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Big Pharma's Green Ambitions

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Pharma, like every other industry, has a negative impact on the environment and in the face of the current climate crisis, owes a responsibility to find ways to mitigate this harm. The industry has risen to the challenges, with a majority of big pharma firms aiming for carbon neutrality by 2030. What steps are big pharma companies taking to improve sustainability and how much further do they need to go to actually make a dent in carbon emissions? Let's find out.

Climate change - what once felt like a faraway threat has become an imminent crisis. The rise in the earth's temperature can create favourable conditions for the spread of vector-borne diseases such as malaria or increasing pollen-related allergies. The World Health Organisation (WHO) estimates that between 2030 and 2050 climate change will cause an estimated 250,000 additional deaths each year. In November 2021, a Canadian woman in her 70s became the first person to be officially diagnosed with 'climate change.'

The pharmaceutical sector is at the centre of this crisis. A 2019 study by Canada's McMaster University which assessed emissions reported by big pharma companies found the industry emitted more, and was more carbon-intensive, than the automotive industry. Specifically, the 48.55 tonnes of CO2 (carbon dioxide) equivalent that the sector emitted per million dollars of revenue was found to be 55 per cent greater than the emissions of the automotive sector. The industry is now finding ways to undo the damage and big pharma firms have set ambitious carbon reduction targets for themselves.

In November 2021, ten big pharma companies (AstraZeneca, Biogen, GSK, Johnson & Johnson, Merck, Novartis, Eli Lilly, Pfizer, Sanofi, and Takeda) and Schneider Electric launched the Energise programme, to engage hundreds of suppliers in climate action and decarbonisation of the pharmaceutical value chain.

In June 2021, eight other pharma companies (Sharp, Harro Hofliger, Schreiner MediPharm, Körber Pharma Packaging Solutions, SCHOTT Pharmaceutical Systems, HealthBeacon, Datwyler and Ypsomed Group,) have founded the Alliance to Zero. This is a non-profit membership association for pharma and biotech supply chain enterprises, that aims to facilitate the transition of the pharma sector to compliance with net-zero emissions, in line with the goal of the Paris Climate Agreement.

Big pharma's response to a changing climate

Big pharma has announced initiatives to address climate change by cutting carbon emissions, saving water, cutting waste, and incorporating environmentally stable manufacturing into their products.

In 2022, French firm Sanofi started constructing a new manufacturing site in Singapore that will be nearly carbon neutral, using green electricity from the site's own solar panels. The site will enable the manufacture of multiple vaccines, with just 12 days needed to switch from making one vaccine to another. It is expected to be fully operational by 2026. In 2020, Sanofi

also joined RE100, a global initiative in which companies commit to 100 per cent renewable energy by 2050 (in France, all of Sanofi's sites are already fully renewable-powered). The firm also reduced water withdrawals by 22 per cent between 2015 and 2020.

Japan's Takeda achieved carbon neutrality in 2020. One of the ways Takeda achieved this milestone is through investment in more than 30 renewable energy and carbon offset projects across 12 countries. In May 2022, the firm announced an accelerated goal to achieve net-zero GHG (greenhouse gas) emissions related to operations, including before 2035 and for its entire value chain before 2040. To achieve climate-related goals, a company-wide, cross-divisional programme has been established to increase renewable energy usage and drive energy efficiency. Takeda is also looking beyond its own operations and is working with suppliers to help them establish science-based reduction targets and reduce GHG emissions.

In 2021, UK's GlaxoSmithKline (GSK) announced a £50 million ($59 million) investment in renewable energy and carbon reduction at major UK and US manufacturing sites.

Swiss firm Novartis is committed to becoming carbon neutral across its value chain by 2040. From 2021, Novartis has avoided an average of 18,000 shipments per year saving approximately 1,400 tonnes of CO2 annually. It has also started to use solvents at most of its manufacturing plants that are recycled and can be reused.

In January 2020, UK's AstraZeneca announced its 'Ambition Zero Carbon' plan to achieve zero carbon emissions by 2025 and to ensure the entire value chain is carbon negative by 2030. The firm has committed to invest $1 billion over the next ten years to deliver these targets. Part of this ambitious strategy includes moving toward an entirely global fleet, operating solely on electric vehicles by 2025.

In 2020, US based Biogen announced, 'Healthy Climate, Healthy Lives,' a groundbreaking $250 million, 20-year initiative to eliminate fossil fuels across its operations and collaborations with renowned institutions, aimed at improving the health of the world population.

At Johnson & Johnson in the US, half of the electricity the company uses already comes from renewable sources, and the firm has further committed to reaching the 100 per cent sustainable power target by 2025. The pharmaceutical giant has also set a goal of net-zero emissions across its vast supply chain by 2045.

The other leading pharma giants from the US, Eli Lilly and Merck aim to shift global transportation from air to sea freight, as this has a substantially lower carbon footprint. Both the drugmakers have also invested in renewables as part of their push towards net-zero. Merck has secured several contracts with wind and solar power providers to accelerate its own goal of 100 per cent renewable energy by 2025, while Eli Lilly entered a joint venture with Enerpower in July 2021 to open the largest solar farm in Ireland, UK which will power its nearby drug manufacturing plant.

Pfizer from the US, too, has pledged to go carbon neutral by 2030 and will, among other strategies, reduce direct emissions by 46 per cent and purchase 100 per cent of its electricity from renewable sources. Following a virtual power purchase agreement with Vesper Energy, Pfizer expects its North American operations to be 100 per cent solar-powered by the end of 2023.

Path to net-zero

The industry has set ambitious targets and is making larger strides in achieving this task, but there's a lot that it has to do to actually make a dent in carbon emissions.

Getting energy from renewable sources, investing in greener fuels for shipping and using more eco-friendly and less wasteful forms of packaging are all steps in the right direction.

Another way to reduce emissions is to use synthetic biology for the production of APIs (Active Pharmaceutical Ingredients) and other raw materials. Current small-molecule intermediate/API manufacturing almost entirely relies on unsustainable, petroleum-industry-derived precursors.

“The growing need to quickly move away from fossil fuel amid the threat of climate change creates urgent demand for novel sustainable approaches to replace the current supply chain of small molecule drug production. Other than sporadic uses of biocatalysts in specific steps of some pharmaceutical synthesis, truly sustainably produced synthetic small-molecule pharmaceuticals are very rare. Synthetic biology that integrates metabolic engineering of various biological hosts (For example, bacteria, fungi, and plant cells) and enzyme engineering will be a major solution that will lead to the next green revolution in the way future small-molecule pharmaceuticals will be produced,” said Dr Jing-Ke Weng, Co-founder, DoubleRainbow Biosciences, USA.

Double Rainbow is a sustainable biotech company harnessing the power of natural evolution through bioengineering to improve the quality of human health.

Manufacturing is another carbon-intensive stage of a pharma company’s supply chain. One of the most effective ways of reducing carbon emissions associated with this is to adopt continuous manufacturing, an efficient alternative to batch manufacturing, that combines multiple separate production stages into one single, continuous production line.

Back in 2014, US-based biotech company Amgen had opened a biomanufacturing plant incorporating continuous purification methods in Singapore for commercial production of biologic drug substances. Compared with the manufacture of the same amount of product in a traditional facility, the plant has demonstrated a 73 per cent reduction in energy consumption, 54 per cent reduction in water use, and 69 per cent reduction in carbon emissions. In 2018, the firm began building a new next-generation biomanufacturing plant in Rhode Island, USA.

Sanofi followed suit in 2019, opening its first digitally-enabled, continuous manufacturing facility in the US.

However, some experts feel it’s virtually impossible for the industry to avoid emissions entirely.

“While drug companies manufacture life saving medications, their production is resource-intensive and requires a great deal of energy-intensive production, for example, operations involving automated air circulation and high water and electricity usage. Combined with the required high standards that result from strict, ever-increasing, and absolute binding regulations by healthcare authorities, it is very difficult to avoid residual emissions entirely,” said Henryk Badack, Senior Vice President Technical Services/Internal Project Management, Vetter Pharma, Germany.

Vetter is a global CDMO (contract development and manufacturing organisation) with an enduring commitment to sustainability.

He added, “It is not always possible, for example, to integrate recycled materials into production. In the case of waste management, biopharma companies cannot recycle many substances as they have been in contact with active ingredients. This would be too dangerous for humans and the environment alike.”

Perhaps net-zero emissions are somewhat ambitious, but not unattainable and the industry should take all necessary steps to be more sustainable, to maintain a healthy ecosystem.

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