

Leveraging Communal Goals to Build a Sustainable Future for Pharma Manufacturing

By **William Powers**, Senior Director of Business Development,
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Identifying and implementing more sustainable manufacturing practices are top of mind across the pharmaceutical industry as doing so will significantly reduce a company's carbon footprint and have a positive impact on global health. The imperative to adapt manufacturing practices to yield greener results is pressing, and yet, many manufacturers have long-established, reliable workflows to ensure product quality and safety for patients that are difficult to change. To help better merge the congruent agendas of delivering vital medicines to patients and minimizing damage to the planet, CDMOs and suppliers are in search of strategies that meet drug manufacturing targets while reducing carbon emissions and waste.

In 2023, CEOs from seven of the world's largest pharma companies authored the [Open Letter on Supplier Targets from Members of the Sustainable Markets Initiative Health Systems Task Force](#).¹ This letter implored pharma suppliers and manufacturers to look thoroughly at their processes to identify where they are contributing to CO2 emissions, how emissions reduction planning can

be enacted, and ultimately, how to reduce their carbon footprint and achieve sustainable goals. In response, global suppliers are considering where and how to implement sustainable processes to align with these targets and support a growing movement to make the pharma industry more sustainable.

Recognizing The Impact Of Climate Change

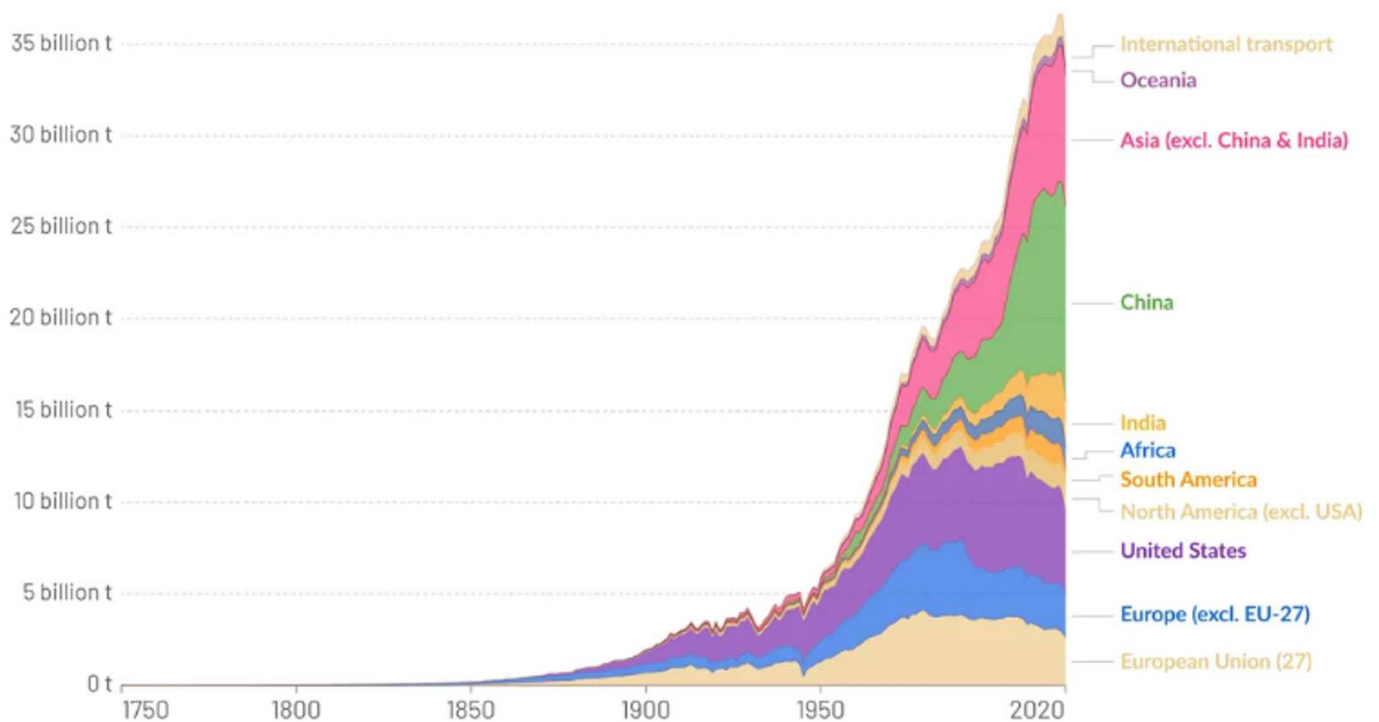
As shown in Figure 1, global CO2 emissions have skyrocketed over the last 100 years. This fact is intrinsically tied to the industrial revolution; population growth; demand for electricity, transportation, plastics, food, and medicines; and the steady growth of manufacturing around the world. CO2 emissions, which make up the majority of greenhouse gases, trap heat in the Earth's atmosphere, which causes the planet to warm and has led to rising sea levels, rapidly shifting climates, threatened wildlife, destroyed habitats, depleted natural resources, and a diminishing quality of life for all living things. This is the impact of unchecked global warming.

Figure 1 displays global CO2 emissions by country since 1750. While emissions have risen dramatically since 1950, regions such as Europe, South America, Africa, and the United States have shown a slight decline in CO2 emissions in recent years. This decrease is not by accident. As the planet continues to heat up, a growing array of data reflects the

importance of reducing carbon emissions as soon as possible.

Figure 2 charts the steady rise in the ocean's temperatures, which endangers wildlife and ocean climates; meanwhile, Figure 3 demonstrates how global temperature anomalies have become more frequent since the 1950s.

World CO2 emission by region since 1750 (billion t)



Source: Global Carbon Project, Our World in Data

More charts at (link in bio): genuineimpact.substack.com



Figure 1. World CO2 emission trends by region since 1750 (billion t)

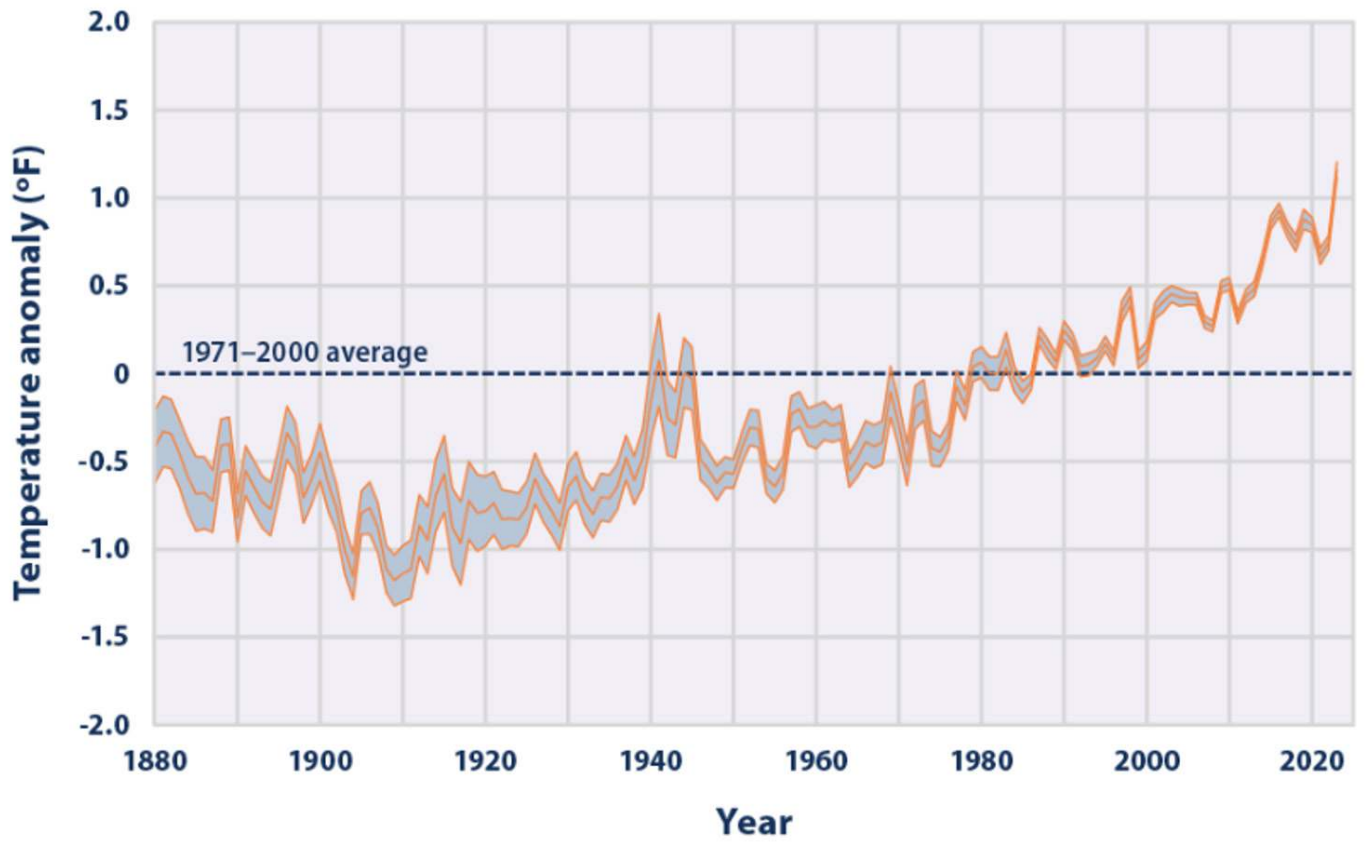
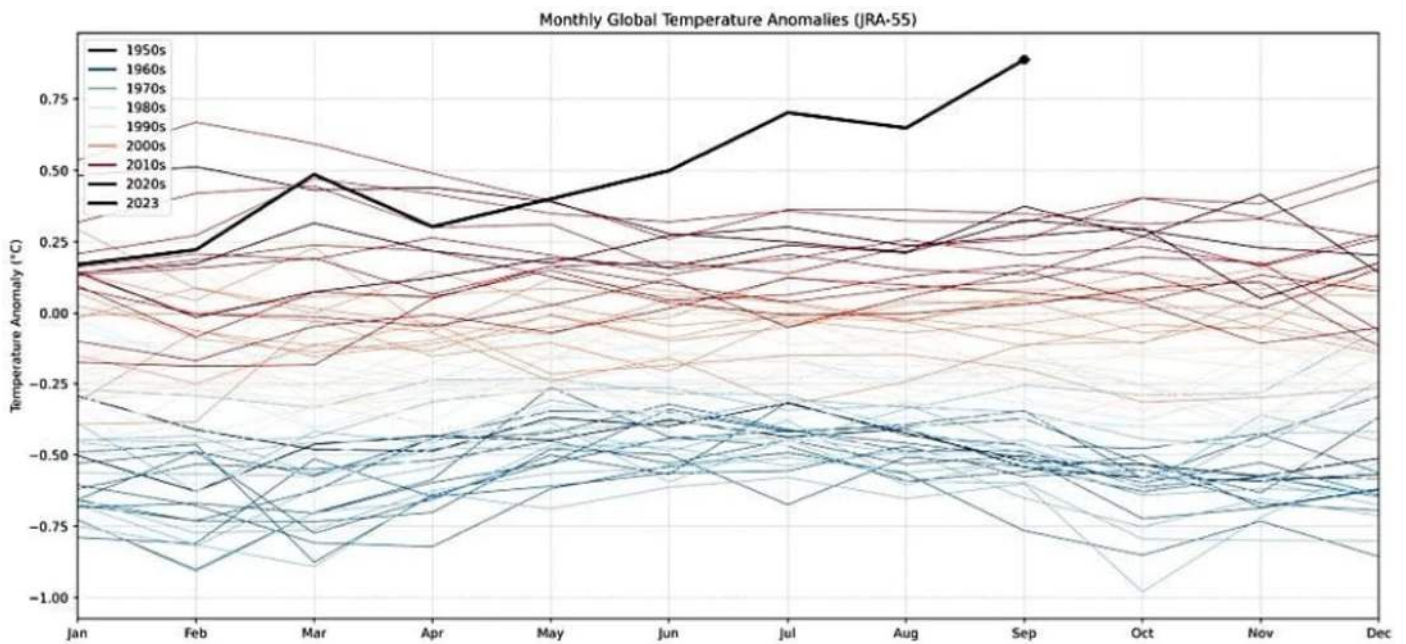


Figure 2. Global sea temperatures since 1880

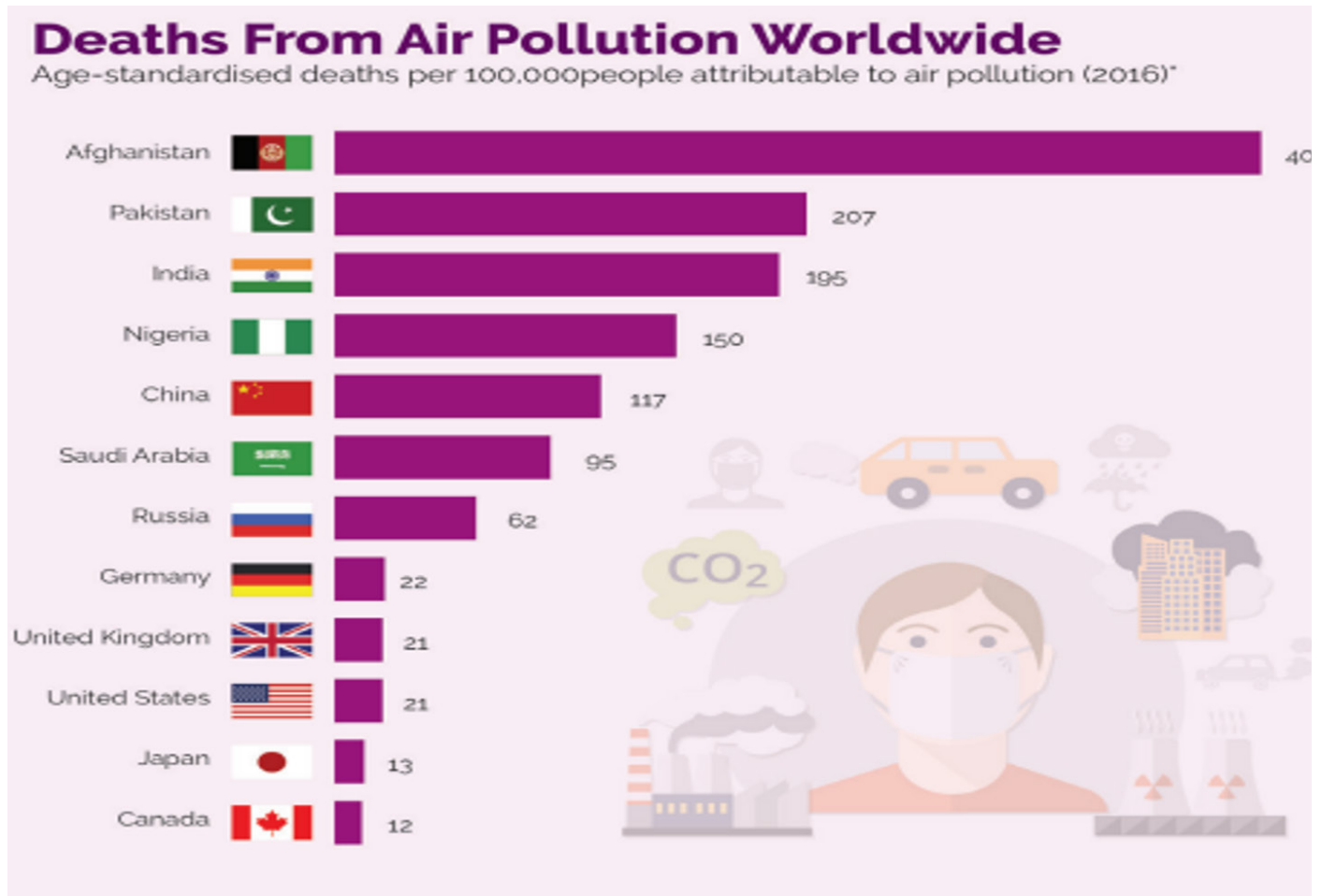


Source: Zeke Hausfather

Figure 3. Monthly global temperature anomaly trends since the 1950s

Finally, Figure 4 demonstrates the number of deaths caused by air pollution in a variety of countries as measured in 2018. Air pollution often has a significant impact on poorer

countries that see rapid population growth coupled with increased industrial activity and limited healthcare facilities.



Source: Health Effects Institute. State of Global Health 2018.

Figure 4. Global death rates from air pollution in 2018

In Figure 5, which demonstrates countries with the worst air pollution rates, “worst” air pollution is determined by particulate size, concentration, and population density of a given country. The term “PM 2.5” refers to particulate matter with diameters of less than 2.5 microns. These particles give rise to respiratory and cardiovascular health issues and are direct products of the combustion processes of fossil fuels.

While data is useful for conveying these trends, there are also tangible and unsettling examples of how global warming is impacting our environment, including the recession of glaciers and polar ice caps, the severity of natural disasters worldwide, and the depletion of some of Earth’s most vibrant ecosystems, including the Great Barrier Reef in Australia. From a wildlife perspective, one notable example is the growing number of fish species that are beginning to migrate to colder climates or disappear altogether, which impacts biodiversity and food chains worldwide. As sea levels continue to rise, coastal communities will be significantly impacted, which, due to their role as hubs for shipping, transportation, and trade, will have an influence on economies in all stages of development.

As these compounding factors continue to become a widespread concern, the geopolitical climate will face greater strife. Populations will be displaced due to a lack of livability, which could lead to conflict over access to land and resources. To help reverse and mitigate this damage, manufacturers across industries with significant CO2 emissions must respond swiftly and dramatically.

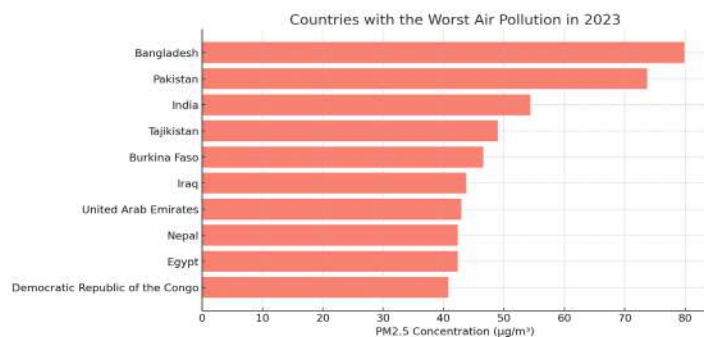


Figure 5. Worst air pollution by country in 2023

Examining The Minimum Supplier Targets

In response to the looming specter of global warming, the Open Letter set forth eight minimum supplier targets, many of which refer to goals outlined in the 2016 Paris Agreement, an international treaty on climate change mitigation. The eight targets are described below:

1. Assess and disclose all Scope 1, 2, and 3 emissions by 2025.
 - Scope 1 emissions are from sources that are owned or controlled by an organization.²
 - Scope 2 emissions are indirect emissions that result from a company’s purchasing and use of energy such as electricity, heating, or cooling.²
 - Scope 3 emissions are the result of activities from assets outside the control of the organization.²

2. Commit to setting targets to conform with the 1.5°C pathway, which corresponds to the Paris Agreement’s goal to limit global warming’s temperature increase to 1.5°C above pre-industrial levels.
3. Reduce waste and energy usage and increase reuse of materials in manufacturing.
4. Switch to at least 80% renewable power by 2030 and make this commitment public.
5. Explore options to source green heat, which refers to heating technology that does not emit CO2 or other harmful gases or particles into the air.
6. Make commitments that align with the [Science Based Targets](#) initiative (SBTi) and include green transportation solutions in core offerings by 2025.
7. Commit to setting standards for one’s own suppliers.
8. Set targets to improve water efficiency and adopt water stewardship standards.

These initiatives were prepared by senior management teams with smart, measurable objectives in mind. However, since many of these goals are targeted for completion by 2025, many CDMO teams have felt overwhelmed when considering these projects alongside their existing priorities. For example, CDMOs are under immense pressure to manufacture products safely and efficiently to ensure timely delivery to patients. Drug sponsors rely on outsourcing partners to provide continuous technology innovation to ensure they deliver on competitive timelines. Furthermore, CDMOs must consider the

expectations of other stakeholders, including employees and shareholders. However, despite the heavy lift, these sustainability initiatives are an opportunity for the pharma industry to make marked improvements and encourage others to act.

Identifying Thoughtful Approaches To Implementation

One widely recognized greenhouse gas producer is transportation, which plays a huge role throughout the drug manufacturing life cycle. There are several emergent solutions that aid at different stages of said life cycle, including drone delivery services that would reduce the number of delivery vehicles on the road. In terms of cold chain transport, insulated shipping via air freight is critical to ensure the integrity of therapeutics in transport. However, jet fuel and insulation materials are both derived from fossil fuels. One sustainable option is to leverage reusable cold-chain transportation containers like those made by CSafe, which reduces the need for single-use containers.

Implementing renewable energy sources is a critical supplier target, and yet, it can be a location-dependent challenge. For example, at Singota Solutions, the facility location does not allow access to hydroelectric or wind power, so we must consider working with engineering firms to implement company-owned solar-powered facilities. Renewable energy-powered plants have different challenges than traditional facilities using electric generated from fossil fuels; renewable energy has a largely dynamic range, widely varying frequency, and non-reliable 24-hour availability. To use renewable energy sources reliably for pharma manufactur-

ing, these technologies must be accompanied by enabling technologies that take these variable characteristics and turn them into a usable power form, e.g., batteries.

To ensure effective, lasting results, CDMOs can commit to making emissions reduction a way of life, rather than a flash in the pan, using the following process:

1. The first step is appointing respected internal leaders that will champion this effort. From there, a team can consider the Open Letter objectives to build a plan rooted in deliberate actions.
2. Consider how the Open Letter requirements relate to your services.
3. Identify your Scope 1, 2, and 3 emissions and set up monitoring systems to begin measuring, reviewing, and reporting on them.
4. Leverage strategic calculations to ensure you have a clear picture of where you are starting from and where you are headed in terms of emission reduction.
5. Enlist engineering and design of experiment strategies to implement first-time-right approaches, recycling, and lean manufacturing techniques.
6. Conduct gap and risk assessments for all projects. For example, to cut waste, establish a baseline figure, monitor the situation, and start identifying areas in which waste can be reduced.

To fulfill the goals of the letter, a CDMO team will need to put forth a public commitment with clear targets and timelines. The renewable energy option selected will depend on your geographic location and what is available. You'll also need to identify what providers are available in your region and what renewable energy solutions are within your budget. Cost will be a major factor. Note that the higher cost may be somewhat offset by implementation of waste reduction and lean manufacturing techniques. There are also grants, funding initiatives, and tax incentives to research and apply for. Opting to assign a resource on the CDMO team to identify these opportunities can pay off.

Finally, it is critical that this is viewed as a community effort. Securing buy-in from employees and suppliers will be important. This can be accomplished by implementing training to ensure that employees are well-versed in the impact of reducing carbon emissions not just within the industry but within our communities. Collaboration with suppliers to identify mutually beneficial solutions can ensure more sustainable supply chains.

Righting Our Course

Greenhouse gas emissions resulting in associated sea temperatures have been projected out to the year 2100 under different policy and funding scenarios. Three projections are shown in Figure 6.

How close is the world to its 1.5C target?

Projected greenhouse gas emissions and future warming levels vary by actions taken

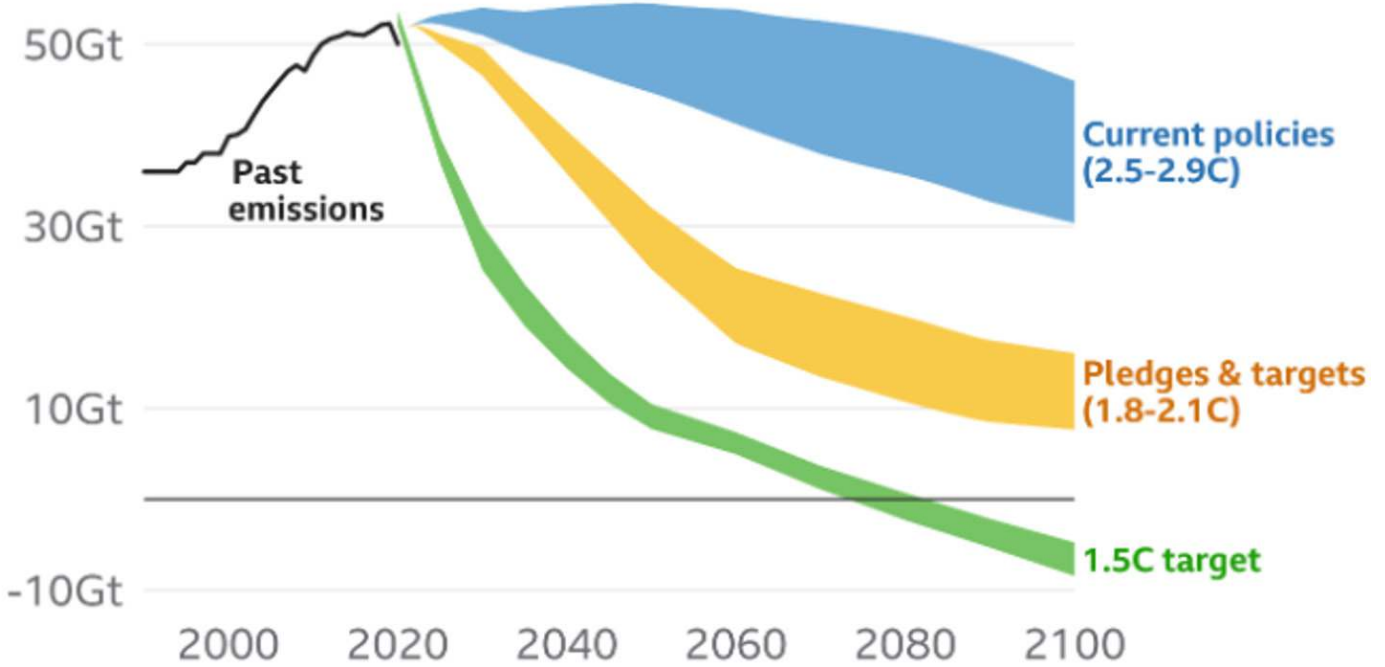


Figure 6. Global trends toward the 1.5°C target

The blue pathway demonstrates where ocean temperature and carbon emissions will likely land with our current policies. However, by implementing the pledges and targets set forth, we can align with the yellow pathway. And if even bigger improvements can help exceed

those goals, we will reach the green pathway, which aligns with the 1.5°C target goal. Though the aspiration is lofty, thoughtful approaches will allow CDMOs to lead the charge toward a greener future across the industry.

Resources

1. Jørgensen, L. F., Garijo, B., Hudson, P., Rim, J., Schwan, S., Soriot, P., & Walmsley, E. (2023, July 20). OPEN LETTER ON SUPPLIER TARGETS FROM MEMBERS OF THE SUSTAINABLE MARKETS INITIATIVE HEALTH SYSTEMS TASK FORCE. https://a.storyblok.com/f/109506/x/5388424c6e/joint-ceo-letter_final_200723.pdf

2. What are scope 1, 2 and 3 carbon emissions?. National Grid Group. (n.d.). <https://www.nationalgrid.com/stories/energy-explained/what-are-scope-1-2-3-carbon-emissions>

About The Author

Mr. Powers has been with Singota for eleven years in the Business Development and Marketing Group. His background includes forty years of experience in manufacturing, engineering, and product development in pharmaceutical, electronic materials, and renewable energy sectors. He holds degrees from Purdue University (BS Mechanical Engineering) and from Carnegie-Mellon Tepper School of Business (MBA).

About Singota Solutions

Singota Solutions leverages 20 years of CDMO expertise to deliver excellence in parenteral drug development, batch manufacturing, and cGMP storage and distribution services to discerning clients. As a privately-held, woman-owned small business, we operate globally out of sites in the US and Europe. Singota specializes in:

- Product development of small and large molecules (monoclonal antibody, oligonucleotide, peptide, protein, vaccine)
- Pre-formulation, formulation development, process development, and analytical development services for liquid and lyo sterile injectable products
- Formulation; aseptic robotic filling; inspection; and labeling and kitting of vials, syringes, and cartridges
- Supplying your needs for batches used for reference standards, toxicology, stability, clinical and commercial purposes
- Technical transfer, optimization and scale-up services needed as your program progresses from pre-clinical to clinical and commercial stages

Clients love our loyal, responsive, exacting service and proactive risk intelligence. Do you want to move your molecules to success faster? Choose Singota Solutions.



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