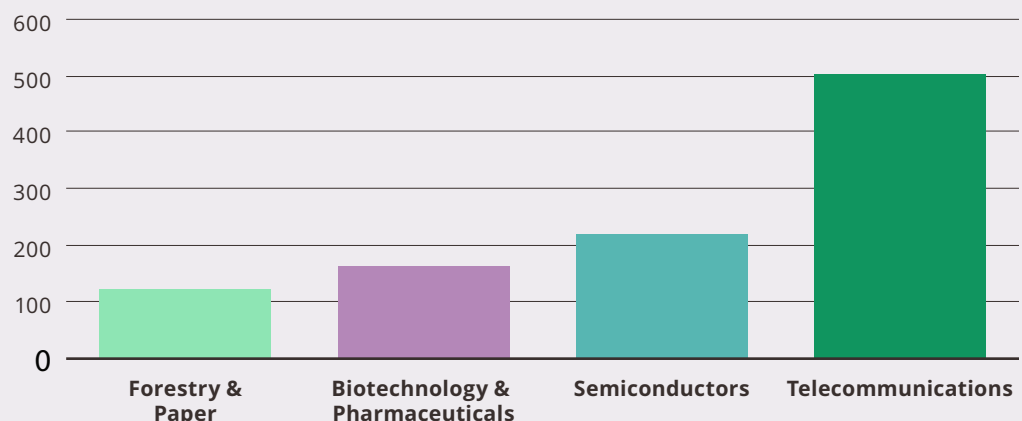
## 02

The total carbon impact of the industry has continued to increase from 3.9% in 2021 to 5% in 2022. An update to the ICE emissions inference methodology has contributed to revised carbon emissions (Scope 1, 2 and 3), amounting to a total of 163 million tCO<sub>2</sub>e for public companies and 30 million tCO<sub>2</sub>e for private companies for a total of 193 million tCO<sub>2</sub>e in 2022.

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 emissions of both the Telecommunications and Semiconductors industries and this is consistent with this year's report as well. It is important to note here that the number of companies considered to calculate each industry's total emissions, are not the same and include all the companies in the respective sector, directly analyzed by ICE in their 2022 emissions dataset.

Considering only Scope 1 and 2, for category 1 data (the best quality data) the Biotechnology and Pharmaceutical industry is relatively carbon intensive, ranking 26th of all industries in 2022, down from 22nd in 2021. While the industry needs to evaluate and address the entire value chain, emissions from Scope 1 and 2 remain crucial opportunities for carbon savings.

**Figure 4: Total Sector Annual Carbon Output Comparison<sup>14</sup>**  
Total Annual Emissions (tCO<sub>2</sub>e) in Millions



<sup>14</sup> Sourced from ICE Emissions Data (as of October 2023)



# 03

**Scope 3 emissions are 4.59 times Scope 1 and 2 combined, with the vast majority coming from Purchased Goods and Services. In response, the industry has launched a suite of collective initiatives that show great promise.**

The carbon impact of indirect emissions in a company's value chain is generally higher than emissions captured in Scope 1 and 2. Scope 3 emissions are 4.59 times larger than Scope 1 and 2 emissions combined for publicly-listed companies and 4.46 times larger for privately-owned companies.<sup>15</sup> While this may seem like a high ratio, in fact it is slightly lower in comparison to other industry sectors, with a median ratio of 5.5. Companies with more accurate reporting, including AstraZeneca, show Scope 3 to be more than 19-fold that of Scope 1 and 2.<sup>16</sup>

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 34<sup>th</sup>, up from 30<sup>th</sup> out of 38 last year. This is in contrast to the ranking above, excluding scope 3, where the Biotechnology and Pharmaceutical industry ranked 26<sup>th</sup> out of 38.

This difference may be the result of Scope 3 playing 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 91 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 5.07 million metric tons CO<sub>2</sub> equivalent per million USD in Revenue (tCO<sub>2</sub>-e/\$m) to 456.4 tCO<sub>2</sub>-e/\$m.

The variability may also be explained by the Scope 3 calculation methodology, company location, the type of research and manufacturing that a company is engaged in, and whether and how often a company utilizes contract manufacturing organizations and contract research organizations, which continues to be a growing trend.<sup>17</sup> 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.

Based on the past 6 years of reported and inferred emissions data Scope 3 emissions increased significantly 2017 onwards as the largest companies by revenue began to include scope 3 in their reporting, while the rest of the industry is catching up. There remains a high degree of variability between the intensity of Scope 3 emission data, ranging from 4.84 tCO<sub>2</sub>e/\$m at the lowest end to 416.10 tCO<sub>2</sub>e/\$m at the high end.

<sup>15</sup> 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 carbon 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

<sup>16</sup> Net Zero Case Study AstraZeneca, Science Based Targets Initiative <https://sciencebasedtargets.org/companies-taking-action/case-studies/net-zero-case-study-astrazeneca>

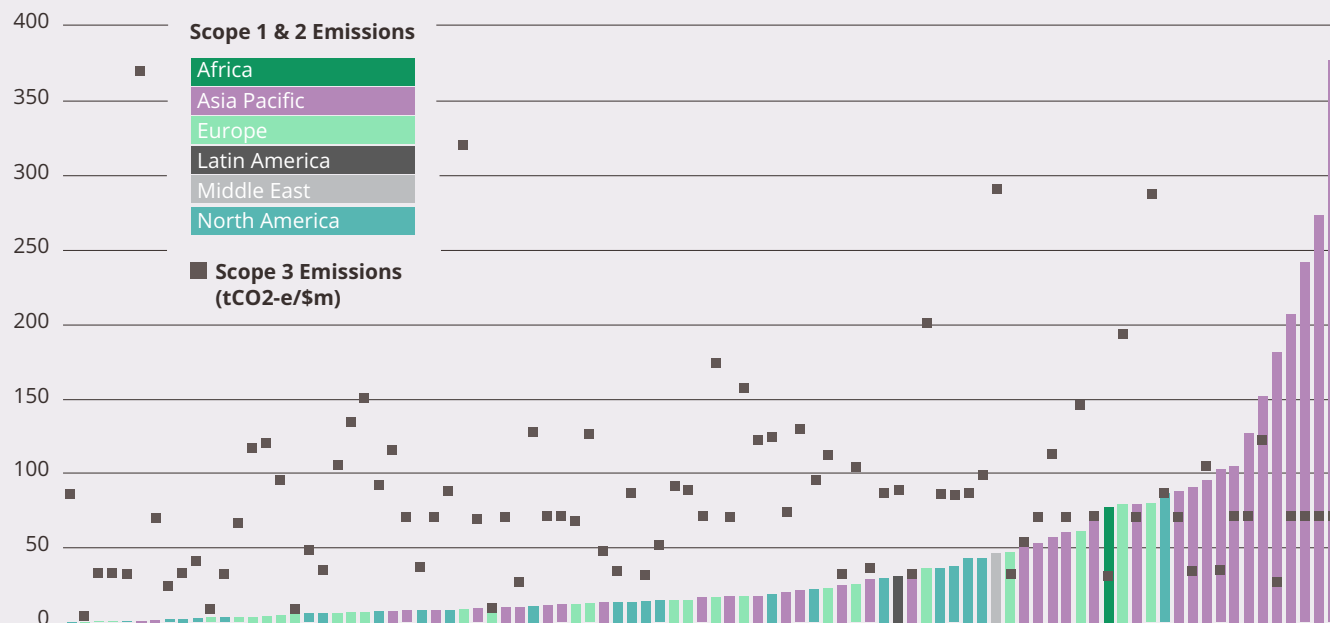
<sup>17</sup> Current Trends and Strategic Options in the Pharma CDMO Market (2019): <https://www.pwc.de/de/gesundheitswesen-und-pharma/studie-pharma-cdmO-market.pdf>





**Figure 5: Company Level Comparison of Scope 1, 2 and Scope 3<sup>18</sup>**

Relative Carbon Intensities, Selected Pharma and Biotech Dataset



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 (18.30 tCO<sub>2</sub>e/\$m, on average) than their Asia-Pacific counterparts, (72.5 tCO<sub>2</sub>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).<sup>19</sup> 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.<sup>20</sup> 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 even line across the right side of Figure 5.<sup>21</sup>

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 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.<sup>22</sup> A common calculation methodology using Environmentally-Extended Input Output (EEIO) emission factors based on national GHG data can only generate a rough estimate.

<sup>18</sup> Sourced from ICE Emissions Data.

<sup>19</sup> Decarbonising Healthcare Supply Chains, Recommendations on how to drive emissions reductions across healthcare supply chains (2022)

<sup>20</sup> Assessing China's Energy and Climate Goals (2021) <https://www.americanprogress.org/issues/security/reports/2021/05/06/499096/assessing-chinas-energy-climate-goals/>

<sup>21</sup> Please see Carbon Accounting Methodology Section for details on how Scope 3 has been inferred

<sup>22</sup> Scope 3 greenhouse gas emissions calculation: guidance for the pharmaceutical industry (2020) <https://pscinitiative.org/resource?resource=779>



**Figure 6: Scope 3 Sector Materiality Assessment<sup>23</sup>**

Scope 3 Sector Profile		Biotechnology & Pharmaceuticals (Private)	Biotechnology & Pharmaceuticals	Medical Technology	Apparel & Textiles	Health Care Retail
1	Purchased Goods and Services	87%	80%	58%	57%	80%
2	Capital Goods	5%	7%	8%	1%	1%
3	Fuel- and Energy-Related Activities	2%	2%	1%	1%	1%
4	Upstream Transportation and Distribution	3%	4%	7%	5%	3%
5	Waste Generated in Operations	1%	1%	0%	0%	0%
6	Business Travel	1%	1%	1%	0%	0%
7	Employee Commuting	1%	1%	2%	1%	0%
8	Upstream Leased Assets	0%	0%	0%	0%	0%
9	Downstream Transportation and Distribution	1%	1%	5%	2%	0%
10	Processing of Sold Products	0%	0%	0%	0%	0%
11	Use of Sold Products	0%	2%	16%	31%	14%
12	End-of-Life Treatment of Sold Products	0%	1%	1%	2%	0%
13	Downstream Leased Assets	0%	0%	0%	0%	0%
14	Franchises	0%	0%	0%	0%	0%
15	Investments	0%	0%	2%	0%	0%

Product-level emissions data would be more accurate and could be shared between companies that have similar supply chains. This challenge in Biotech and Pharma is shared by other sectors and is an opportunity for continued industry collaboration.

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 80%, while Category 2, 'Capital Goods,' comes in second, at 7%, and category 4 'Upstream Transportation and Distribution' at 4%. Private companies are similar with 87% from 'Purchased Goods and Services' and 5% from 'Capital Goods' and 3% from 'Upstream Transportation and Distribution.'

This year's report is based on data from ICE's updated inference methodology (summarized in the methodology section) This methodological change is one of the factors that has contributed to Purchased Goods and Services representing a higher share of overall Scope 3 emissions for the Biotech and Pharmaceutical industry when

<sup>23</sup> Sourced from ICE Emissions Data (as of October 2023)



compared to last year's data and methodology, where Use of Sold Products also accounted for a significant share of overall Scope 3 emissions. This may be due to the fact that certain large Pharma companies with products that use inhalers and their associated high global warming potential propellants. Fortunately, AstraZeneca and GSK have made progress in replacing those propellants.<sup>24</sup> Based on the highest quality data from 2022, 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 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.<sup>25</sup> 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 green lab Standards like My Green Lab Certification. 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.

<sup>24</sup> Increase in dry powder inhalers could lead to decreases in greenhouse gas emissions, Pharmaceutical Technology (April 2022) <https://www.pharmaceutical-technology.com/comment/dry-powder-inhalers-greenhouse-gas/?cf-view>

<sup>25</sup> 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-backed Race to Zero. Thirty-five (35) companies (53% of the sector by revenue) have committed to the campaign, an increase from 30 companies (46% by revenue) at this time last year. Progress towards the Breakthrough Outcome has also been swift, with 63% of Pharma and Med Tech companies in the campaign starting a My Green Lab Certification, nearly half of those 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-backed Race to Zero campaign.<sup>26</sup> 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

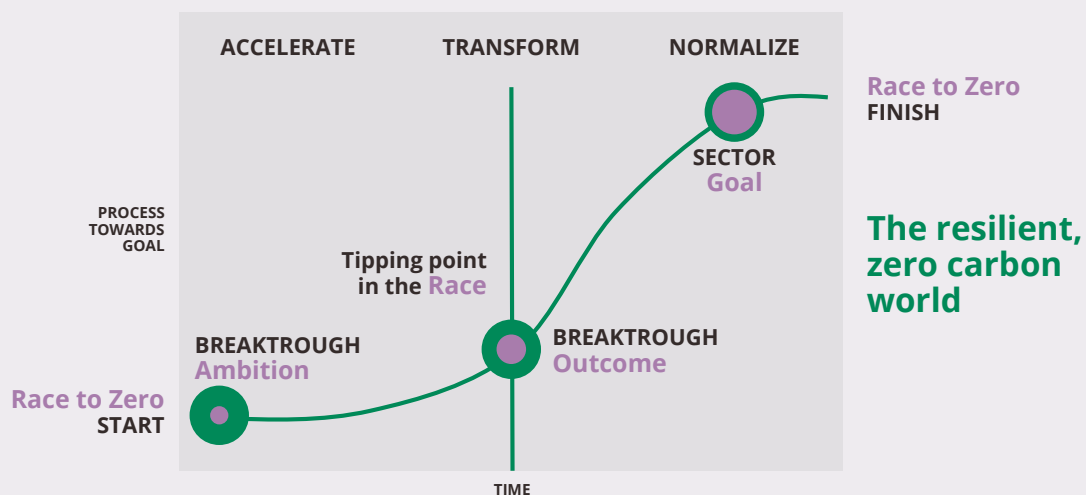
At the time this report was published, 53% of the largest companies by revenue in Pharma and Med Tech have committed to the Race to Zero,<sup>27</sup> up from 46% last year.<sup>28</sup> These companies have pledged to cut total carbon emissions by 50% by 2030 and reach net zero emissions by 2050 or sooner.

<sup>26</sup> <https://racetozero.unfccc.int/>

<sup>27</sup> 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.

<sup>28</sup> Pharma & Medtech announce critical climate breakthrough (2021) <https://racetozero.unfccc.int/pharma-med-tech-announce-critical-climate-breakthrough/>

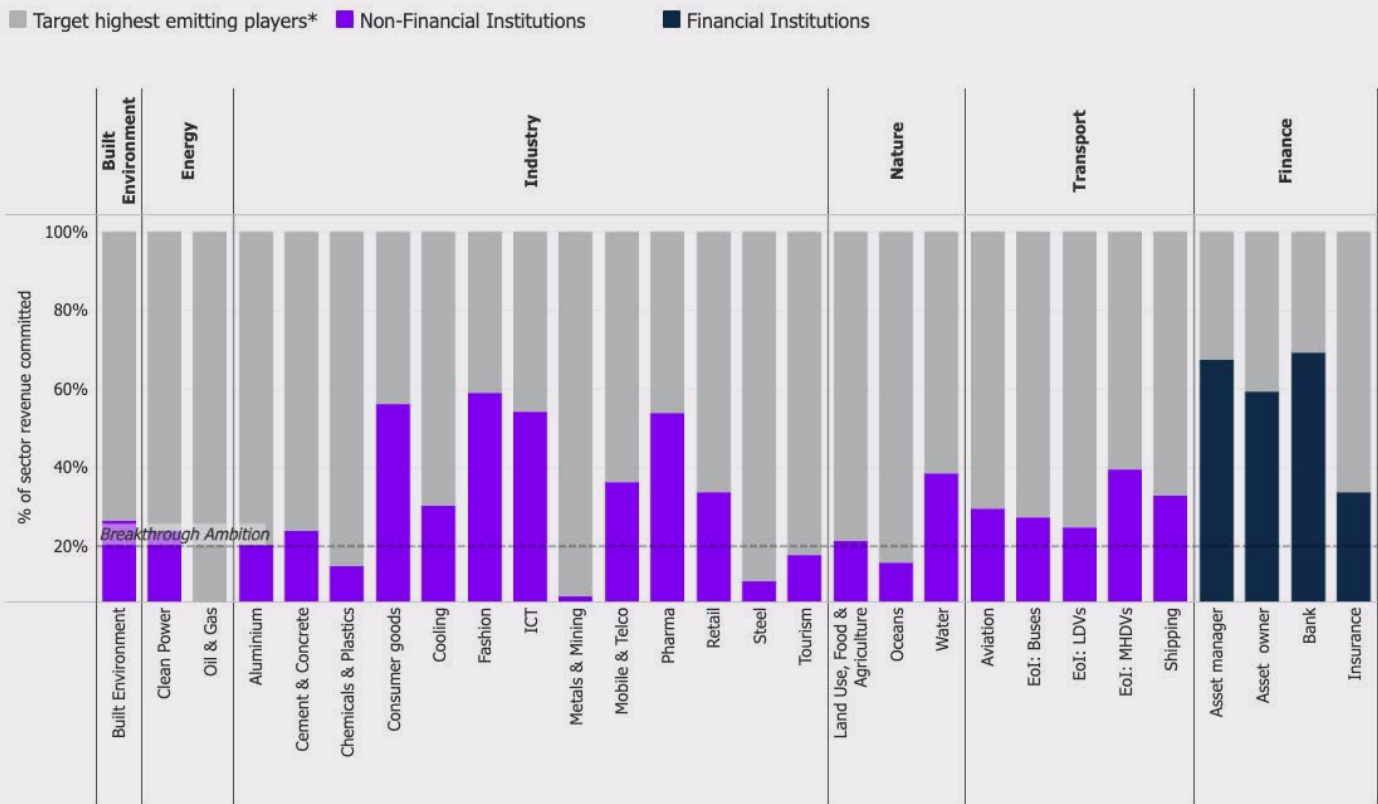
**Figure 7: UNFCCC Race to Zero Systems Transformation Model**







**Figure 8: 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).<sup>29</sup>

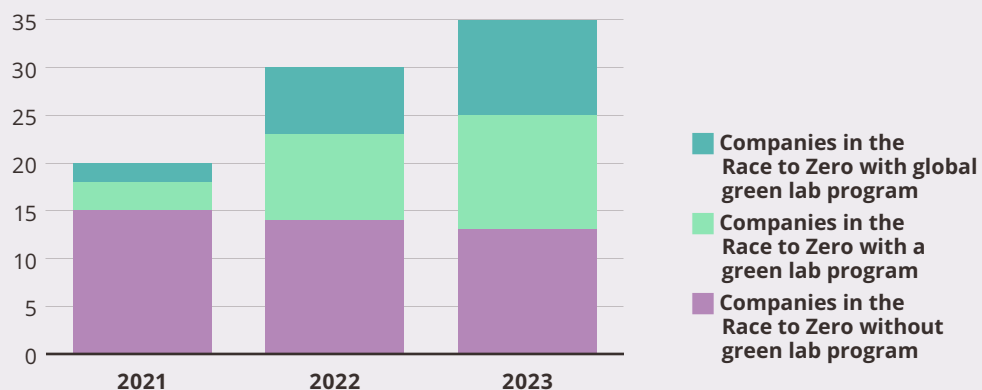
Due to its focus on key leverage points and the potential to drive measurable change, My Green Lab Certification was selected in 2021 as a key indicator of progress for the UNFCCC High-Level Climate Champions' 2030 Breakthroughs, setting a goal that "95% of labs across major Pharma and Med Tech companies are My Green Lab Certified at the highest level by 2030."<sup>30</sup> Achieving that 'Breakthrough Outcome,' along with other decarbonization strategies, will be a crucial action to ensure the industry progresses along its pathway to a net zero future. In addition, developing a robust green lab program at every company will help instill

<sup>29</sup> <https://racetozero.unfccc.int/join-the-race/whos-in/>

<sup>30</sup> Upgrading Our Systems Together: A global challenge to accelerate sectors breakthroughs for COP26 — and beyond (2021)



**Figure 9: Sector Progress to Race to Zero and Breakthrough Outcome**



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 and reduce the downstream impact of products sold, both key targets for scope 3 carbon savings.

Since first publishing this report in November 2022, companies have made significant progress towards the Breakthrough Outcome. 63% of companies in the Race to Zero sector have started a green lab program, up from 53% at this time last year, with nearly half of those now achieving the My Green Lab Certification at a global scale.<sup>31</sup>

<sup>31</sup> Global programs include at least 10 labs engaged 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 footprints and engaging the industry supply chain.

Accurate reporting will provide a clear baseline from which to measure improvements and identify key hotspots for change. After targets aligned with a 1.5°C increase world for both 2030 and 2050 are set, 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.<sup>32</sup> They have also released a study identifying opportunities to reduce the carbon impact of clinical trials.<sup>33</sup>

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 emissions both through direct laboratory operations and from contract laboratories within their supply chain. 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 also ensures manufacturers make products with a focus on sustainability, and these products operate efficiently.

## 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

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32 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>

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



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 programs to align requests and help support suppliers in accomplishing these supply chain goals. 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<sup>34</sup> 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 the following minimum requirements.<sup>35</sup>

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°C 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.

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

35 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](https://a.storyblok.com/f/109506/x/5388424c6e/joint-ceo-letter_final_200723.pdf?cv=1689688147120)





In advance of COP 28, building on current progress in the sector the Sustainable Markets Initiative announced<sup>36</sup> new activities to address the healthcare value chain, including:

- Advance discussions to develop renewable power agreements in India and China, which are estimated to account for up to 50% of materials for medicines.
- China Council launched a Health Working Group<sup>37</sup> in Shanghai. It is comprised of 16 Chinese health companies and members of the Health Systems Task Force
- A new consortium and NHS England to support the development of a sector-wide standard for medicines Life Cycle Assessment (LCA).
- An international measurement framework to calculate the carbon emissions from different patient care pathways.
- The release of a guidance document draft on the footprinting clinical trials.
- A workstream focused on the role consumer health and wellbeing can play in decarbonizing the healthcare sector.



## Energize

Energize,<sup>38</sup> powered by the Schneider Electric NEO Network<sup>TM</sup>, in partnership with the Pharmaceutical Supply Chain Initiative (PSCI), aims to accelerate renewable energy adoption and enable bold climate action within the pharmaceutical value chain. This first-of-its-kind industry program supports pharmaceutical suppliers to learn more about renewable energy adoption and contracting. This gives suppliers — who may not otherwise have the internal resources or expertise available — the opportunity to participate in the market for power purchase agreements (PPAs). A group of industry-leading pharmaceutical companies have committed to engaging their suppliers to support the adoption of renewable energy and reduce greenhouse gas emissions within their supply chains.

In the last 18 months, 472 leading suppliers have registered for the program, representing over 33 terawatt-hours of electricity demand. The program has already formed its first Power Purchase Agreement (PPA) buyers cohort to purchase renewable electricity collectively. The PPA buyers cohort includes 9 companies and intends to go to market together, resulting in a potential aggregate of 2 terawatt-hours (TWh) of electricity demand in Europe and North America. Energize is not currently available in China and India, which this report has identified as the region with the highest carbon intensity and in most in need of this type of support.

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36 SMI Press Release <https://smi.netlify.app/news/global-healthcare-leaders-advance-sector-decarbonisation-ahead-of-cop28>

37 SMI China Council Press Release <https://www.sustainable-markets.org/news/china-council-launches-health-working-group/>

38 Energize Website <https://hub.zeigo.com/energize>



## Activate

Launched in May 2023, Activate<sup>39</sup> is a collaborative program run by Manufacture 2030 (M2030) that is designed to leverage the collective purchasing power of Large Pharma to directly support the decarbonization of the highly interconnected Active Pharmaceutical Ingredient (API) manufacturing supply chain. Manufacture 2030 provides a software platform for baseline data measurement from suppliers, an AI-driven action planning tool to drive operational and resource efficiency, with calculators for carbon savings and cost reduction, as well as a suite of practical tools, expert advice and access to green financing. Activate has already more than 100 API suppliers signed up, engaged in 1000+ reduction actions, reporting back to the 6 founding member pharmaceutical buying companies.

M2030 will be expanding the program to additional buyers & suppliers in 2024, as well as delivering additional targeted support with the first release of the "Activate Playbook" of industry best-practice, all supported by a network of expert partners. 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 as mature carbon reduction measurement or goals, so this program holds promise for supporting companies in achieving their goals within the pharma value chain that have so far not been engaged.



## Converge

Converge is a My Green Lab initiative to harness the collective power of the Pharmaceutical industry to encourage suppliers to reduce the impact of their operational labs through My Green Lab Certification. The program enrolls large Pharma companies that have at least 10 labs enrolled in My Green Lab Certification and requires them to collectively requests that suppliers including CRO's and CDMO's with significant laboratory operations certify their labs in alignment with the 2030 Breakthrough Outcomes target of 95% of all labs being certified at the highest level. The vision of Converge includes:

- Every supplier lab has a thriving culture of sustainability.
- Every scientist within the pharma supply chain knows how their actions can make a difference in lab sustainability.
- The pharmaceutical sector leads the world on supply chain engagement and inspires other sectors to increase their engagement

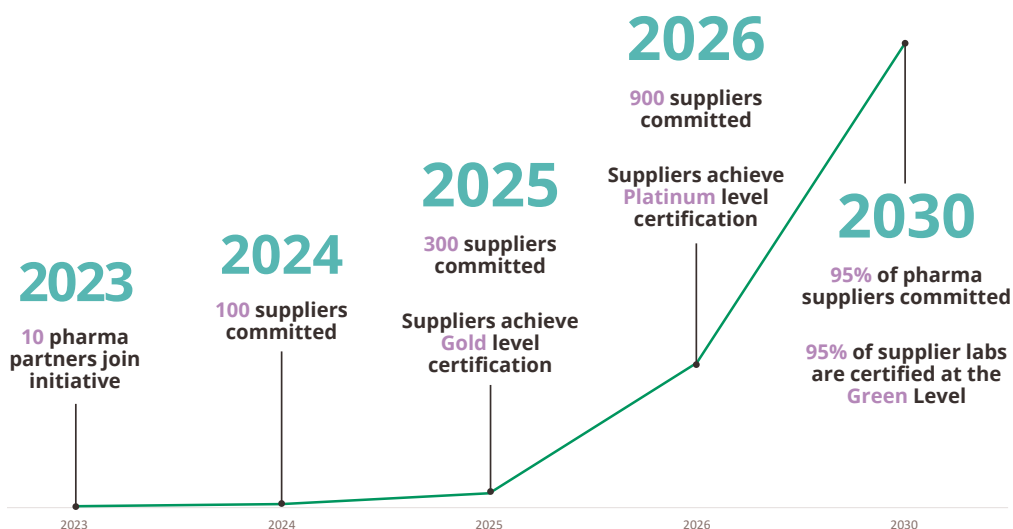
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<sup>39</sup> Activate Program Website <https://manufacture2030.com/how-we-work/activate-program>

In November 2023, four major Pharma companies, AstraZeneca, GSK, Amgen, and Bristol Myers Squibb joined the Converge initiative. They outlined the targets seen in Figure 10 for their joint suppliers.<sup>40</sup>

40 My Green Lab Supplier Initiative Converge Press Release <https://www.mygreenlab.org/blog-beaker/my-green-lab-unveils-converge-a-collaborative-supply-chain-initiative-bringing-sustainability-to-the-forefront-of-the-pharmaceutical-industry>

**Figure 10: Target Setting for the Converge Program**



## Conclusion

Biotech and pharmaceutical companies have the technical acumen, culture of innovation, and financial resources needed to be a global leader in environmental sustainability. They also have a shared supply chain and collaborative industry organizations necessary to align requirements and support collective action. Perhaps no other industry has more experience making long-term capital investments that tackle complex problems for the benefit of society. The industry has just under a decade, roughly the same time it takes to bring a new drug to market, to achieve net zero carbon and, in doing so, inspire industry sectors around the world.



## 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. We will also examine areas that remain poorly quantified, such as the overall carbon impact of laboratories and lab supply chains. This study will be updated regularly for the UNFCCC Conference of the 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

Coverage of emissions data by ICE includes both directly reported and estimated emissions where data is not reported.

ICE conducts quality assurance on reported data and statistically treats data deemed to be incomplete or misreported. The model used to produce the estimated emissions is built on a robust statistical methodology which utilizes ICE's reported emissions dataset of over 5,500 companies to understand emissions hotspots, typical emissions intensities for certain industries and company sizes, alongside other methodological requirements. 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.

During the data collection and analysis process the ICE Data Team assigns each company's Scope 1 and 2 emissions data an ICE Disclosure Category based on the level of disclosure of the reported data. The disclosure categories are as follows, with the ICE definition of Completeness described in more detail below.

**ICE Disclosure Category 1:** Public, Complete Scope 1 and 2 data, with third-party assurance.

**ICE Disclosure Category 2:** Public, Complete Scope 1 and 2 data, with no third-party assurance.

**ICE Disclosure Category 3:** Incomplete Scope 1 and 2 data, with no third-party assurance.

**ICE Disclosure Category 4:** No public data.

**ICE Disclosure Category 5:** No data.

ICE's Emissions Reduction Targets Data includes 9,000+ reported targets across ~2,500 companies, including those aligned with the Science-Based Targets Initiative (SBTi) temperature scoring.

ICE has also updated its estimation model to improve robustness and granularity since the 2022 report by My Green Lab. Some key updates include:

- The use of a more granular sector classification system (shifting from SASB — 3 levels to ICE Uniform Entity Sector classification – 5 levels), enabling inference using a narrower industry grouping.
- Inclusion of region-specific vs global inference if sufficient data points are available.
- Use of median instead of transformed mean as a representative value for industry average, which is less susceptible to outliers.
- Using data points across two years instead of one as one of the minimum data requirements.

Scope 3 emissions  
represent more than

85%

of the world's overall  
footprint



- Acceptance of more reported 0's for certain Scope 3 categories if such categories are not considered material for the particular sector. This is one of the factors contributing to lower inferred Scope 3 emissions under the new methodology compared to last year.

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

Additionally, due to lack of publicly reported FY2021 revenue data for a portion of the group of private companies considered for this study, FY2020 revenue has been used where FY2021 revenue data is not available or accessible, to conduct emissions inference.

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