



**The Business Case for Decarbonization
of a Healthcare Delivery System—A Case
Study on Optimizing Last-Mile
Pharmaceutical Delivery**

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Introduction

Healthcare systems around the world account for approximately 4-5% of total greenhouse gas (GHG) emissions.¹ The American healthcare industry is the second largest in the world, producing 479 million metric tons (MMT) of CO₂ annually—almost 8% of the country's total carbon emissions.² Approximately 71% of emissions from the US healthcare industry are generated in the supply chain from producing, transporting, and disposing of goods and services, including pharmaceuticals and other medical devices and equipment.³

Given that approximately 82% of emissions for healthcare systems are produced by Scope 3⁴, it was important to explore collaboration with a supply chain partner to understand “influenceable” Scope 3 emissions, or emissions that healthcare systems can control based on their practices. Cardinal Health is a leading pharmaceutical distributor, medical and laboratory products manufacturer, and healthcare solutions provider servicing nearly 90% of US hospitals.⁵ Cardinal Health partnered with NYU Stern Center for Sustainable Business (CSB) to use the Return on Sustainability Investment (ROSI™) framework and methodology to determine the tangible and intangible financial benefits associated with optimizing last-mile delivery.

The Business Case for Optimizing Last-Mile Delivery

With increasing pressure from governments, policymakers, investors, and customers, it is now a critical time for businesses to prioritize supply chain decarbonization.⁶ In March 2023, the US Department of Health and Human Services (HHS) urged hospitals and health systems to commit to a 50-52% reduction in their GHG emissions by 2030.⁷ Members of the HHS's Health Sector Climate Pledge, such as Kaiser Permanente and Advocate Aurora Health and Children's Hospital, commit to further reducing their emissions to net zero by 2050.⁸ Given that policymakers are considering accelerating healthcare decarbonization through policy

¹ Rodríguez-Jiménez, L., Romero-Martín, M., Spruell, T., Steley, Z., & Gómez-Salgado, J. (2023). The carbon footprint of healthcare settings: A systematic review. *Journal of Advanced Nursing*, 79(8), 2830–2844. <https://doi.org/10.1111/jan.15671>

² Thiel, C. L., & Richie, C. (2022). Carbon Emissions from Overuse of U.S. Health Care: Medical and Ethical Problems. *Hastings Center Report*, 52(4), 10–16. <https://doi.org/10.1002/hast.1404>

³ Reed, C. (2022, August 29). Decarbonizing health care facilities. *American Hospital Association*. Retrieved October 24, 2023, from <https://www.hfm magazine.com/articles/4562-decarbonizing-health-care-facilities>

⁴ How the U.S. Health Care System Contributes to Climate Change. (2022). Commonwealth Fund. <https://doi.org/10.26099/m2nn-gh13>

⁵ About us | Cardinal Health. (n.d.). <https://www.cardinalhealth.com/en/about-us.html>

⁶ Spiller, P. (2021, June 14). Making supply-chain decarbonization happen. McKinsey & Company. <https://www.mckinsey.com/capabilities/operations/our-insights/making-supply-chain-decarbonization-happen>

⁷ Office of the Assistant Secretary for Health (OASH). (2023, March 9). HHS reopens health sector climate pledge. HHS.gov. <https://www.hhs.gov/about/news/2023/03/09/hhs-reopens-health-sector-climate-pledge.html>

⁸ Assistant Secretary for Health (ASH). (2023, October 19). Health sector commitments to emissions reduction and resilience. HHS.gov. <https://www.hhs.gov/climate-change-health-equity-environmental-justice/climate-change-health-equity/actions/health-sector-pledge/index.html>

development,⁹ early actors in this space will find themselves better equipped for future regulatory changes.

As the regulatory environment continues to evolve, healthcare systems are also beginning to create demand for low-carbon supplies and suppliers. For example, in 2020, the UK's National Health Service (NHS) committed to net zero direct carbon emissions by 2040 and net zero emissions across the supply chain by 2045.¹⁰ In order to achieve these ambitious goals, the NHS will not purchase from suppliers that cannot, at a minimum, meet their decarbonization commitments by 2030. Suppliers to the NHS must, therefore, publicly demonstrate reduced GHG emissions, low or zero-carbon delivery vehicle utilization, and other climate impact reduction products and services by 2024. US supply chains are also being asked to demonstrate their commitment to climate action. Given the growing customer demand, supply chain partners that act early may be rewarded with improved economic performance or¹¹, conversely, find themselves disadvantaged in the marketplace by failing to act.

ROSI™ Benefits

NYU Stern CSB's Decarbonization in Healthcare Systems Framework was used to identify the following potential benefits for Cardinal Health:

1. Reduced fuel consumption
 - a. Reduced fuel costs
 - b. Reduced CO₂ emissions - the specific GHG protocol scope depends on whether or not a company owns their delivery fleet
2. Avoided costs of carbon credits & social cost of carbon (SCC)
3. Reduced administrative costs related to packing and dispatching orders
4. Increased employee engagement & retention
5. Reduced operations costs for customers
6. Reduction in warehouse accidents
7. Improved customer loyalty

Methodology: Applying ROSI™

The ROSI™ process combined comprehensive research on fleet optimization and decarbonization strategies, Cardinal Health's current and future sustainability efforts, internal stakeholder interviews, and scoping and prioritization to determine which benefits would have

⁹ Alonso-Zaldivar, R. (2021, August 30). US health agency will prod hospitals to cut carbon emissions | AP News. AP News. <https://apnews.com/article/business-science-health-climate-change-0b9d23615a79b7d38e18ea48a7d8d29a>

¹⁰ NHS, G. (n.d.). Greener NHS » Suppliers. <https://www.england.nhs.uk/greenernhs/get-involved/suppliers/>

¹¹ Zhang, A., Alvi, M. F., Gong, Y., & Wang, J. X. (2022). Overcoming barriers to supply chain decarbonization: Case studies of first movers. *Resources, Conservation and Recycling*, 186, 106536. <https://doi.org/10.1016/j.resconrec.2022.106536>

the greatest impact and scalability based on Cardinal's fleet composition and data availability. Additional details on the ROSI™ process and the benefits assessed are highlighted below.

Benefit 1: Reduced fuel consumption & costs resulting in reduced CO₂ emissions from delivery schedule optimization

For companies that outsource last-mile delivery to third-party logistics partners, such as Cardinal Health, they can start by collaborating closely with their logistics providers to better understand the baseline emissions footprint of last-mile deliveries. Essential data includes number of deliveries, total distance traveled, amount of fuel consumed by fuel type, vehicle type and corresponding fuel efficiency and fuel type. Opportunities for reducing the number of same-day deliveries will have to be discussed with customers to understand the reasons behind high frequency deliveries, and determine opportunities to reduce them without compromising the quality of care that customers are able to provide.

Measuring the impact of reduced fuel consumption is an effective strategy to reduce associated costs and CO₂ emissions by creating a baseline for modeling future performance and identifying opportunities to optimize delivery schedules and services.

1. For this benefit analysis, sample delivery data to hospital customers was used to calculate a baseline for total fuel consumed in 2022-23.
2. Using the baseline data provided, two alternative scenarios with optimized delivery schedules resulting in reduced fuel consumption were created.
3. To project the cost and CO₂ savings under each alternative scenario, relative to the 2022-23 baseline, total fuel consumed was projected through FY2030 as the business as usual scenario while factoring in company growth. Cost and CO₂ savings were calculated by subtracting the reduced alternative scenario values from the business as usual projection.

Delivery schedule optimization might allow Cardinal Health to increase delivery efficiency by consolidating customer orders to reduce the total number of deliveries ultimately resulting in fewer miles traveled, reduced fuel consumption and costs, and reduced CO₂ emissions.

Benefit 2: Avoided costs of carbon credits & social cost of carbon (SCC)

Morgan Stanley estimates that at least one gigaton of CO₂ must be removed annually, by 2030, in order to achieve the 2015 Paris Climate Accords sustainability targets.¹² Voluntary carbon credits are often employed by companies and countries to reduce their net carbon emissions and progress towards decarbonization goals. The social cost of carbon (SCC) is a tool created by scientists and economists to approximate “the cost, in dollars, of the damage done by each

¹² Carbon-Offsets market set to surge | Morgan Stanley. (n.d.). Morgan Stanley. <https://www.morganstanley.com/ideas/carbon-offset-market-growth>

additional ton of carbon.¹³ For this case study, both carbon credits and the social cost of carbon were used as proxies for the financial impact of reducing carbon emissions for internal decision-making purposes. By reducing Scope 3 emissions through the optimization of delivery schedules, Cardinal Health can:

- (1) Reduce the amount of carbon needed to be offset by carbon credits, therefore reducing the total amount of carbon credits needed to be purchased if they pursue this option for decarbonization, and
- (2) Determine if the cost of optimizing delivery schedules offsets the social cost of carbon associated with the additional emissions from not optimizing

Conclusion

Through this project, CSB identified many potential benefits for Cardinal Health through delivery schedule optimization. Through the early optimization of delivery schedules, pharmaceutical distributors such as Cardinal Health can increase operational efficiency, reduce fuel costs, reduce carbon emissions, and help lead the pharmaceutical industry in decarbonization and climate action.

The ROSI™ model was applied to Cardinal Health's hospital deliveries to explore the opportunities and benefits created from optimizing delivery schedules, but the methods and lessons learned from this case can also be used by other organizations who deliver pharmaceutical products to healthcare customers. Additionally, the Healthcare Delivery Systems Decarbonization Framework can provide further decarbonization insights that can support a more holistic discussion about the challenges and opportunities associated with decarbonizing healthcare systems while also identifying areas where further data and research are necessary.

Healthcare systems around the world are major contributors to global GHG emissions and the American healthcare industry is the second largest healthcare system in the world. Decarbonizing healthcare supply chains is a challenging but crucial task to reduce the impacts of climate change that will require close collaboration across healthcare providers and supply chain partners. As the regulatory environment evolves and healthcare systems accelerate their decarbonization efforts, supply chain partners will also face increasing pressure to reduce their own emissions and early actors in this space will be rewarded. This project is one example of how ROSI can discover the business opportunities and value of optimizing pharmaceutical deliveries.

¹³ Asdourian, E., & Wessel, D. (2023, March 14). What is the social cost of carbon? The Brookings Institution. Retrieved October 24, 2023, from <https://www.brookings.edu/articles/what-is-the-social-cost-of-carbon/>

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