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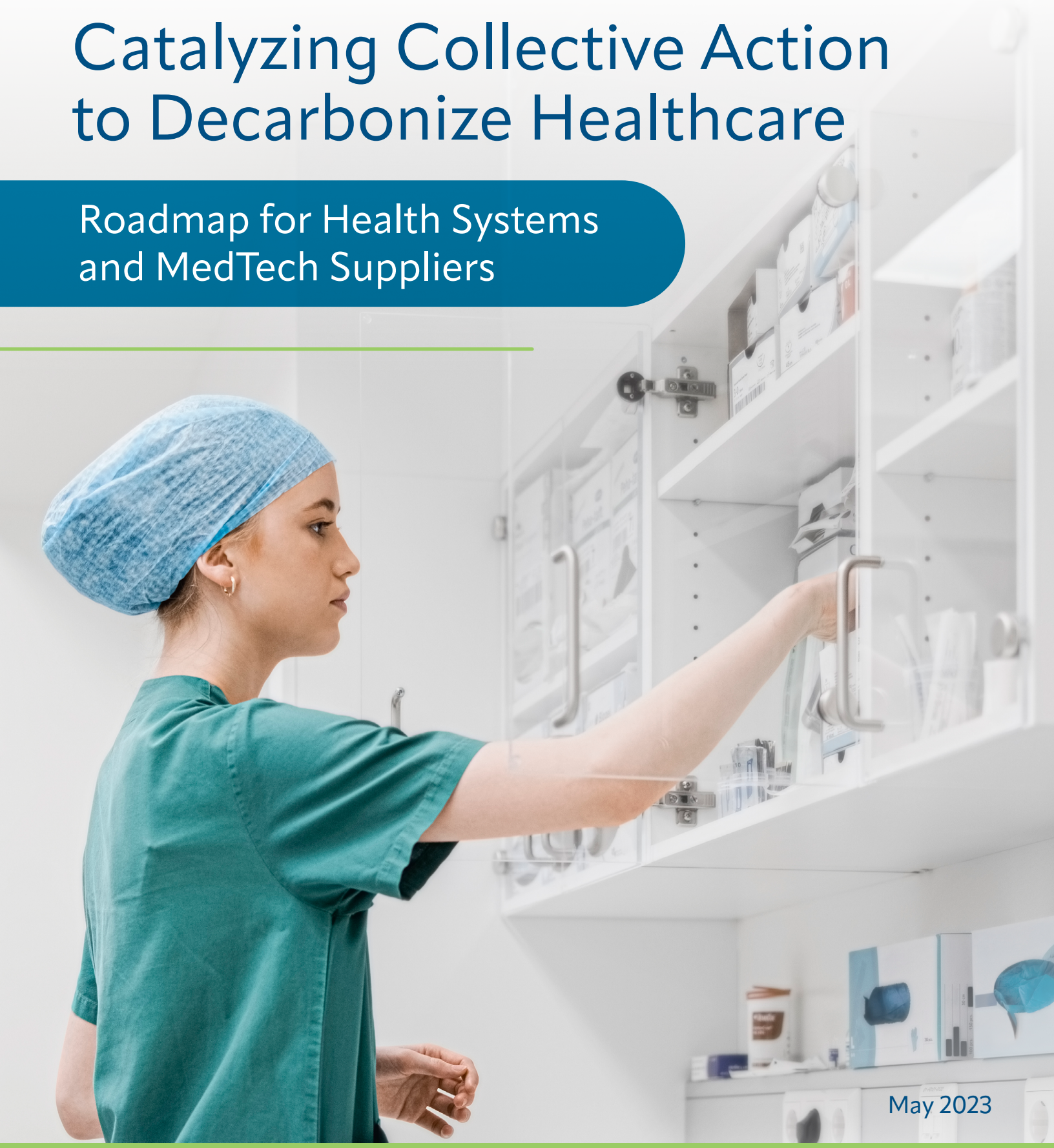
Catalyzing Collective Action to Decarbonize Healthcare

Roadmap for Health Systems and MedTech Suppliers



May 2023

Table of Contents

About This Paper

In November 2022, Kaiser Permanente and Health Care Without Harm convened a Roundtable of health system and their top suppliers, as well as group purchasing organizations (GPOs), to discuss how they might work together to address greenhouse gas emissions related to the healthcare value chain. The health systems represented hundreds of hospitals from across the country and the suppliers included medical device, equipment, service, and distribution (MedTech) companies, representing over $1 trillion in annual revenue. The convening grew out of initial work on supply chain decarbonization done by the U.S. Health Care Climate Council and MedTech supplier partners.

While several existing health sector industry collaboratives are working on decarbonization, they are either broad sector collaborations or primarily focused on decarbonizing the pharmaceutical value chain; and MedTech companies are not well represented. With medical devices and supplies generating 7% of the United States health sector footprint, Roundtable participants agreed working together was critical to reduce healthcare value chain emissions.[1]

Kaiser Permanente and Health Care Without Harm reconvened the participants for an April 2023 Roundtable, facilitated by Accenture, to identify areas for collective action, defined as initiatives done in collaborartion, to decarbonize the healthcare MedTech value chain. This paper demonstrates the need for collective action and sets the foundation for a collaborative effort. Health systems and their MedTech suppliers must together address product composition, packaging, distribution, utilization, and disposal in order to decarbonize emissions from the supply chain. Suppliers can focus on making products more sustainable, but health systems ultimately make decisions about procurement and use.

The recommendations in this paper come from the outputs of the April Roundtable, subject matter expert interviews, and secondary research. The paper describes key decarbonization levers with corresponding collective actions and collective commitments (individual commitments made by each company) that will accelerate emissions reduction efforts. The identified collective actions are assessed for impact and effort and mapped to a 24-month roadmap to illustrate an actionable path forward. For this work to be successful, companies would need to commit time and resources to a formal collaborative. The paper concludes with best practice recommendations for effective governance and productive cooperation.

Executive Summary – Key Findings

To mobilize collective action and provide a roadmap for near-term efforts to decarbonize the MedTech value chain, key collective actions have been selected under four decarbonization levers:

- **Renewable Energy**
- **Product Innovation**
- **Product Utilization – Clinical Engagement**
- **Transportation and Logistics**

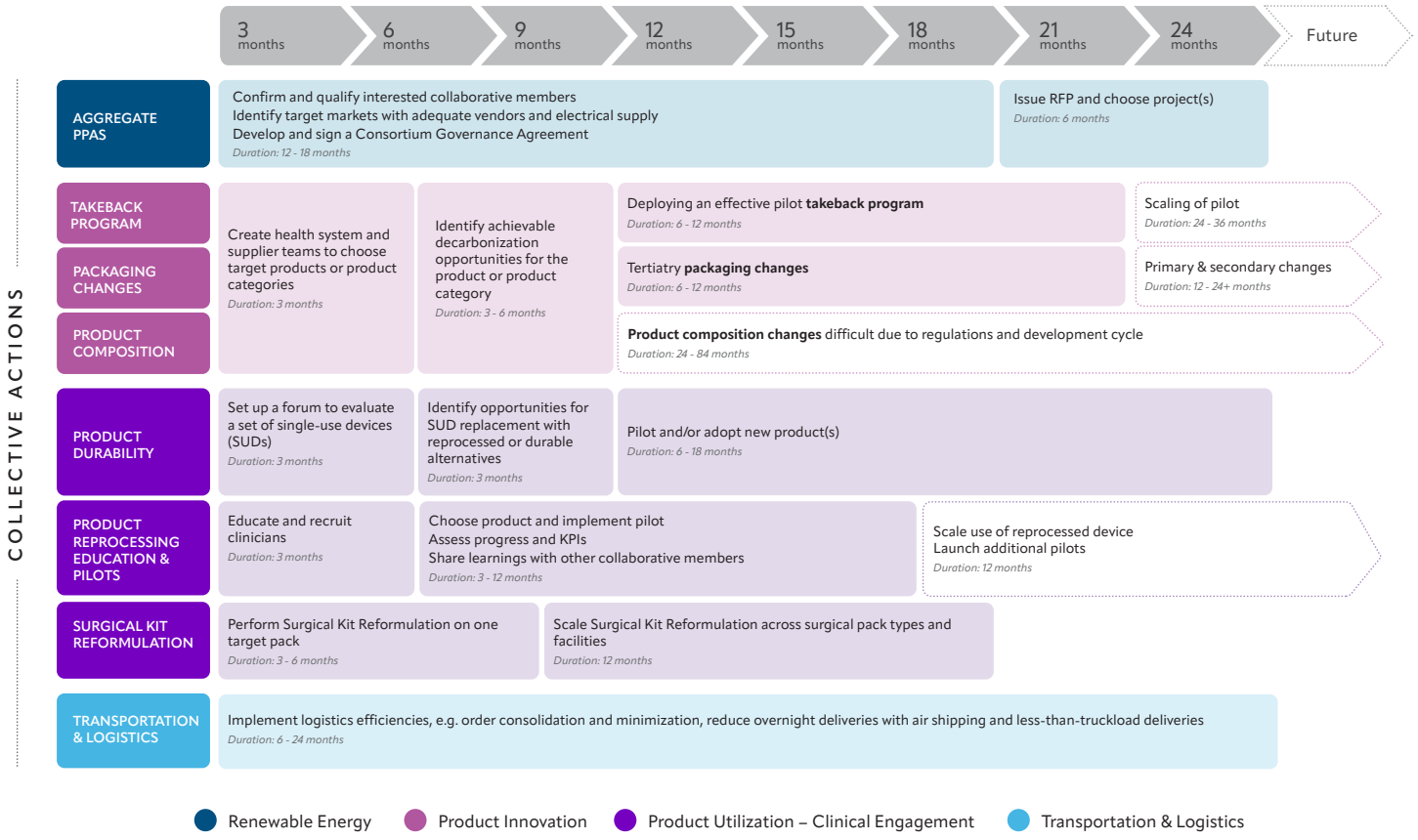
For each action, the following criteria are considered:

- Health system and supplier roles and value proposition
- Impact and effort
- Timeline
- Proposed metrics for measuring progress

The table below summarizes the lever and collective actions with further detail provided in the paper.

LEVER CATEGORY	COLLECTIVE ACTION	DESCRIPTION	IMPACT	EFFORT
Renewable Energy	Aggregate Power Purchase Agreements	Pursue aggregate Power Purchase Agreements to: • Procure renewable electricity at a lower price by aggregating demand • Enable smaller companies to participate • Bring new renewable capacity onto the grid	High	Medium
Product Innovation (Composition, Packaging, and End-of-Life)	Takeback Programs	Identify and pursue takeback programs for packaging and products to reprocess or recycle component parts to reduce and move towards a circular economy.	Medium	Medium
	Packaging Changes	Identify and pursue opportunities to reduce packaging where possible and substitute more sustainable materials where packaging is needed.	Low-Medium	Low-High
	Product Composition Changes	Identify and pursue product composition changes to bring more sustainable products to market.	High	High
Product Utilization – Clinical Engagement	Increased Product Durability	Set up a forum to evaluate opportunities to replace single-use devices with reprocessed or durable options while maintaining patient safety in different clinical environments.	Medium	Medium
	Product Reprocessing Education and Pilots	Educate clinicians on available reprocessed devices and set up pilots for specific devices to increase adoption.	Medium	Low-Medium
	Surgical Kit Reformulation	Identify surgical kit items that routinely go unused during procedures and remove them from surgical packs to avoid the unnecessary purchase and disposal of those supplies.	Medium	Medium-High
Transportation and Logistics	Implement Logistics Efficiencies	Reduce transportation-related emissions through order consolidation, packing efficiency, optimized delivery routes, decreased delivery frequency, and minimized less-than-truckload, overnight, and last-mile deliveries.	Medium	Medium-High

Each collective action has been mapped to a 24-month timeline based on estimated ranges for execution. Several initiatives can be accomplished within the first 12-24 months while others will lay the foundation for further decarbonization.



Achieving these collective efforts will require the following enablers:

LEADERSHIP

Leadership support is critical for enterprise-wide supply chain decarbonization initiatives. Leaders must provide resources to operationalize efforts, as well as the direction and incentives to ensure culture change.

DATA ACCESS AND TRANSPARENCY

Both health systems and suppliers require access to the right data at the right time to support decarbonization. There are currently two significant areas of challenge:

- **Accurate emissions accounting:** Accurate, product-level emissions are not currently available for most medical supplies and equipment. Many companies do not properly understand their own emissions.
- **Data Standardization:** Procurement professionals are currently not getting the data they need to make sourcing decisions and suppliers are getting inundated with a variety of data requests.

There are already efforts underway to address data challenges at the federal, cross-sectoral, and health system-MedTech interface levels. The Roundtable participants are focusing on collective actions and commitments for decarbonization, while supporting and aligning with existing data initiatives as appropriate.

The Imperative

Climate change is a global health crisis, disrupting access to clean air, safe drinking water, nutritious food supply, and safe shelter. The warming climate results in heat-related illness and death, injuries and fatalities due to weather events, increases in respiratory and cardiovascular disease, vector-borne illness, and mental health impacts; we are already experiencing widespread adverse health impacts (Figure 1). The World Health Organization projects there will be an additional 250,000 deaths per year worldwide caused by climate change between 2030 and 2050, and direct damage costs to health are estimated to be between USD $2–4 billion per year by 2030.[2] According to the Intergovernmental Panel on Climate Change, emissions must begin to decrease by 2025 and be reduced by 43% by 2030 in order to limiting warming to around 1.5°C (2.7°F) and avoid the most catastrophic impacts of climate change.[3]

In the United States, populations are already facing increasingly frequent and severe heat waves, wildfires, flooding, hurricanes, and droughts, devastating communities across the country. In 2022, there were 18 weather and climate disaster events with losses exceeding $1 billion each. These events led to $165B in damages, and 474 deaths.[4] As temperatures continue to rise, United States populations are faced with worsening chronic conditions and heat-related deaths, with 1,300 people dying in U.S. cities from extreme heat every year.[5] In one week of June 2021 alone, a heat wave within the Pacific Northwest resulted in 600 heat-related deaths in the states of Washington and Oregon.[6] A 2021 study indicated that across the Western United States, there were ~150,000 asthma events resulting from wildfires and these smoke-induced asthma exacerbation cases contributed to over $1.5 billion in excess healthcare costs.[7] Increased flooding intensity and hurricanes have resulted in fatalities, destruction, damage, and displacement; Hurricane Ida in 2021 caused ten heat-related deaths and millions of Louisiana residents to lose power.[8]

Climate change disproportionately impacts populations already suffering health inequities – communities of color, low-income communities, people with disabilities, children, the elderly, and people with underlying health conditions. These same populations are among the most exposed, most sensitive, and have the least individual and community resources to prepare for and respond to health threats. As health systems and suppliers try to address health equity, climate change must be understood as a force multiplier for the other determinants of health. For example, people with underlying health conditions such as asthma are more likely to have a serious problem in extreme heat, and asthma is more prevalent in children and communities of color.[9]

The business of healthcare and access to healthcare services and supplies are also vulnerable to the effects of climate change. Health systems and suppliers must prepare for changes in disease prevalence and assess their facilities and supply chains for climate vulnerability. Extreme weather events put health systems at risk for patient evacuations, suspended services, postponed procedures, and closures. These situations can lead to reduced revenues from decreased clinical demand and lower reimbursement rates. After Superstorm Sandy in 2012, NYU Langone Health had to suspend surgery and inpatient admissions for two months and close the Emergency Department for 18 months, with 500 providers forced to seek privileges elsewhere during the months of rebuilding. Lost revenue during this time period was estimated at $400 million.[10] Climate-related events also cause supply chain disruptions, affecting access to critical supplies. In 2017, Hurricane Maria damaged a vital saline manufacturing plant in Puerto Rico, causing a widespread shortage of small-volume saline bags throughout the United States.[11]

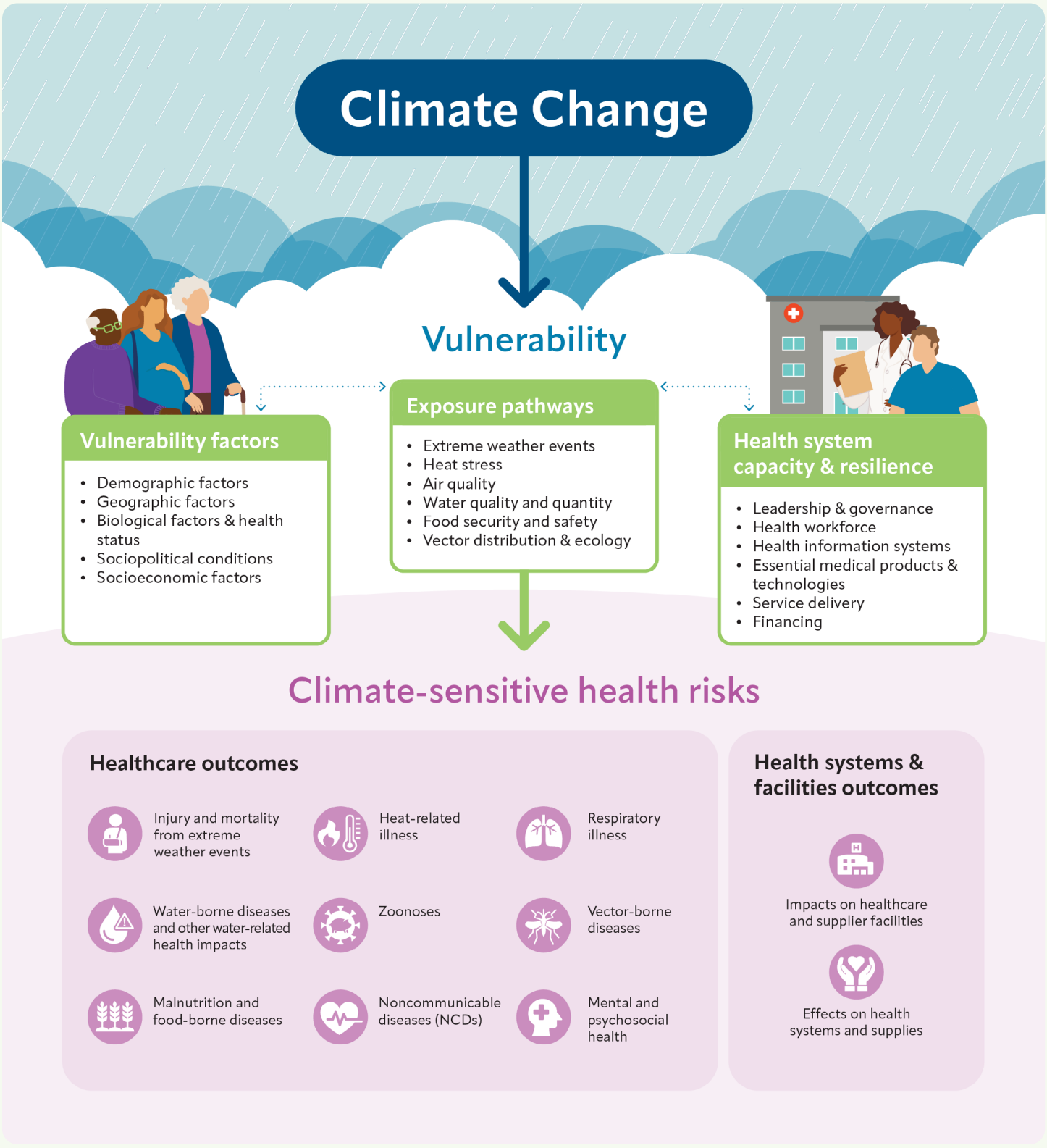


FIGURE 1: An overview of climate-sensitive health risks, their exposure pathways and vulnerability factors. Climate change impacts health both directly and indirectly, and is strongly mediated by environmental, social, and public health determinants.

Source: Climate Change and Health, World Health Organization https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health

Health Sector Contribution to Climate Change

The health sector, which must care for people during and after extreme weather events and adapt to changing disease prevalence, has a key role to play in decarbonization. The health sector is responsible for 4.4% of global emissions and the U.S. is the largest healthcare emitter in absolute and per capita terms, making up 27% of healthcare's global footprint (Figure 2).[12,13]

In the U.S., the health sector accounts for 8.5% of national emissions and 82% of those emissions are generated by the supply chain.[14] Pharmaceuticals and chemicals account for 18% and medical devices and supplies account for 7% of U.S. health sector emissions (Figure 3).[1]

As the only industry with a healing mission, the health sector has a unique responsibility to address its footprint. With the majority of emissions in the value chain, it is essential that health systems, distributors, group purchasing organizations), pharmaceutical companies, and MedTech companies individually set ambitious decarbonization goals and also collaborate to accelerate decarbonization efforts. The health sector has not historically been a leader in climate action, but there is now growing momentum within the sector.

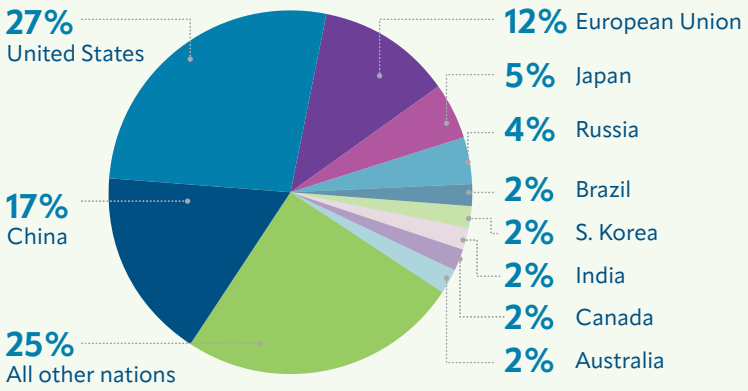


FIGURE 2: Top ten emitters plus all other nations and percentage of global health care footprint

Source: Health Care's Climate Footprint, Health Care Without Harm and ARUP https://noharm-global.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_092319.pdf

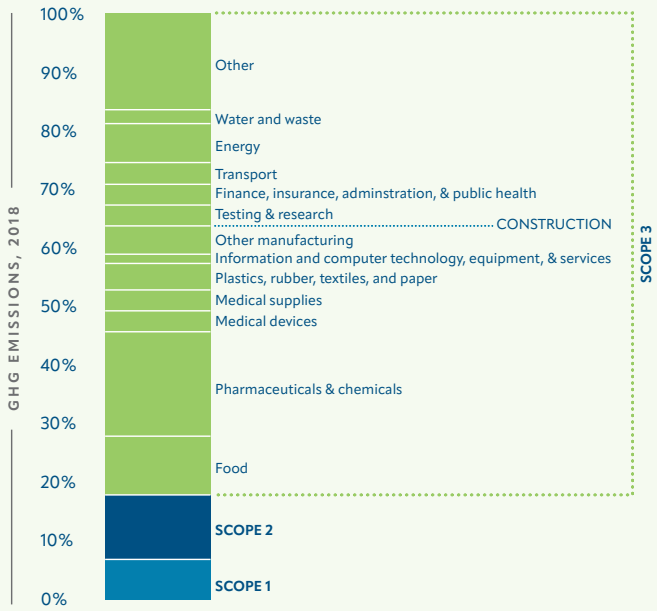


FIGURE 3: U.S. national health care greenhouse gas (GHG) emissions by GHG Protocol Scope, 2018

Source: Eckelman et. al., Health Care Pollution And Public Health Damage In The United States: An Update https://www.healthaffairs.org/doi/10.1377/hlthaff.2020.01247

Current State Landscape

Competing Priorities

The latest United Nations Global Compact-Accenture CEO Study on Sustainability found that CEOs are navigating unprecedented uncertainty. Among the 2,600 CEOs across industries surveyed for the study, 93% of CEOs said they are facing ten or more simultaneous global challenges to their business.[15] In addition to challenges from threats to public health, inflation and price volatility, and talent scarcity, it has been a very difficult few years financially for health systems. Hospitals ended 2022 with higher expenses due to ongoing staffing shortages and fewer patient discharges.[16] According to a survey of more than 900 hospitals, November 2022 was the 11th straight month of negative operating margins.[17] Recent healthcare CFO survey data suggests that 60% of healthcare organizations defaulted or were unable to meet terms on bond and loan covenants, and 74% of CFOs cited supply chain disruption as a threat to their business in 2023.[18]

The good news is that despite these competing priorities, CEOs understand that sustainability is not only a climate imperative, but also the foundation for security, growth, and resilience. In the UNGC-Accenture CEO Study on Sustainability, 98% of CEOs see it as part of their role to make their business more sustainable, up from 83% in 2013. Leading CEOs are already embedding sustainability into their businesses by launching new products and services for sustainability (63%), enhancing sustainability data collection across their value chains (55%) and investing in renewable energy sources (49%). Nearly half (49%) are transitioning to circular business models, and 40% are increasing R&D funding for sustainable innovation.[19]

Sector Momentum

According to a 2022 Accenture study of Global 2000 companies, the health and life sciences sector companies combined have set the fewest net zero targets of all industries; only 10% of health companies and 33% of life sciences companies had net zero goals in place. However, momentum is beginning to grow. The proportion of companies setting net zero targets began to increase from 2021 to 2022, with a 6% increase for health companies and a 9% increase for life sciences companies.[20] In October of 2020, the National Health Service of England (NHS) became the first health system to commit to net zero emissions, with a goal of 2040.[21] In April 2022, over 100 health organizations committed to the White House and Department of Health and Human Services (HHS) Health Sector Climate Pledge, committing to reduce emissions by 50% by 2030 and achieve net zero by 2050, publicly accounting for progress annually.[22]

In addition to an increasing number of individual net zero targets, there has been a considerable increase in climate action in the health sector over the last several years. Over 60 countries, including the United States, committed to the 2021 COP26 Health Program, pledging to develop more climate-resilient and low-carbon health systems. In 2022, over 100 healthcare organizations committed to the White House and Health and Human Services Health Sector Climate Pledge, agreeing to 1) reduce emissions by 50% by 2030, achieve net zero by 2050, and to publicly report data on progress, 2) develop an inventory of supply chain emissions (Scope 3), and 3) create action plans to develop climate resilience. With federal health system commitments, this Pledge includes 15% of all U.S. hospitals.[23] The Joint Commission, the largest standards-setting and accrediting body in healthcare, not only committed to the White House pledge but also has targeted climate change as a top strategic priority. Jonathan B. Perlin, MD, PhD, The Joint Commission's new president and CEO, believes "Decarbonization and sustainability are critical to a health agenda, especially because climate change is having a direct and inequitable impact on the health and well-being of people globally".[24] In March 2023, the Joint Commission published for public comment a new proposed Leadership Standard (LD.05.01.01) requiring hospitals to address environmental sustainability, including measuring and reducing their greenhouse gas emissions.[25] After receiving negative industry feedback, the Joint Commission announced they were considering introducing the new standard as optional rather than as a mandatory requirement.[26]

Growing Pressures and Opportunities

Increasing regulatory mandates and market forces are compelling health sector companies to disclose the business risks and opportunities related to climate change and how those risks will be managed. As multinational, publicly-listed corporations, many MedTech companies are subject to new regulations taking effect in Europe and the U.S.

The Corporate Sustainability Reporting Directive (CSRD) went into effect in the EU January 2023 with the goal of making corporate sustainability reporting more common, consistent, and standardized, like financial accounting and reporting. The CSRD applies to both EU companies and non-EU companies with either a significant presence in Europe or those listed on a European exchange. To comply, companies will need to publish detailed sustainability reporting including strategy, targets, and transition plans, as well as impacts on climate, biodiversity, working conditions, diversity, human rights, and human health across value chains. The first CSRD report for large companies will will be due in early 2025 based on 2024 fiscal year data. Small and medium companies will follow shortly thereafter with reporting begining in 2026, following streamlined guidelines. [27]

The Securities and Exchange Commission proposed a new rule in March 2022 to enhance and standardize climate disclosures for investors. This rule would require publicly-listed companies to include disclosures regarding Scope 1, Scope 2, and Scope 3 greenhouse gas emissions; material climate-related risks; and plans for addressing those risks as part of their registration statements, periodic reports, and audited financial statements.[28] While the climate rule has faced significant opposition and has yet to go into effect, it is expected to be finalized in the second quarter of 2023.[29]

Investors and credit rating agencies are also increasingly considering the need for companies to decarbonize and plan for climate impacts. According to Bloomberg, Global ESG assets surpassed $35 trillion in 2020 and are projected to surpass $50 trillion by 2025, one-third of the projected total assets under management globally.[30] The three big credit rating agencies – Fitch, Moody's, and Standard & Poor's – have all started to integrate ESG factors into their rating methodologies. Recent research on 700 companies showed that this data is not yet impacting credit ratings, but it serves as an important market signal and may begin to affect the cost of capital in coming years.[31]

In addition to mandates, legislation is creating new opportunities for companies to implement sustainability initiatives. In August 2022, the Inflation Reduction Act (IRA) was signed into law directing $369 billion in federal funding to clean energy. This investment is projected to reduce national emissions 43% by 2030.[32] The IRA will provide billions of dollars in grants, loans, and expanded tax credits for renewable energy, energy efficiency, and electric vehicles. The IRA also includes a "direct pay" option so nonprofit health systems with no tax liability will be able to receive a payment equal to the amount of the tax credit. This act provides incentives for decarbonization across the health care supply chain, addressing emissions as varied as medical supply manufacturing and hospital construction material.[33] Additionally, the IRA allocates funding to the EPA to implement enhanced GHG emissions reporting requirements. These product declarations of GHG emissions should foster further supply chain decarbonization.[34] HHS has elevated the IRA as a vehicle for health sector decarbonization. On Earth Day 2023, HHS issued the *Quickfinder for Leveraging the Inflation Reduction Act for the Health Sector* to help healthcare companies take advantage of the IRA's opportunities to advance decarbonization and resilience. [35]

Convening the Roundtable

In response to growing pressure and the urgent need for action, health industry companies have begun organizing collaboratives to address key climate issues at scale, including these summarized below (See *Appendix A* for details):

Sustainable Markets Initiative Health Systems Task Force	Launched in 2021 and convened by AstraZeneca, this public-private partnership focuses on the delivery of net zero, patient-centric health systems with three working groups across Supply Chains (small molecule and biologics drugs), Patient Care Pathways, and Clinical Trials.
National Academy of Medicine's Action Collaborative on Decarbonizing the US Healthcare Sector	Launched in 2021, this public-private partnership has four working groups across Health Supply Chain and Infrastructure, Health Professional Education and Communication, Health Care Delivery, and Policy, Financing, and Metrics.
Energize	Launched in 2021 and convened by Schneider Electric, this collaboration between 17 pharmaceutical companies creates opportunities for their suppliers to decarbonize through renewable electricity.
Manufacture 2030 Activate	Announced in 2022, this group is focused on accelerating decarbonization of Active Pharmaceutical Ingredient suppliers via data collection, technology, and operational and resource efficiency opportunities.
Pharmaceutical Supply Chain Initiative's (PSCI) Decarbonization Team	PSCI has focused on responsible pharmaceutical supply chains since 2006, but in recent years formed a Decarbonization Team developing maturity models, environmental surveys, and learning plans for member companies' suppliers.

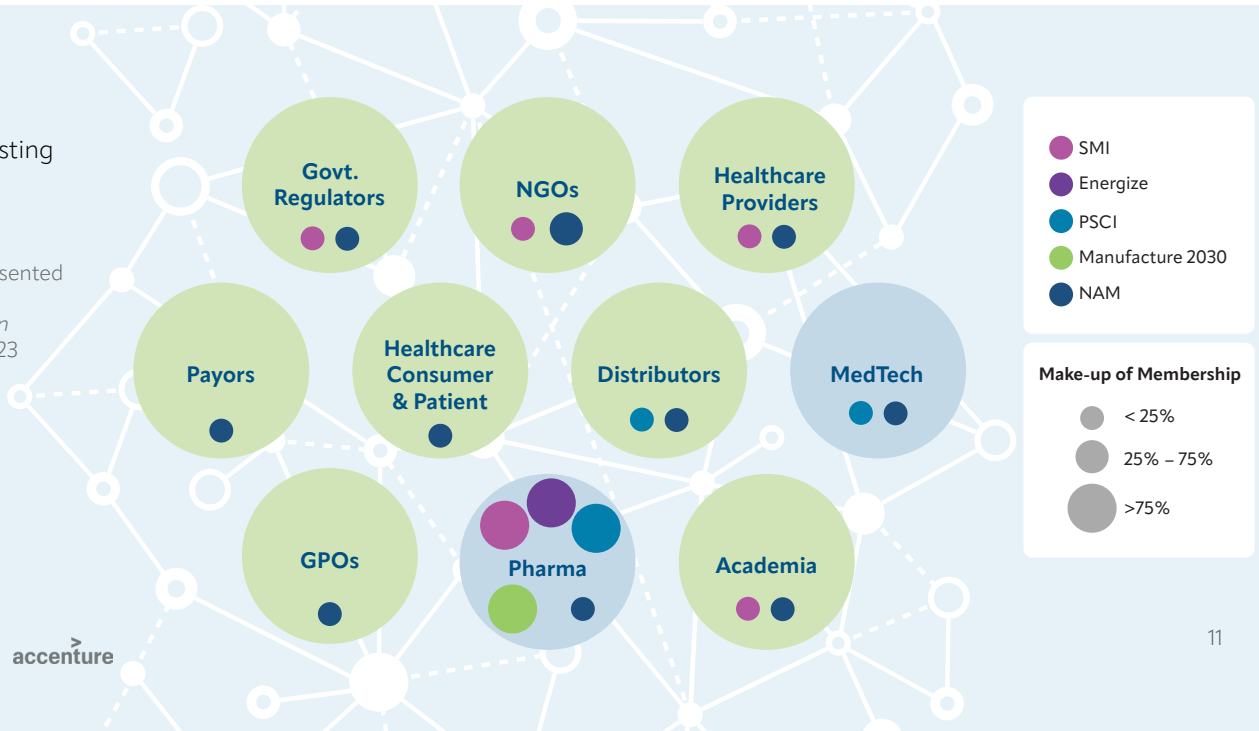


FIGURE 4: Health sector stakeholder presence within existing decarbonization collaboratives

Source: Accenture, presented at *Decarbonizing the Healthcare Value Chain* Roundtable, April 3, 2023

While these collaboratives are important for value chain decarbonization, they are focused on the broad sector or on pharmaceutical companies; MedTech companies are not well represented (See Figure 4). This presents a significant opportunity for health systems and MedTech companies to work together to decarbonize the supply chain.[1]

Kaiser Permanente and Health Care Without Harm recognized this need and hosted Roundtables on Decarbonizing the Healthcare Value Chain in November 2022 and April 2023 for health systems and their top suppliers. The Roundtable participants are generally industry sustainability leaders, but there are differences between the health systems and the MedTech suppliers. The health system participants are nearly all nonprofit organizations that have not been subject to public reporting standards or investor pressure to disclose climate risks including emissions. In contrast, many of the suppliers are publicly-listed, multinational companies that have been tracking and reporting on their greenhouse gas emissions for many years.

The participating health systems have been working on sustainability efforts for decades, setting targets and making progress in areas such as energy, water, and waste, but many are not tracking and reporting on total annual emissions. In fact, many health systems have not yet completed a Scope 3 emissions inventory baseline. Of the 15 participating health systems:

- The majority have committed to the White House and HHS Health Sector Climate Pledge (HHS Pledge)
- Four are participating in the UN's Race to Zero. The Race to Zero is a global campaign backed by the United Nations that aims to build a healthier, fairer zero-carbon world by rallying non-state actors – including companies, cities, regions, financial, and educational institutions – to halve global emissions by 2030 and reach net zero emissions by 2050.[36]
- Seven of the participating health systems announced their net zero targets with their commitment to the HHS Pledge. While the HHS Pledge includes a net zero target, it does not specify whether that includes emissions across Scopes 1, 2, and 3, so the details for these health systems' targets are not clear.
- Nine have goals to be carbon neutral for Scopes 1 and 2 by or before 2030
- Seven committed to 100% renewable electricity usage by 2030

The participating MedTech suppliers are ahead of the Roundtable's health systems in tracking and reporting emissions, and are beginning to engage their suppliers to address emissions upstream. Of the 16 MedTech supplier participants:

- A majority have approved or committed to science-based near-term goals through the Science-Based Targets Initiative (SBTi)
- Nine are participating in the UN's Race to Zero
- Seven committed to carbon neutrality in their operations (Scopes 1 & Scope 2 emissions) by 2030
- Seven have set targets to use 100% renewable electricity by 2030
- Three have committed to the White House and HHS Pledge

For a complete listing of health systems and suppliers that have been involved in the Roundtables, please see *Appendix B*.

During the April Roundtable, participants shared decarbonization activities that worked well for them in their individual organizations and then identified activities that could be scaled or accelerated with collective action. That input formed the basis for this paper along with subject matter expert interviews and secondary research.

For further details on the findings from the Roundtable discussion, see *Appendix C*.

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Opportunities for Successful Collective Action Overview

Collective action is the path to decarbonization at the pace and scale required to address climate impacts. As reporting requirements expand to include Scope 3 emissions and more companies focus on decarbonizing their value chains, collaboration throughout the supply chain becomes essential. Companies must have access to emissions data from their vendors both upstream and downstream, and encourage those vendors to address their own total emissions. Small and medium-sized suppliers will likely need guidance from larger customers on reporting requirements, data needs, and decarbonization efforts.

Research from the Harvard Business Review identified more than 150 business climate collaborations with activities as varied as common carbon accounting frameworks, principles for responsible investments, and shared net zero objectives.[37] The UNGC-Accenture CEO Study on Sustainability found that 78% of CEOs believe industry consortiums are needed and valueable for innovation, standards-setting, investment efficiencies, and effective policy advocacy.[38]

Roundtable participants agreed they want to avoid duplicating the efforts of existing health industry collaboratives, but acknowledged the need for an effort focused specifically on decarbonizing the MedTech value chain. They emphasized a desire for quick, effective action with a 24-month roadmap featuring specific, measurable, achievable, relevant, and time-bound (SMART) initiatives.

To meet these criteria and provide a launchpad for the work ahead, key collective actions have been selected under four levers:

1. Renewable Energy
2. Product Innovation (Composition, Packaging, and End-of-Life)
3. Product Utilization - Clinical Engagement
4. Transportation and Logistics.

Each action presented below includes the following information:

- Description
- Health system and supplier roles and value propositions
- Proposed metrics for measuring progress
- Impact and effort
- Timeline

Impact and effort were assessed and timelines were estimated to inform the 24-month roadmap. Impact was determined by the expected effect the action would have on health systems' and MedTech suppliers' carbon footprint, with particular focus on how the collaborative action can accelerate impact. Effort was based on existence of a precedent or foundation for these actions (e.g. existing programs or past successes), number of stakeholders involved, and regulatory barriers that may be in place. Both criteria were rated on a scale of "low," "medium," and "high."

Collective commitments are defined as agreed-upon individual company commitments and can be employed as companion strategies to scale impact. They are reviewed following the consideration of collective actions.

The 24-month timeline maps all collective action initiatives indicating the progress that could be made for each initiative during that time period.

LEVER CATEGORY	COLLECTIVE ACTION	DESCRIPTION
Renewable Energy	Aggregate Power Purchase Agreements	Pursue aggregate Power Purchase Agreements to: • Procure renewable electricity at a lower price through aggregated demand • Enable smaller companies to participate • Bring new renewable capacity onto the grid.
Product Innovation (Composition, Packaging, and End-of-Life)	Takeback Programs	Identify and pursue takeback programs for packaging and products to reprocess or recycle component parts to reduce waste and move towards a circular economy.
	Packaging Changes	Identify and pursue opportunities to reduce packaging where possible and substitute more sustainable materials where packaging is needed.
	Product Composition Changes	Identify and pursue product composition changes to bring more sustainable products to market.
Product Utilization – Clinical Engagement	Identify Opportunities for Increased Product Durability	Set up a forum to evaluate opportunities to replace single-use devices with reprocessed or durable options while maintaining patient safety in different clinical environments.
	Product Reprocessing Education and Pilots	Educate clinicians on available reprocessed devices and set up pilots for specific devices to increase adoption.
	Surgical Kit Reformulation	Identify surgical kit items that routinely go unused during procedures and remove them from surgical packs to avoid the unnecessary purchase and disposal of those supplies.
Transportation and Logistics	Implement Logistics Efficiencies	Reduce transportation-related emissions through order consolidation, packing efficiency, optimized delivery routes, decreased delivery frequency, and minimized less-than-truckload, overnight, and last-mile deliveries.

Renewable Energy

Health systems spend over $8 billion each year on energy, accounting for approximately 10% of the energy used by commercial buildings in the United States.[39] Because they operate around the clock, hospitals use 2.5 times more energy per square foot compared to office buildings.[40] Annual energy costs for health systems is roughly $10,000 per patient bed, and these costs are expected to increase in the future.[41] Considering these facts and the accessibility of credits from the IRA, the value case for transitioning to renewable energy has become increasingly strong. The costs of wind and solar have fallen by more than 13% compared to 2020, continuing a trend that has persisted since 2010.[42,43] By focusing on energy efficiency and renewable energy, health systems can lower their GHG emissions, save on energy expenditure, and improve the air quality of surrounding communities.[44]

To drive renewable energy sourcing, health systems and suppliers can pursue joint purchasing of renewable electricity through offsite Power Purchase Agreements (PPAs). PPAs are financial agreements where a solar developer designs, permits, and installs a solar energy system, then sells the power generated to a customer at a fixed rate typically lower than the local utility's retail rate. PPA contracts typically last 10 to 25 years with the developer assuming responsibility for operation and maintenance for the duration of the contract. There are two common options for offsite PPAs: a physical PPA or a virtual PPA (VPPA). Here is a simple explanation of how they work:

- With a Physical PPA, a customer purchases energy from a renewable energy project in their electric grid and physically receives the electricity. Physical PPAs are limited to states where customers are allowed to buy power competitively on the retail market, currently including 26 states and Washington, D.C.[45]
- With a Virtual PPA (VPPA), there is not a physical delivery of energy from the vendor to the customer. The energy is sold into the market where the renewable development is located, and the buyer commits to a fixed price for the electricity. VPPAs work as a "contract for differences" meaning when the market price is higher than the fixed VPPA price, the developer pays the positive difference to the buyer, and if the market price is below the contract price, the buyer pays the developer the difference.

Two or more buyers can work together to buy renewable energy from a large-scale generation facility, commonly a VPPA, to create an aggregate PPA. Aggregate PPAs enable companies to achieve economies of scale, thus allowing smaller companies to participate. They also bring new renewable capacity onto the grid. Although valuable, aggregate PPAs are complex; the most significant challenge is that each buyer has unique needs and requirements that can lead to drawn out negotiations over terms and timeline of the deal. However, these challenges can be overcome, especially when the co-buyers align on priorities and rules of engagement ahead of time.

> *In 2016, Boston Medical Center entered into a partnership with the Massachusetts Institute of Technology and the Post Office Square Redevelopment Corporation to enable the construction of Summit Farms, a 650-acre, 60-megawatt solar installation on farmland in North Carolina. This was the largest renewable-energy project ever built in the U.S. at the time, and the solar energy purchased covers 100% of BMC's electrical consumption.[46]*

Collective Action: Aggregate Power Purchase Agreements

IMPACT	EFFORT	TIME
High	Medium	12-24 months

DESCRIPTION

Health systems and MedTech suppliers can form a buying group for an aggregate VPPA. The first step will be to confirm interest from collaborative members and qualify their feasibility as co-offtakers (purchasers of the electricity). Feasibility depends on three major factors:

1. **Electricity Load Location:** Companies must be in a geography where PPAs are economically and legally viable.
2. **Available Offtake:** The amount of renewable energy the companies collectively want to buy must be 150,000 megawatt hours (MWh) or more annually, with higher demand increasing the possibility of a successful deal.
3. **Internal Sustainability Sophistication and Leadership Alignment:** Participating companies will require education on the financial, legal, treasury, and tax implications of entering into a PPA. Coordinated procurement can be complicated; key individuals in each company will need to have dedicated time if a PPA is to be signed successfully. To streamline the process, larger, better-resourced, and more experienced companies within the group can take the lead, but all companies will need to understand the mechanics and risks of the deal. The first PPA cohort of the Energize collaborative described above will go to market with two sponsoring pharmaceutical companies as anchor tenants joined by seven of their suppliers.[47]

After the participating offtakers have been qualified, target markets need to be identified. These are locations where PPAs are economically viable, vendors exist, and there is adequate electrical supply to support an aggregate PPA. Lastly, companies engaged in the aggregate PPA must develop a Consortium Governance Agreement to detail the collaboration before beginning the go-to-market RFP process.

HEALTH SYSTEM & MEDTECH SUPPLIER ROLES AND VALUE PROPOSITION

The value proposition for pursuing aggregate PPAs for both health systems and MedTech suppliers lies in the opportunity to procure renewable electricity at a lower price by aggregating demand. As a collaborative, organizations can pool their demand forming an aggregate PPA, whereas organizations individually may not generate sufficient demand for their PPA. Advantages of a PPA include low upfront capital costs, avoidance of the risks and complexity of installing and maintaining solar equipment, and an off-balance sheet financing solution in which regular payments for electricity are treated as operating expenses. PPAs also provide price stability, locking in a price and providing a hedge against utility price fluctuations over time. Inceased participation by more companies enhances the consortium's negotiating power and could potentially lower pricing and result in shorter contract durations. The price of electricity through PPAs is typically less than the retail rate but an annual price escalator may result in offtakers paying more than market rate if the price of electricity declines.[48]

PROPOSED METRICS

- # of participating companies
- Megawatts (MW) renewable electricity procured
- % increase in organizations' renewable electricity after PPA completed
- Estimated metric tons of carbon dioxide equivalent (MTCO2e) reduced

IMPACT: HIGH

Aggregate PPAs are a highly effective vehicle for health systems and MedTech suppliers to access significant amounts of renewable energy. This advances progress toward their own Scope 2 emissions reduction goals and supports the transition to a clean energy economy.

EFFORT: MEDIUM

Aggregate PPAs are complex to execute. The regulations around the use of PPAs vary by state and energy market. Participating companies must agree on priorities and timelines, which slows down the decision-making process. It will be critical to work with an experienced advisor and ensure alignment on agreements representing the best interests of all buyers.

TIMELINE: 12-24 MONTHS

It will take 12-24 months to execute an aggregate PPA with the support of a partner experiened in renewable energy procurement and PPAs. It typically takes 12-18 months to qualify the participating companies, identify target markets, ensure adequate load, and agree on how the participating companies will work together (i.e. develop a Consortium Governance Agreement). The companies must then find vendors and projects in the marketplace, which can take 6 months. The timeline for companies to procure electricity from a PPA is dependent on the type of renewable energy project. For instance, if the consortium chooses an existing installation or a project that is underway, energy will be available much sooner than if the group invests in a new solar development project.

Product Innovation

The carbon footprint of healthcare products is determined by product composition, packaging, and end-of-life. Embedded carbon in MedTech products contributes substantially to both health systems' and suppliers' Scope 3 emissions. Suppliers have been looking at ways to produce more sustainable products in response to customer demand for environmentally preferable products and to meet their own decarbonization goals. However, changing products can be particularly challenging because design and manufacturing changes may require significant upfront investment, longer timelines, and regulatory considerations. Collaboration between health systems and MedTech suppliers creates a significant opportunity to focus on specific subsets or categories of products and identify ways to decarbonize across the product lifecycle. Opportunities for product composition, packaging, and end-of-life are outlined here. Clinical use of medical products is addressed under Product Utilization - Clinical Engagement below.

Some leading suppliers have begun analyzing product data and doing internal assessments to identify hotspots or specific products to be prioritized for design changes. Typically,Leading suppliers have completed a small number of product Life Cycle Analyses (LCAs), mostly for internal use, with a few publishing the data. As examples:

- Siemens Healthineers publishes Environmental Product Declarations (EPDs) for all its products, which provide detailed information about the environmental performance of a product over its life cycle based on LCA data. [49]
- Stryker utilizes additive manufacturing (3D printing) technologies, which have lower contributions to ozone depletion, global warming, smog formation, and fossil fuel depletion, compared to conventionally manufactured counterparts

It's important to recognize that the LCA process is time-consuming, expensive, and includes numerous assumptions. Leading suppliers have mature sustainability programs that are well-established and resourced, but the majority of suppliers likely have not yet started these types of analyses.

The first step for the collaborative would be to create groups of health systems and suppliers to identify the products or product categories of interest. One approach could be for each supplier to identify one product or product line for focused effort, taking advantage of the diversity of suppliers. Health systems may be interested in addressing products that are purchased at hight cost or volume. In both approaches, known information about product emissions hotspots should be included.

The next step would be for the health system-supplier team to to identify achievable decarbonization opportunities for the chosen product based on composition, packaging, and end-of-life. Once identified, a plan can be developed to move toward implementation.

Collective Action 1: Takeback Programs

IMPACT	EFFORT	TIME
Medium	Medium	6 – 12 months (Pilot), 24 – 36 months (Scaled)

DESCRIPTION

Product and packaging takeback programs allow MedTech suppliers to collect and reprocess or recycle the component parts of used products. Together, healthcare systems and MedTech suppliers can optimize the collection process to ensure maximum reprocessing or recycling and divert as much waste as possible from landfills. They can also educate clinical end users about medical products that are eligible for takeback so that they are not accidentally or intentionally discarded following use. Takeback networks can be designed to streamline pick-up across multiple locations. Across the country, there are several examples of health systems successfully using reprocessed devices and recycling blue wrap, demonstrating the viability of this approach.

Prior to initiating a takeback program, health systems and suppliers should develop a shared understanding of the procedures involved. This dialogue would include site-specific locations, pickup cadence, and measurement. Devices can either be reprocessed or broken down into components for reuse and/or recycling. If reprocessed, medical devices can be re-sold for patient care.[49] When health systems upgrade large, expensive medical equipment, existing equipment can be refurbished and resold, not only extending the life of the product, but also enabling health systems with more limited resources to access this equipment. Exploring innovative business models where products are rented or supplied as a service is also an option. In the last few years, several companies have begun offering Medical Device-as-a-Service allowing consumers pay a monthly fee for electronic monitoring devices and the associated software.

The goal would be to ultimately move towards a circular economy to foster a low-emission future. In a circular economy, products go through cycles of reuse, reprocessing, repair, repurposing, and recycling with the overarching goal of maximizing the original material and minimizing waste.

> *Stryker's Sustainability Solutions business unit collects and reprocesses a portfolio of thousands of medical device SKUs to prolong the life of specific products. Over the past five years, they've reached 3,000 engaged customers, savings of approximately $1 billion attributable to customers, and 25 million pounds of waste diverted from landfills in the short-term.*[50]

The ultimate goal is to move towards a circular economy that fosters a low-emissions future. In a circular economy, products go through cycles of reuse, reprocessing, repair, repurposing, and recycling with the intention of maximizing the life of original material and minimizing waste.[51]

HEALTH SYSTEM ROLE AND VALUE PROPOSITION

Health systems will play a crucial role in takeback programs by establishing internal systems for collecting products and ensuring minimal contamination. Working with suppliers or third parties, they will need to arrange the logistics of returning products for reprocessing or recycling, potentially including consolidation and storage of materials from several clinical sites between pick-ups. Health system can also target a designated percentage of products within predefined categories to be included in takeback programs. The value proposition includes decreased emissions and potenially lower costs. Health systems will save on disposal expenses (although the supplier's cost of recycling may be greater than the cost of disposal) and reprocessed devices are typically priced lower than original equipment. Health systems would be able to track metrics that show the percentage of materials or products that were

involved in takeback programs and potentially use internal benchmarking to identify best practices in different facilities. There may also be an opportunity to efficiently recycle products for new uses within the health system. For example, University of Vermont Medical Center has its recycled blue wrap, a plastic fabric used to wrap surgical instruments, made into bed pans, wash basins, urinals.[52]

SUPPLIER ROLE AND VALUE PROPOSITION

Suppliers' role would be to establish the reprocessing or recycling for the product and work with health systems on takeback logistics. Suppliers would benefit from the reduced emissions, cost savings, and new business opportunities. Suppliers could also benefit from a lower cost of goods sold due to a secondary material supply being created or an alternative source of raw materials for repurposing within operations.[53] With a circular business model, suppliers may break down their products into components in order to sell the recycled material, thus creating a net new revenue stream for the company.[54] All of these factors can improve cost effectivity as the cost of the product is spread over multiple lifetimes and offset by new revenue streams. This may be passed onto the health system or re-invested into further product innovation.

PROPOSED METRICS

- % of total product produced diverted into takeback program
- % of original product recovered (through reuse or recycling)
- Estimated MTCO2e reduced

IMPACT: MEDIUM

Successful takeback programs can significantly reduce emissions, given that less new product is needed to meet demand. However, additional emissions from reverse logistics, used product treatment, and disassembly must also be considered when exploring potential products for takeback programs.

EFFORT: MEDIUM

Takeback programs require new systems and processes to be established for both health systems and suppliers. With a number of takeback pilots and reprocessing programs already successfully deployed, challenges to implementation are being identified and addressed that can inform new, and scaled takeback efforts. Health systems often have limited space for collection and sorting so new solutions for offsite storage and sorting may need to be jointly explored. Clinical staff buy-in and training is also critical, as there will need to be significant behavior change in clinical settings to ensure used products are diverted into takeback collection points.

TIMELINE: 6 – 12 MONTHS (Pilot), 24 – 36 MONTHS (Scaled Program)

There are a number of takeback programs and pilots that have been deployed for specific products, providing case studies on best practices and challenges that can be leveraged by the broader collaborative for new initiatives. Scaled programs would take longer to deploy, given the high level of dependency on health systems to collect used products.

Collective Action 2: Packaging Changes

IMPACT	EFFORT	TIME
Low-Medium	Low-High	6-12 months (tertiary), 12-24 months (secondary), 24+ months (primary)

DESCRIPTION

Health systems and MedTech suppliers can work together to identify packaging materials that can be reduced or made more sustainable. Both sterile and non-sterile medical devices have primary, secondary, and tertiary packaging. Primary packaging, the packaging in direct contact with the product itself, can be a non-sterile barrier, single sterile barrier, double sterile barrier, or a carton.[55] Secondary and tertiary packaging serve to protect the product during shipping and handling. Making changes to primary packaging is difficult since those materials may have specific qualities related to the sterilization method for a product. So the initial focus should be on secondary and tertiary packaging where packaging design, material, and quantities can all be considered. Reusable container options for tertiary packaging may be an option, and converting the required device Instructions for Use (IFU) from paper to electronic (eIFU) is an option for reducing paper use.

> *Merck KGaA, with its partners, developed a more sustainable packaging design for transportation of its Millistak+ Pod Disposable Depth Filters. An LCA revealed a 24% reduction in corrugated cardboard, which translated to a 17% decrease in GHG emissions. In 2020, approximately 12 metric tons of corrugated cardboard were saved and end users required 70% less time to open and dispose of the packaging.*[56]

HEALTH SYSTEM ROLE AND VALUE PROPOSITION

Packaging reduction and material changes would help health systems reduce their Scope 3 footprint as it relates to emissions of purchased goods and waste generated through operations. The role of health systems would be to identify opportunities for packaging changes and ensure internal systems are able to manage proposed changes. For instance, if there is an opportunity to put more units into a box to reduce the amount of secondary packaging used, health systems need to ensure they can order larger quantities and store the bigger boxes. If there is an opportunity to switch to reusable totes for tertiary packaging, health systems would need to put processes in place to collect totes for return.

Health systems could also send clear signals to all their vendors by including packaging parameters in their procurement contracts. Contracts could dictate an expected percentage for packaging reduction and for materials transitioned to those that are more readily recyclable or compostable. Plastic within packaging exists as one of the largest opportunities, as hospital audits have shown that 50% of total plastic waste by weight was disposable packaging plastic.[57] Setting targets within supplier contracts would help build the case for suppliers to initiate changes in packaging.

SUPPLIER ROLE AND VALUE PROPOSITION

MedTech suppliers would also identify opportunities for packaging changes and assess suggestions for health systems. Suppliers should focus specifically on opportunities to reduce and replace single-use plastics and petroleum-based packaging. For example, there may be opportunities to discontinue the use of individual protective plastic bags for certain products or components. Suppliers should also consider replacing plastic packaging with alternatives that are recyclable or degradable. These supplier-specific actions can be enhanced by sharing learnings and best practices with other MedTech suppliers.[58] A new, annual conference for healthcare packaging professionals called the[PACK]outTM has sustainability as one of its three pillars and could potentially serve as a good forum for ideation and innovation.[59]

On the supplier side, reducing or reusing packaging can substantially impact costs, especially when scaled across millions of SKUs. The transition to more sustainable materials may initially be more expensive, but will likely result in savings as Extended Producer Responsibility (EPR) laws take effect in the U.S. and around the world. These laws hold producers responsible for the entire lifecycle of their products incentivizing them to adopt sustainable practices. Globally, EPR laws have focused on packaging, packaging waste, electronic or electrical waste, and batteries. In the U.S, California, Colorado, Maine, Oregon, and Washington passed packaging-focused EPR laws in 2021 and 2022.[60]

PROPOSED METRICS

- Tons of packaging avoided
- % reduction in virgin plastic packaging
- % of recycled material used in packaging
- % of products with electronic instructions for use (eIFUs)
- Estimated MTCO2e reduced

IMPACT: LOW-MEDIUM

Reducing packaging and replacing plastic with lower-carbon alternatives would significantly reduce the carbon footprint for product packaging. Plastics made up 3.4% of global emissions in 2019 and are projected to double by 2060.[61] Lower-volume packaging could improve shipping efficiency, but plastic-alternatives run the risk of being heavier or bulkier, which could have an adverse impact on shipping emissions.

EFFORT: LOW (Tertiary); HIGH (Sterile barrier)

As long as packing and assembly are adaptable, MedTech suppliers can manage changes to secondary and tertiary packaging on their own, making this process more straightforward. Additional stakeholders need to review and approve sterile barrier packaging, including clinical and regulatory stakeholders. Changes in sterile barrier packaging may also require clinical behavior change, which would need to be addressed during implementation.

TIMELINE: 6 – 12 MONTHS (Tertiary), 12 – 24 MONTHS (Secondary), 24+ MONTHS (Primary)

Packaging reduction can be a quick win for health systems and MedTech suppliers, particularly when considering tertiary packaging. A packaging reduction review and development of new guidelines for key products can be developed in approximately six months. Sterile barrier packaging would take longer to address given additional regulatory controls.

Collective Action 3: Product Composition Changes

IMPACT	EFFORT	TIME
High	High	24-84 months

DESCRIPTION

Product composition changes would be the most difficult category for quick collective action. The process of product development can take years and is subject to regulation. The Food and Drug Administration's Center for Devices and Radiological Health (CDRH) is responsible for regulating firms who manufacture, repackage, relabel, and/or import medical devices sold in the United States. Medical devices are classified into Class I, II, and III with progressively increasing regulatory control.[62] A new device takes three to seven years to go from concept through research, development and testing, to approval.[63] For legacy products with strong market share, it can be difficult to justify making a change for the sake of sustainability. Many companies are developing alternatives

to plastic products using biodegradable plant-based materials, but it is still a nascent market.[64]

HEALTH SYSTEM ROLE AND VALUE PROPOSITION

Health systems can support the development of lower-carbon products in several ways. They can make procurement commitments and provide preferential purchasing for suppliers who are cutting emissions in their operations and products. They can also invest in product development through an innovation fund. To identify preferred suppliers, health systems can add purchasing criteria into RFPs and vendor scorecards giving preference to vendors who have set science-based targets and can share information related to their products' environmental impacts. When choosing new products, carbon footprint should be considered along with other traditional criteria.[1] Procurement commitments for lower-carbon products can help move the market and are already being implemented. For example, in 2021, 12 health systems committed to spend $1 billion with minority and women owned businesses (MWBEs) by 2025, with integrated commitments to sustainability, and community wealth building.[65]

SUPPLIER ROLE AND VALUE PROPOSITION

The value proposition for suppliers lies in becoming a preferred supplier and market leader providing sustainable solutions to health systems and GPOs. Companies that are early adopters of lower-carbon products will have a competitive advantage as product disclosure requirements, Extended Producer Responsibility (EPR) laws, and carbon pricing come into force around the world.

To seize this opportunity, it's crucial for suppliers to understand the carbon footprints of their existing portfolios and design and test new, lower-carbon products. They will need to be able to share transparent, verifiable data on emissions and other environmental attributes, such as the percentage of recycled materials. As suppliers adopt recycled materials or source raw materials from environmentally-preferred vendors, Eco-labels on products will be useful to help customers compare products and make informed choices. Suppliers will also be critical in providing education about the safety and use cases for these new products.

PROPOSED METRICS

- # of new products available with lower carbon footprints versus legacy products
- Estimated MTCO2e reduced

IMPACT: HIGH

Much of a product's carbon footprint comes from its raw materials and manufacturing, so addressing this directly is likely to have a major impact on emissions for both health systems and MedTechs.

EFFORT: HIGH

New product composition takes significant time and investment and some products changes may be subject to regulatory approval. According to suppliers, the timeline to develop new, low-carbon MedTech products is two to seven years. That extended timeline may be preferable to the complex process and additional stakeholders involved in reformulating existing products.

TIMELINE: 24 – 84 MONTHS

Product reformulation requires significant R&D support to ensure that new materials meet product specifications and is cost effective.

Product Utilization - Clinical Engagement

Product utilization plays an important role in the emissions generated over the course of a product's lifecycle. To build sustainability across the supply chain, the clinician-patient-product interface must be considered with an effort to move toward more sustainable use of products. Clinicians and other clinical staff are not only key decision makers on the types of products being procured, but also determine where, when, how, and how much of products are being used. To enable adoption of sustainable products and practices, clinical staff need to be educated on the importance of using sustainable products, as well as their availability, safety, and efficacy. For example, the Sustainable Healthcare Coalition, a UK-based healthcare sector-led group that is focused on sustainable practices in healthcare, has developed a care pathway carbon calculator to support the transition to lower-carbon care.[66]

Health systems and suppliers can drive increased use of sustainable products by advancing clinical stakeholder education and engagement. Initiatives can focus on reducing the amount of a product used, or the way a device or piece of medical equipment is employed.

> *Great Ormond Street Hospital, a children's hospital in the United Kingdom, successfully reduced unnecessary plastic glove usage through an educational campaign including email communications, in-person trainings, and posters. Staff were trained on when gloves were necessary and when handwashing alone was sufficient. Results were reported throughout the organization to celebrate progress and raise awareness during the campaign. This culminated in a total reduction of 25 metric tons of plastic gloves and a cost reduction of $134,000 US dollars.*[67]

Radiology is notorious for its energy-intensive equipment, particularly MRIs. A 2022 study found average carbon emissions were 17.5 kg/MRI scan.[68] But simple training for clinical staff can greatly reduce emissions. A recent study found that implementing power-saving measures, such as switching off MRIs when not in use, leads to a 25%-33% decrease in energy use; enabling power-save mode can provide an additional 22%-28% decrease.[69]

Three collective actions focused on engaging clinical staff to reduce product-related emissions are detailed below.

"We cannot ultimately have sustainability across the supply chain unless we address the way in which clinicians are interfacing with patients and products."

SONIA ROSCHNIK
Executive Director, Geneva Sustainability Centre, International Hospital Federation

Collective Action 1: Identify Opportunities for Increased Product Durability

IMPACT	EFFORT	TIME
Medium	Medium	12-24 months

DESCRIPTION

Single-use devices (SUDs) have become ubiquitous in healthcare. Research has shown that SUDs produce greenhouse gas emissions that are severalfold higher on a lifecycle basis compared to more reusable equipment. Despite higher acquisition costs, resuables have lower costs over the product lifetime.[70]

Clinicians are uniquely positioned to collaborate with infection prevention and suppliers to identify single-use products that could be replaced with reprocessed or durable options without an impact to patient safety or ease of use. Health systems and suppliers can set up a forum to evaluate a set of single-use products chosen based on volume, spend, or other agreed-upon criteria. They can then determine which products can be substituted in different clinical environments and health systems can run pilots or begin transitioning to the new product. For instance, single-use pulse oximeters could be replaced by durable models and disinfected between patient uses. Timelines and decarbonization impact will vary based on the product and the intervention; for example, it would likely take longer to institute a change for endoscopes than for pulse oximeters.

HEALTH SYSTEM ROLE AND VALUE PROPOSITION

Clinicians and clinical staff are end users of these products and have valuable insights into product use, patient experience, and process efficiencies. Inviting clinicians to participate in identifying opportunities for more durable product usage increases their understanding and buy-in. Including infection prevention professionals in those discussions ensures clinicians feel confident that they are not compromising patient safety and can better equip them to educate their colleagues. Clinical champions are essential for leading any changes that impact the delivery of care.

In addition to clinician input, health care systems should establish procurement policies that prioritize, or at the very least consider, product reusability. The considerable purchasing power of health systems and partner GPOs will influence the market, driving investments into resources to transition to increased product durability.

SUPPLIER ROLE AND VALUE PROPOSITION

MedTech suppliers actively work to assess customer needs and priorities to develop aligned products. Through participating in a forum focused on product durability, suppliers can both gather insights from health system participants and share potential design and manufacturing challenges. Suppliers can use these forums to bring forward alternate products and use the insights to consider the opportunities for more durable products.

PROPOSED METRICS

- # of single-use devices replaced with reusable alternatives
- Increase in # of reprocessed devices
- Net waste diverted from landfill with product change (lbs)
- Cost savings
- Estimated MTCO2e reduced

IMPACT: MEDIUM

A forum with interdisciplinary experts, including clinicians, can have a meaningful impact on the adoption of more sustainable products. When changing from an SUD to a more durable option, the emissions impacts of disinfection and sterilization will also need to be considered.

EFFORT: MEDIUM

Given the presence of interdisciplinary decision-making bodies focused on product use, the forum can leverage existing best practices as a framework for action. The involvement of

clinician and infection-prevention professionals is crucial to the adoptions of durable devices; their input and and openness to changes will play a pivotal role. This shift to durable devices might require changes in policies and practice. For cost considerations, an approach based on the total cost of ownership should be utilized.

TIMELINE: 12 – 24 MONTHS

Setting up a forum of cross-functional stakeholders and aligning on products to evaluate will likely take three months. Product substitutions then need to be identified and agreed upon. The process of making the actual substitutions can be lengthy due to existing inventory, contract terms, and changes needed to clinical practice policies or protocols. Health systems might opt for a pilot as part of the process as well.

Collective Action 2: Product Reprocessing Education and Pilots

IMPACT	EFFORT	TIME
Medium	Low-Medium	12 months

DESCRIPTION

Product reprocessing of SUDs offers a key opportunity for health systems and MedTech suppliers to reduce waste, lower costs, and address carbon emissions. Hospitals in the United States generate 29 pounds of waste per staffed bed per day.[71] There are over 300 types of "single-use" devices that are available for reprocessing. According to a recent analysis by the Association of Medical Device Reprocessors (AMDR), 8,622 hospitals and ambulatory surgical centers reprocessed medical devices in 2019, diverting over 18 million pounds of medical waste and saving over $20 million in waste disposal costs.[72] Recent research indicates that pursuing a reprocessing program can save between $600,000 and $1 million annually for a 200-bed hospital and generate even greater savings for larger health systems.[73]

Clinicians may be reluctant to switch to reprocessed devices due to concerns about changes in device efficacy, performance, or infection risk. There is a perception that single-use devices are safer than reusable or reprocessed devices; however, there is no compelling evidence that single-use devices reduce infection risk.[74] Health systems and suppliers can create opportunities to educate clinicians and infection prevention professionals on the safety and quality of available reprocessed devices and set up pilots for specific devices to increase adoption. A clinician cohort could be created to pilot specific reprocessed devices across a number of institutions at the same time allowing for shared experiences and feedback. Those clinicians involved in successful pilots can become clinical champions to help educate their colleagues nationally.

HEALTH SYSTEM ROLE AND VALUE PROPOSITION

Engaging clinicians in reprocessing pilots can lead to increased adoption of reprocessed devices, resulting in cost savings, waste reduction, and the potential for improved access to medical devices in resource-constrained settings. Hospitals save approximately 50% for every reprocessed device purchased and spend less on disposal of waste.[75]

SUPPLIER ROLE AND VALUE PROPOSITION

For MedTech suppliers, the value proposition for engaging clinicians includes increased opportunities to sell reprocessed devices and receiving targeted feedback for existing and future products. Feedback from a key end-user sheds light on customer needs,

priorities, and preferences which can accelerate improved product development and increased market share. The joint effort will also serve to build relationships with key health system stakeholders.

PROPOSED METRICS

- # of reprocessing pilots involving health system clinicians
- Increase in unit sales of reprocessed products / units of reprocessed devices repurchased
- Estimated MTCO2e reduced

IMPACT: MEDIUM

Clinician end user engagement in reprocessing pilots can lead to increased adoption, extending the lifespan of devices. This reduces emissions associated with both producing and using new devices and the associated waste.

EFFORT: LOW-MEDIUM

As described above, clinicians may be hesitant to pursue and adopt new, sustainable products for a variety of reasons including concerns that reprocessed products may negatively interfere with patient safety and quality of care. However, these products are already in use at many leading health systems so this should be a manageable challenge. One caveat is that amidst increased clinician workload, burnout, and lack of resources, sustainability may be a secondary priority compared to emergent patient care, making it more difficult to get pilots launched.

TIMELINE: 12 MONTHS

Gaining initial clinician buy-in can take time; once mobilization is achieved, reprocessed options can be prioritized for pilots. After clinician pilots, it will take time to scale the program based on contract terms, existing inventory, collection processes, and logistics.

> "There currently exists a mismatch between what is in the market and what is being procured."
>
> **DANIEL ERIKSSON**
> Founder/CEO Nordic Center for Sustainable Healthcare

Collective Action 3: Surgical Kit Reformulation

IMPACT	EFFORT	TIME
Medium-High	Medium	3-6 months (Pilot), 12 months (Scaled)

DESCRIPTION

Operating rooms (ORs) are one of the largest revenue drivers in hospitals but also produce up to 70% of the eight trillion tons of medical waste generated annually by U.S. hospitals.[76]

A considerable portion of OR waste is directly linked to opened-but-unused supplies and recyclable materials that were sorted incorrectly.[77] From a series of audits, it has been observed that ORs routinely discard supplies in surgical kits that were never used over the course of the operation.[78]

Many health systems have instituted surgical kit reformulation to identify items that routinely go unused during procedures, and then remove them from the preference card and pick list. This avoids the unnecessary purchase and disposal of those supplies, leading to both waste reduction and cost savings.

> *Through a review of surgical kits and evaluation of surgeon preference cards, Providence St. Vincent Medical Center (PSVMC) was able to remove approximately 40,000 unneccessary products. The net results were annual savings of $1.5 million on supply purchases and $270,000 on expired items. Additionally, over 9,000 instrument sets were kept out of circulation decreasing sterile processing utilization by 72,000 trays, resulting in annual savings of 495,000 kWh of electricity, one million gallons of water, and about $50,000 in direct costs.*[40]

Health systems create some of their own surgical kits, packs, and trays and purchase other standard and custom kits from suppliers, so reformulating surgical kits can be a key area for collaboration.

HEALTH SYSTEM ROLE AND VALUE PROPOSITION

Health systems can work to identify routinely unused items in surgical kits created in-house as well as kits purchased from suppliers. Health systems can then begin reformulating kits, packs, and trays, both on their own and with their suppliers. For health systems, benefits include waste reduction and cost savings, as well as insights related to best practice as required instruments and supplies are reviewed with surgeons.

SUPPLIER ROLE AND VALUE PROPOSITION

Suppliers that create surgical kits, packs, and trays would work with their health system customers on surgical kit reformulation. They would receive data and feedback from health systems on what supplies routinely go unused and adjust their standard and custom products to eliminate these supplies. This allows suppliers to be valued partners for their health system customers. Suppliers can also offer newly reformulated kits to other health systems.

PROPOSED METRICS

- Reduction in waste (lbs)
- Avoided medical waste disposal costs
- Procurement cost savings
- Estimated MTCO2e reduced

IMPACT: MEDIUM-HIGH

Streamlining OR kits and standardizing the type and number of items would improve inventory and supply costs and reduce waste. Given the potential scale and outsized contribution ORs have on medical waste, this collaborative action is estimated to have medium-high impact.

EFFORT: MEDIUM

OR kit reformulation has been successfully implemented by many health systems for years. Although the process seems straightforward, OR kit reformulation does requires working with a number of stakeholders in the OR and supply chain. Clear communication, surgeon engagement, and a feedback mechanism are all key for success. Historically, vendors have had different levels of interest in working with health systems so a cooperative effort will help streamline the process. There will likely be a lag time before a supplier can distribute reformulated packs since many make up the packs in bulk volumes.[79]

TIMELINE: 3 – 6 MONTHS (Pilot), 12 MONTHS (Scaled)

Practice Greenhealth guidance on OR Kit Reformulation recommends starting with a pilot of one pack selected for potential impact. The process involves collaboration between individuals across nursing, sustainability , procurement, sterile processing, and OR leadership. Decisions about kit composition require input from multiple surgeons, then data collection and estimation of impacts can begin. Final steps include coordinating with procurement and vendors on reformulation requests before scaling the approach to additional packs.[79]

Transportation and Logistics

According to the U.S. Environmental Protection Agency, the transportation sector generates the largest share of the country's GHG emissions, contributing 28% of total emissions.[80] The health sector contributes to these emissions via the transportation of patients, emplyees, and goods and services. Health systems and MedTech suppliers can identify transportation and delivery strategies to decrease emissions while simultaneously increasing efficiency and customer satisfaction.

Collective Action: Implement Logistics Efficiencies

IMPACT	EFFORT	TIME
Medium	Medium-High	6 – 24 Months

DESCRIPTION

Efficient and timely logistics and delivery are vital for health systems to ensure availability of supplies for patient care and operations. However, the complexity of health system logistics, especially for critical, time-sensitive, or expensive products, frequently results in last minute orders and inefficient delivery and transportation, including less-than-truckload (LTL) deliveries. These situations negatively impact both health systems' and suppliers' carbon footprints and bottom lines. Health systems and suppliers can work together to optimize ordering, packing, and delivery routes and frequency. They can also minimize less-than-truckload, overnight, and last-mile deliveries, while ensuring the availability of critical supplies. These changes can apply to supplies being delivered to medical facilities as well as those going to patient homes.

Reducing the number and frequency of deliveries may require challenging system and process adjustments for suppliers, distributors, and health system. This will involve considerations across the supply chain, including advanced ordering and shipping, route planning, receiving product, and optimal storage conditions. For instance, supplies that are shipped by ground, sea, or rail must be sent further in advance than those shipped by air. If supplies are shipped in advance, health systems would have to be ready to receive the product; otherwise, suppliers will have to bear the effort and expense of storing their products in facilities. Depending on the product, this could mean finding a facility in which certain criteria, like temperature, humidity, or an adequate power supply, can be maintained to prevent product damage.

While complex, carefully planned changes to logistics can result in increased efficiency and decreased emissions.

> *In 2020, Baxter and NHS Oxford University Hospitals partnered with Pedal and Post, a local cycle courier company, to deliver patient-specific, compounded chemotherapy, antibiotics, and intravenous nutrition products to hospital sites in Oxford, England. In the first 10 months of the project, cycle couriers expedited delivery of 36,000 products cutting transport time in half. Bicycle delivery also yieled sustainability benefits estimated at 10 tons of averted carbon emissions annually.*[81]

HEALTH SYSTEM ROLE AND VALUE PROPOSITION

Health systems can increase logistical efficiency by using order management technologies powered by optimization algorithms to consolidate orders and minimize small, frequent deliveries. These changes can have immediate impacts on clinical services. In a recent survey, 87% of nurses indicated that logistical inefficiency affected their work at a weekly cadence; 71% indicated delivery errors or delays affected their ability to care for patients at least once monthly.[82] In order to manage this change, health systems may need to consider adding additional storage space.

Health systems and suppliers must collaborate on order-to-delivery timelines so that delivery can be optimized without affecting product availability for patient care. With the growth of home care, there is an opportunity to consolidate the typically separate deliveries of medical equipment, supplies and medications to patients' homes. To further enable optimization on this front, health systems can share order management data with suppliers to allow direct fulfillment, deliveries, and scheduling. Finally, health systems and suppliers can streamline delivery and unloading operations to reduce idle time and corresponding carbon emissions.

Through these actions, health systems can reduced emissions and progress toward their sustainability goals. Supplier cost savings can be passed on to health systems through lower negotiated prices.

SUPPLIER ROLE AND VALUE PROPOSITION

MedTech suppliers can utilize a variety of individual actions to drive value and reduce cost and emissions. First, suppliers can periodically optimize their networks to ensure distribution centers are strategically located and their delivery routes are minimizing miles traveled. Suppliers can also adjust modes of transportation depending upon expected and actual orders. Earlier and more complete order data can enable greater reductions in emissions from delivery. For example, if a supplier can forecast increased seasonal demand, they can utilize cheaper, lower-carbon modes such as rail or ocean freight. Data allows suppliers to consolidate multiple orders, avoid overnight delivery, manage their own inventory, and identify patterns in demand. To aid in this, suppliers can use transportation management systems (TMS), technology that to identifies real-time opportunities for mode switches and load pooling.

As with many of the collective actions in this paper, the importance of communication, cooperation and training for key actors (e.g. logistics managers, nurses, purchasers, etc.) cannot be overstated. Increasing collaboration and awareness are crucial elements to optimizing logistics between MedTech suppliers and the health systems they serve.

PROPOSED METRICS

- % of overnight deliveries / shipments (of total deliveries received)
- % of deliveries / shipments utilizing lower-carbon transport modes
- % of Less-than-truckload (LTL) deliveries
- Number of consolidated orders versus single orders
- Estimated MTCO2e reduced

IMPACT: MEDIUM

Based on U.S. healthcare emissions numbers,[83] transportation is estimated to account for approximately 5% of the national healthcare footprint. Estimating the impact on individual health systems and suppliers is difficult from publicly available emissions data. For health systems, upstream transportation emissions may be embedded in the Purchased Goods and Services category with a spend-based emissions inventory. For suppliers, the downstream emissions are coming from both fleet and third parties. Given this allocation, optimizing logistics and deliveries is expected to have a medium impact.

EFFORT: MEDIUM-HIGH

Ease of implementation is highly dependent on the nature of a supplier's logistics network. For example, if a supplier uses its own fleet to transport its product, network changes and mode optimization may be more straightforward. However, a majority of suppliers work with distributors and third-party logistics providers, adding additional complexity to implementing changes.

TIMELINE: 6 – 24 MONTHS (highly dependent on MedTech suppliers' logistics resources and strategies)

Impact and Effort Assessment Matrix

The Impact and Effort Assessment Matrix below in Figure 5 plots collective actions by lever categories based upon defined impact and effort described in further detail above.

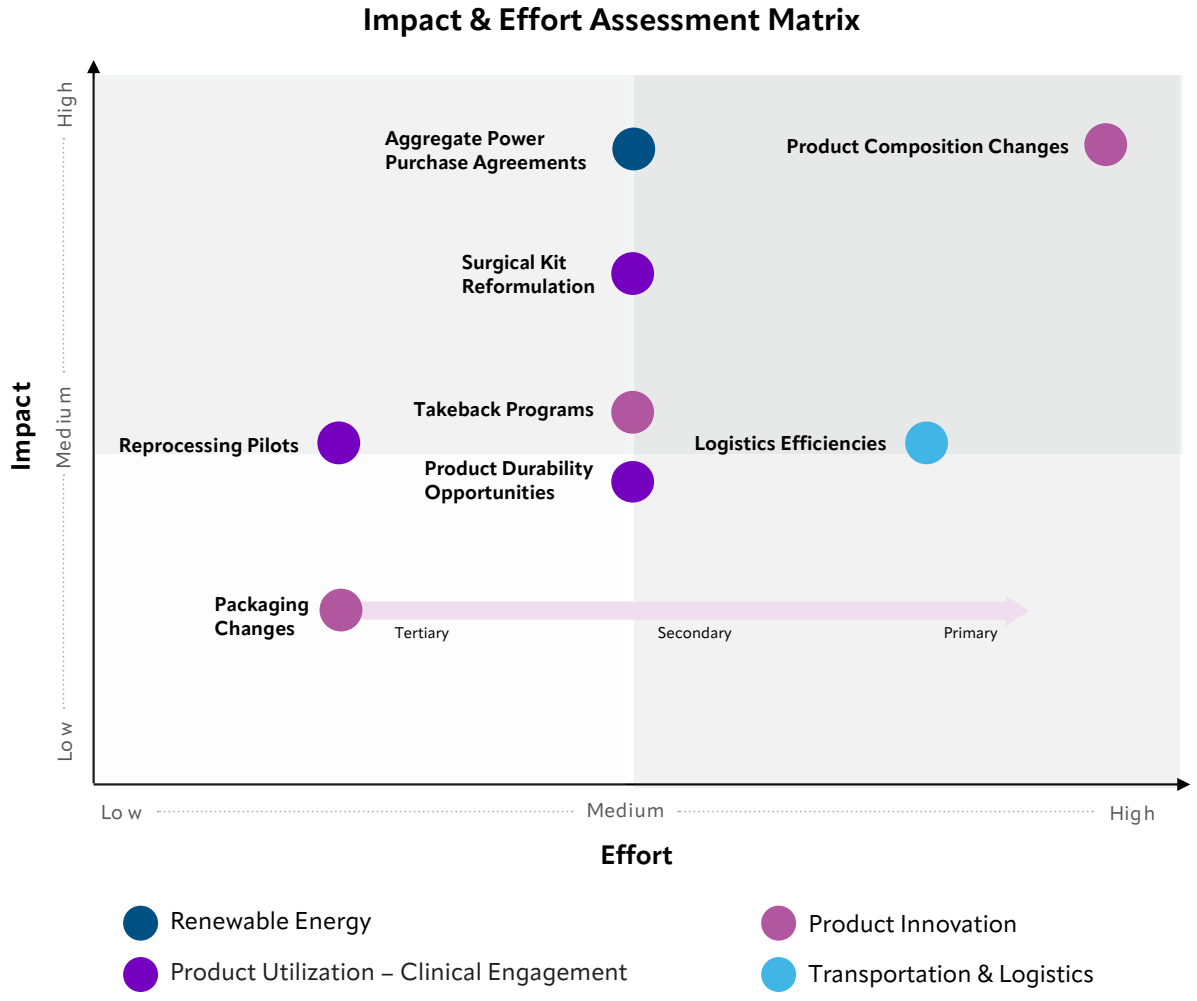


FIGURE 5: Collective action opportunities mapped based on impact and effort

Opportunities for Collective Commitment

Collective commitments, defined as agreed-upon individual company commitments, are also important for decarbonizing at the pace and scale needed to address climate impacts. This approach has several benefits including increased accountability and investment in the success of the collaborative effort, knowledge sharing that can accelerate innovation, and combined resources and influence that can be leveraged to drive more effective and efficient progress.

Proposed collective commitments are outlined under each of the four levers.

Collective Commitments

Renewable Energy

Produce or procure % of electricity from renewable sources

Commit to RE100

Install EV charging stations

Product Innovation
(Composition, Packaging, and End-of-Life)

Appoint a medical director of sustainability, and/or

Assign a clinician sustainability representative to product committees

Product Utilization – Clinical Engagement

Set company targets around waste reduction and SUD reduction

Pursue My Green Lab certification product committees

Transportation and Logistics

Transition fleet to electric or hybrid-electric vehicles

Implement "no idling" policy

Renewable Energy

Companies can collectively commit to powering their operations with a certain percentage of renewable electricity by a specific target year. Eligible companies could also commit to RE100, a collaborative initiative bringing together the world's most influential businesses committed to 100% renewable electricity. RE100 members must have significant annual electricity demand and are typically in the Global Fortune 500. Companies with smaller consumption may be considered if they are a key player in their industry or in a priority region.[84] A collaborative could also develop company commitments to install EV charging stations powered by renewable energy, or to provide incentives to employees for EV or hybrid adoption.

Product Innovation

Companies can collectively commit to set targets for reductions in waste and single-use devices that align with the collective actions described above. They can also pursue My Green Lab certification to address sustainability through purchasing, recycling, and reducing waste in their laboratories. The certification program supports laboratory personnel to make changes in the lab and in interdisciplinary projects through actionable initiatives across 15 key areas. [85]

Product Utilization - Clinical Engagement

Companies can collectively commit to appoint a medical director of sustainability and/or assign a clinician sustainability representative to serve as a change champion on product committees. The individual would play an important role engaging clinicians in supply chain conversations, advocating for the integration of sustainability criteria into purchasing scorecards, and driving the organizational adoption of sustainable products. Clinician leadership is essential for developing and implementing a sustainable clinical care strategy, educating others about opportunity areas, and offering insights on product development and use.

Transportation and Logistics

Companies can collectively commit to transitioning their fleets to electric or hybrid-electric vehicles. Electric vehicles create zero tailpipe emissions and can help reduce the environmental impact of last-mile delivery.[86] Companies can also commit to implementing a "no idling" policy to reduce air pollution during non-value add vehicle usage. For health systems, this would include emergency and service vehicles; and for MedTech suppliers, shipping vehicles.

Enablers

Roundtable participants discussed what would need to be true to for value chain decarbonization initiatives to be successful. These enablers will need to be considered in parallel with collective action and commitments.

LEADERSHIP

Leadership support is a critical enabler. Supply chain decarbonization initiatives are complicated and involve individuals and departments across health systems and vendor companies. Leaders must provide the human and financial resources needed to operationalize efforts, as well as the directives and incentives to ensure enterprise-wide cooperation. Leaders need to develop standard business case formats that include sustainability metrics as well as financial implications.

> "What makes a big difference is when leaders are interested in the success; then everyone will align behind it and will be held accountable even if the solution isn't obvious – leadership in uncertainty matters, especially if you don't know what the answer is."
>
> **FIONA ADSHEAD**
> Chair, Sustainable Healthcare Coalition

DATA ACCESS AND TRANSPARENCY

Health systems and suppliers both need to have access to data to be able to support decarbonization across the supply chain. Data is required to 1) Embed sustainability criteria in purchasing and product decisions and set vendor guidelines; and 2) For use in calculating and identifying hotspots in Scope 3 emissions with more granularity than using database emissions factors. As vendor data is collected, suppliers need feedback about how they are tracking toward their goals, and highlighting potential opportunities.

Data challenges exist in terms of both accurate emissions accounting and data standardization. Currently, health systems and suppliers are using a spend-based method for calculating Scope 3 emissions. This method relies on emissions factors from the EPA's US Environmentally-Extended Input-Output Database (USEEIO). While the spend-based approach has its limitations, it does allow for identification of key suppliers and emissions hotspots that can be addressed by individual organizations and collectively. The next step is for an organization to calculate their Scope 3 emissions based on a percentage of a supplier's Scope 1 and 2 emissions.

- **Accurate emissions accounting:** Accurate, product-level emissions are not available for everything companies procure today. Health systems have tens of thousands of suppliers and the same can be true for many of their MedTech suppliers. Many companies in the supply chain do not properly understand their own Scope 1 and 2 emissions, let alone those of second-tier suppliers and beyond. And even when estimates are available, different companies use different industry averages, factors, and assumptions that makes apples-to-apples comparison of suppliers extremely difficult.

  Many health systems have over 100,000 individual suppliers and the time and effort spent on data collection must be balanced with pursuing opportunities for near-term decarbonization. Many health systems are prioritizing suppliers based on spend or other known emissions hotspots. In 2021, the NHS issued a Net Zero Supplier Roadmap that outlines requirements for suppliers to align with the NHS net zero ambition by 2030. The roadmap requires suppliers with contracts above £5 million to publish a carbon reduction plan as of April 2023, and for all suppliers to publicly report targets, emissions across all Scopes, and a carbon reduction plan aligned with NHS' net zero target by April 2027.[87]

  Product-level emissions are not available for most medical supplies and equipment. There

is a new initiative by Association for Healthcare Resource & Materials Management (AHRMM), the leading membership group for health care supply chain professionals that is part of the American Hospital Association, to address this challenge. **Sustainable Healthcare Assessment of Product Emissions (SHAPE)** plans to design and oversee a greenhouse gas emissions database for healthcare products. The database will be open source allowing suppliers, GPOS, and hospitals access to independently validated product emissions data based on the ISO 14067 standard. SHAPE is still in design phase working with stakeholders and potential partners to explore potential supplier concerns about transparency and digital tools to help scale these assessments to the millions of medical products procured.

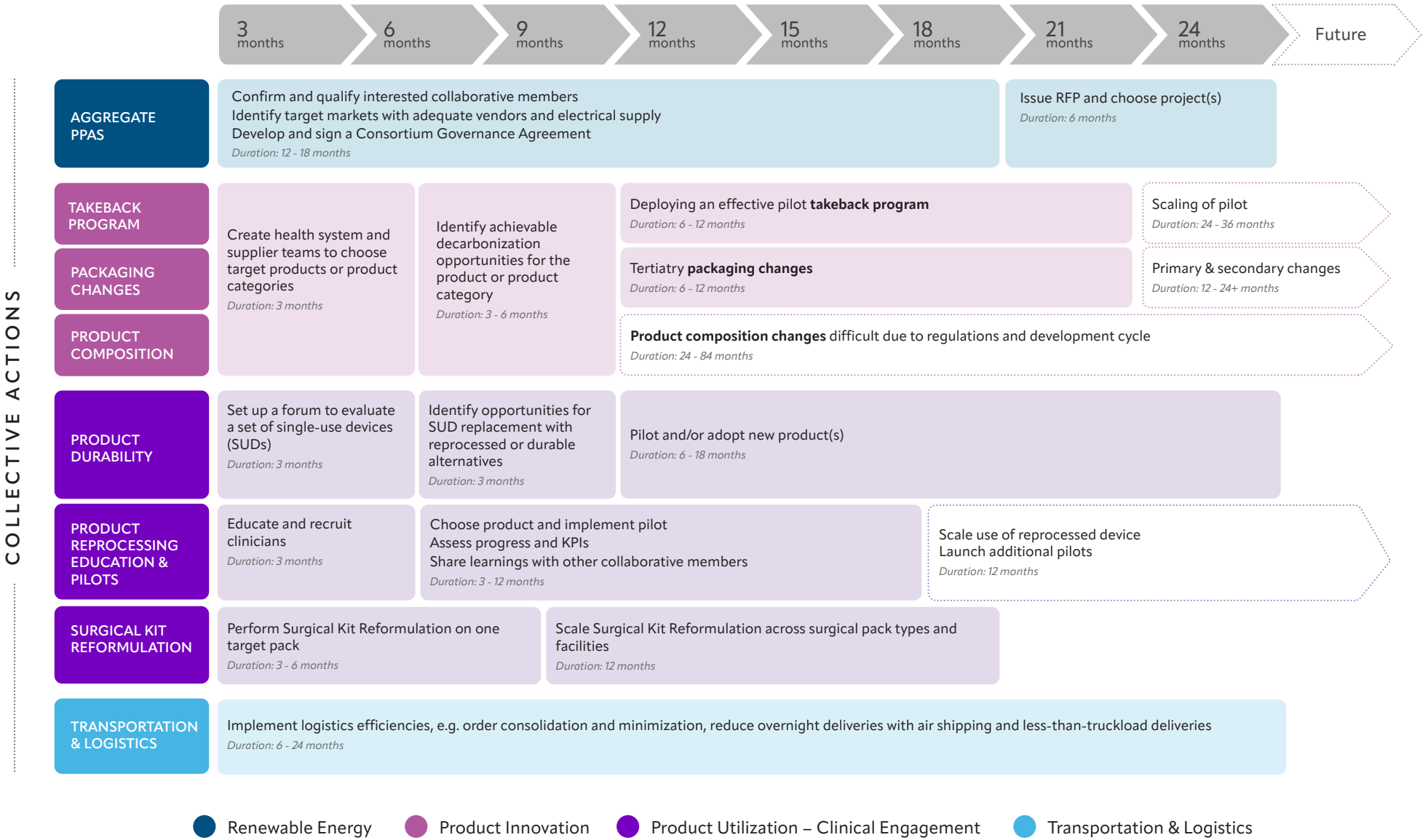
- **Data standardization:** A lack of data standards has been acknowledged across industries as a significant problem. Procurement professionals are not getting the data they need to make sourcing decisions and suppliers are getting inundated with a variety of data requests. There are many efforts underway at a variety of levels to address this issue both across sectors and in the health sector specifically. For example:
  - At the *federal level:* The Biden Administration's proposed **Federal Supplier Climate Risks and Resilience Rule** would require major Federal contractors (contracts of $7.5M or more in sales) to publicly disclose their emissions and risks and set science-based targets; and HHS and NHS England announced a collaboration at COP27 to align procurement requirements.
  - At the *cross-sectoral level:* The **Sustainable Purchasing Leadership Council (SPLC)** recently launched a cross-sectoral **Procurement Climate Collaborative**[i] including a working group focused on development of procurement-centered measurement strategy.[88] With the understanding that carbon accounting is misaligned with the practical needs of procurement, the goal is to define meaningful and actionable shared measurement that will enable procurement decisions supporting near-term operational change by suppliers. The group has drafted a map of data and measurement needs at each stage of procurement and this prototype solution will now be tested by the full collaborative.
  - At the *industry collaborative level:* In April 2021, the **Pharmaceutical Supply Chain Initiative (PSCI)** released an Environmental Survey to standardize data collection from suppliers for their members. Members of the SMI Health Systems Task Force have committed to align on a set of common supplier standards supporting emissions reduction.
  - At the *health system – MedTech interface:*
    - **Group Purchasing Organizations (GPOs)** are working with their customers to enable tracking and monitoring of progress toward decarbonization goals. With 96-98% of health systems using at least one group purchasing organization (GPO) contract for their purchasing function,[89] both health systems and suppliers felt that GPOs could play a key role in the standardization of requests and collection of data.
    - The U.S. Healthcare Climate Council developed a standard set of supplier questions and recently released a **Climate Excellence Standard for Health Sector** to identify leading suppliers, address supply chain opportunities, and accelerate momentum. Suppliers will be qualified by data gathered through publicly accessible websites and results will be reported through a dashboard.

With the multitude of efforts underway to address data challenges, Roundtable participants will be best served by focusing on collective actions and commitments, while supporting existing data initiatives individually or collectively, as appropriate.

> "We can't wait for the perfect solutions, let's start today with what we can do today. As we learn more we can do more"
>
> **VIBHAS DESHPANDE**
> Vice President, Sustainability Innovation and Strategic Research, Siemens Healthineers

24 Month Roadmap

Each collective action has been mapped to a 24-month timeline based on estimated ranges for execution. A collaborative can accomplish several actions within the first 12 – 24 months, developing the foundations for further decarbonization.



Renewable Energy

COLLECTIVE ACTION: AGGREGATE POWER PURCHASE AGREEMENTS (12 – 24 months)

For aggregate PPAs, it typically takes 12-18 months prior to initiating the go-to-market process. Then an additional 6 months would be needed to put out an RFP and secure a project.

Product Innovation

COLLECTIVE ACTION 1: IMPLEMENT TAKEBACK PROGRAMS (24 – 36 months)

A takeback program pilot would be undertaken over the course of 6-12 months. Scaling the pilot to other hospitals within the health system network would occur over 24-36 months.

COLLECTIVE ACTION 2: PACKAGING CHANGES (Tertiary: 6 – 12 months, Primary & Secondary: 12 – 24+ months)

Packaging changes could be implemented in a 6-12 month timeframe for tertiary packaging and significantly longer timelines for primary or sterile packaging, with a timeframe of 12-24 months or greater.

COLLECTIVE ACTION 3: PRODUCT COMPOSITION CHANGES (24 – 84 months)

With a timeline to implement of 24-84 months, this is the most challenging of all suggested collective actions due to the multiyear development process for products, regulatory guidelines, and the sourcing of materials.

Product Utilization - Clinical Engagement

COLLECTIVE ACTION 1: IDENTIFY OPPORTUNITIES FOR INCREASED PRODUCT DURABILITY (12 – 24 months)

Minimizing the need for SUDs and looking for alternatives that are reusable or more durable would take 12-24 months based on gathering input from clinical end users and moving towards implementation.

COLLECTIVE ACTION 2: CLINICIAN AND PHYSICIAN ENGAGEMENT IN PRODUCT REPROCESSING PILOTS (3 – 15 months)

The first 3 months will be focused on clinician outreach and education and then a product reprocessing pilot can be started. After the initial pilot, if successful, the use of the reprocessed device can be scaled and other pilots launched.

COLLECTIVE ACTION 3: SURGICAL KIT REFORMULATION (15 – 18 months)

Reformulated surgical kits would first be pilot tested within a single surgical specialty over 3-6 months. Upon completion, this action could be scaled over one year or more to the remaining surgical specialties and hospitals.

Transportation and Logistics

COLLECTIVE ACTION: IMPLEMENT LOGISTICS EFFICIENCIES (6 – 24 months)

It would take approximately 6-24 months to implement efficiencies directly related to the transport of medical equipment and supplies.

Moving Forward as a Collaborative

The Roundtable participants agree collaboration is needed to decarbonize the emissions from medical devices and supplies. This paper has identified collective actions and commitments that can form the basis for this cooperative work. The next step is to design and launch a formal collaborative to enable execution of the 24-month roadmap. Establishing clear goals and criteria for membership, including leadership approval and a financial investment, will provide the formal collaborative with the commitment and resources needed to move forward.

Benefits of working collaboratively to achieve decarbonization across the value chain include enabling innovation, defining standards and targets, producing efficiencies in terms of needed investment, aggregating purchasing power, and increasing effectiveness in policy advocacy. As discussed above, there are a number of other health sector collaboratives focused on decarbonization; it will be important for this health system-MedTech supplier initiative to carve out its unique value proposition and to ensure coordination with other existing initiatives.

> "The market will not be transformed by a diverse set of asks; a collaborative's purpose is to bring together diverse purchasers to align on common asks, creating clear signals for market transformation."
>
> **SARAH O'BRIEN**
> CEO, Sustainable Purchasing Leadership Council

Despite the clear benefits of collaboration, it is not easy. There are a variety of challenges that can be minimized by following best practices. It is first critical to agree on ambition, a shared purpose, and a clear understanding of what and how members are contributing. Objectives need to be established that are quantifiable, timebound, and actionable. Successful efforts such as the 100,000 Lives Campaign, set goals so ambitious they could only be reached through collaboration.[90] Benchmarking against these desired outcomes is a necessary step to ensure accountability and forward progress.

After obtaining consensus on objectives, subject matter experts universally agree that a governance structure must be put in place to enable efficient operation. It is not useful for a large group of stakeholders to become hyper-focused on a specific action item; searching for consensus on nonessential items can result in wasted time, diverting resources from the collaboratives' core aims.[90] It is recommended that a representative executive group be established as a decision-making body to facilitate action and rapid decision-making. Forming other smaller working groups within the collaborative will help formulate the best shared solutions while building a sense of ownership and accountability.

Interpersonal and inter-organizational differences can also be a challenge. Interestingly, research revealed that the higher the proportion of experts within a team, the greater the likelihood of nonproductive conflicts or stalemates.[91] Companies may also be less willing to share information if they view this as a threat to their market position. The success of some past efforts was diminished when only some of the participating companies were willing to share data. Establishing principles of engagement or "rules of the road" for participant behavior and member expectations as part of the membership agreement can help create accountability and avoid these issues. The Chatham House Rule for collaborative meetings is also recommended to create an environment of trust as "participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.[92]

Some companies may also have concerns about antitrust violations. According to a 2020 international survey, fear of prosecution related to anti-trust violations can discourage up to 60% of companies from participating in climate coalitions.[37] In the United States, there was an antitrust investigation into voluntary agreements between automakers and the state of California, and the Arizona attorney general wrote an op-ed in March 2022 titled "ESG May Be an Antitrust Violation."[93] To address these concerns, any agreements used by the collaborative should be reviewed to ensure they are in compliance with competition laws.

Collaborative members will have differing levels of maturity along their decarbonization journeys; it is important to both create a space for the mature members to take leadership roles and ensure less mature members have opportunities to participate and feel heard and recognized. It is helpful to have a menu of options with minimum requirements so that members can choose activities in which to participate. Having a few of members who pilot solutions and share lessons learned can become a virtuous cycle, making it easier for others follow suit.

In the coming months, a formal collective established with these best practices can provide the vehicle for Roundtable participants to implement collective actions to decarbonize the healthcare value chain.

Appendix A: Industry Collaboratives

Two key industry collaboratives launched in 2021 are public-private partnerships that have broad scopes and cross-sector membership:

SUSTAINABLE MARKETS INITIATIVE HEALTH SYSTEMS TASK FORCE

The Sustainable Markets Initiative (SMI), launched at Davos in January 2020, is a network of global CEOs across industries working together to build prosperous and sustainable economies that generate long-term value through the balanced integration of natural, social, human, and financial capital. The Health Systems Task Force, launched in 2021 and convened by AstraZeneca is a public-private partnership to accelerate the delivery of net zero, patient-centric health systems that improve individual, societal, and planetary health. The initiative has three working groups to address emissions across Supply Chains, with a focus on small molecule drugs and biologics, Patient Care Pathways, and Clinical Trials. Members include seven European-based pharmaceutical companies, National Health Service (NHS) England, Karolinska Institute, the Sustainable Healthcare Coalition, UNICEF, the University of Pavia, and the World Health Organization (WHO).

NATIONAL ACADEMY OF MEDICINE'S ACTION COLLABORATIVE ON DECARBONIZING THE U.S. HEALTHCARE SECTOR

The National Academy of Medicine's (NAM) Action Collaborative on Decarbonizing the U.S. Healthcare Sector is a public-private collaborative, launched in 2021 that provides a neutral platform to align collective decarbonization goals and actions based on evidence, shared solutions, and commitment to health equity promotion.[94] The Action Collaborative has four working groups: Health Care Supply Chain and Infrastructure, Health Professional Education and Communication, Health Care Delivery, and Policy, Financing, and Metrics. Members of the Action Collaborative represent health and hospital systems, clinicians, private payers, biopharmaceutical and medical device companies, health care services, health professional education, academia, nonprofits, and the federal government.

Other recently launched collaboratives or new initiatives are primarily focused on the pharmaceutical industry.

ENERGIZE

Schneider Electric's Energize, launched in 2021, supports pharmaceutical industry suppliers in adopting renewable energy through an aggregated approach to contracting for PPAs. Members include 17 pharmaceutical companies.[95]

MANUFACTURE 2030 ACTIVATE

Announced in 2022, with an official launch in April 2023, Manufacture 2030 Activate aims to decarbonize Active Pharmaceutical Ingredient suppliers through measurement, tools, advice, and green financing. The collaborative currently has five pharmaceutical members.

PHARMACEUTICAL SUPPLY CHAIN INITIATIVE (PSCI) DECARBONIZATION TEAM

The Pharmaceutical Supply Chain Initiative (PSCI) was launched in 2006 to promote responsible supply chain practices, human rights, environmental sustainability, and ethical business. In recent years, they formed a Decarbonization Team to support their members and created a Decarbonization Maturity Model and an Environmental Survey for members to collect data from suppliers. They are currently developing Suppler Learning Plans across several decarbonization topics. PSCI has 75 members, predominantly pharmaceutical companies.[96]

Appendix B: Health System – MedTech Roundtable Participants

HEALTH SYSTEMS
Advocate Health
Boston Medical Center
Cleveland Clinic
CommonSpirit Health
Hackensack Meridian Health Network
HealthPartners
Kaiser Permanente
Mass General Brigham
Northwell Health
NYU Langone Health
Providence
Seattle Children's Hospital
Stanford Healthcare
The Ohio State University and Wexner Medical Center
The University of Vermont Medical Center

MEDTECH SUPPLIERS / DISTRIBUTORS
Abbott Laboratories
Baxter International
BD
Boston Scientific
Cardinal Health
Cencora
Edwards Lifesciences
GE HealthCare
Genentech
Henry Schein
Johnson & Johnson
McKesson
Medline
Medtronic
Olympus America
Össur
Philips Healthcare
Roche Diagnostics
Siemens Healthineers
Stryker
Zimmer Biomet

GPOS
Premier
Vizient

INDUSTRY PARTNERS
Health Care Without Harm
Institute for Healthcare Improvement
National Academy of Medicine
Sustainable Purchasing Leadership Council

Appendix C: Findings from the April Roundtable

At the April Roundtable, participants identified decarbonization activities that worked well for them in their individual organizations under five levers: 1) Energy Efficiency and Renewable Energy, 2) Physician and Clinical End User Engagement, 3) Product Composition, Packaging, and End-of-Life, 4) Product Utilization, 5) Transportation and Logistics. The group was then asked to identify which of these could be scaled or accelerated with collective action.

Energy Efficiency and Renewable Energy – Most of the Roundtable participants have successfully implemented energy efficiency initiatives at their sites and many have installed onsite renewables and/or procured renewable energy through Power Purchase Agreements (PPAs) or their utilities. Aggregate PPAs or Virtual Power Purchase Agreements (VPPAs) were identified as a key opportunity for collective action. There was a suggestion to talk continue the conversation with leading industry experts in the field.

CLINICAL END USER ENGAGEMENT

Clinical advisory teams were identified as key to building engagement across the supply chain and with clinical stakeholders. Gathering input from this advisory team about new products and processes ahead of time has led to more favorable adoption outcomes. Another widely recommended approach was to ensure sustainability criteria are routinely considered by value analysis committees (VACs) that evaluate new product purchases for hospitals and clinics. This approach leads to increased buy-in from physicians and clinical end users who are concerned about patient safety and the functionality and quality of products. For instance, clinical end user engagement is critical for reprocessing initiatives. Having physician-led initiatives increases the willingness to adopt new processes and products. It was also suggested that training sessions or videos during orientation, annual trainings for target areas like operating rooms, and continuing education helps raise awareness at the broader organization level. A novel strategy that was successfully implemented was having patient care advocates serve the dual role of decarbonization advocates.

PRODUCT INNOVATION

Suppliers with decarbonization goals have been looking at ways to produce more sustainable products, not only to drive decarbonization but also to meet customer EPP goals, through changes in design, materials, and packaging. By meeting such targets, suppliers can gain a competitive advantage in the market as health system customers may prioritize preference for environmentally responsible products. Product energy use was also elevated as an important consideration both in how a product is initially designed and then used in the field. Other efforts discussed included utilizing assets more efficiently and extending the useful life of products. A key issue raised was for buyers to be able to understand and trust the sustainability attributes of products and the need for an independently verified "ecolabel" like those used for food and consumer goods products. Greenhealth Exchange recently launched Greenhealth Approved to address this gap. Products are reviewed against a set of sustainability criteria established for its category and if a product both meets sustainability criteria and functions in clinical settings, it receives a Greenhealth Approved seal. There are currently limited categories being reviewed and a small number of products that have been reviewed but provides a way for suppliers to differentiate their products and help health care providers make purchasing decisions.

A more complicated collective action opportunity would be to look to circular economy solutions to reduce waste and the need to source virgin material. Ideas for takeback programs included both packaging and products. A number of health systems have worked with suppliers to shift to reusable totes for deliver. Takeback is, of course, complicated, requiring changes by both suppliers and health systems. Products would need to be designed for reuse, refurbishment, or recycling and systems in place to do so. Health systems would need to put systems in place to collect and store products that are being sent back to the manufacturer. There

are successes in place in health systems across the country who are using reprocessed devices and recycling blue wrap recycling that demonstrate the viability of this approach.

PRODUCT UTILIZATION

In addition to changes in product composition, packaging, and end-of-life considerations, how and how much a product is being used must also be considered. Many health systems have instituted surgical kit reformulation to identify items that routinely go unused during procedures, and then removing them from the preference card and pick list to avoid the unnecessary purchase and disposal of those supplies. Great Ormond Street Hospital, a children's hospital in the United Kingdom, provides a success story of reducing unnecessary plastic glove use that was initiated by their infection prevention department. Through an educational campaign including email communications, in-person trainings, and posters, staff were trained on when gloves were and were not necessary, and when handwashing alone was sufficient. Metrics were reported throughout the organization to show progress and raise awareness during the campaign. This culminated in a total reduction of 25 metric tons of plastic gloves and a cost reduction of $134,000 US dollars.

TRANSPORTATION AND LOGISTICS

Transportation and logistics have been a key area of focus for many companies. Participants shared efforts related to packing efficiency, route optimization, and minimization of less-than-truckload and last-mile deliveries. Order optimization, consolidating separate smaller orders into larger deliveries to reduce delivery frequency, is also being utilized. Looking to other sectors, many retailers like Amazon and Walmart are prompting consumers to consolidate orders for delivery. Relatedly, participants discussed efforts to minimize overnight and rush shipping since emissions related to air travel are significantly higher. Health systems participants identified opportunities to consolidate sending supplies to patient homes across departments versus having multiple deliveries going independently.

Successes were also shared related to electrification of fleets, charging station construction, and incentives to employees to encourage car-sharing, hybrid, and electric vehicles.

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About the Organizations

About Kaiser Permanente

Kaiser Permanente is committed to helping shape the future of health care. We are recognized as one of America's leading health care providers and not-for-profit health plans. Founded in 1945, Kaiser Permanente has a mission to provide high-quality, affordable health care services and to improve the health of our members and the communities we serve. We currently serve 12.7 million members in 8 states and the District of Columbia. Care for members and patients is focused on their total health and guided by their personal Permanente Medical Group physicians, specialists, and team of caregivers. Our expert and caring medical teams are empowered and supported by industry-leading technology advances and tools for health promotion, disease prevention, state-of-the-art care delivery, and world-class chronic disease management. Kaiser Permanente is dedicated to care innovations, clinical research, health education, and the support of community health. For more information, visit about.kp.org.

About Health Care Without Harm

Health Care Without Harm seeks to transform the health care sector worldwide so that it reduces its environmental impact, becomes a community anchor for sustainability, and a leader in the global movement for environmental health and justice. For more than 25 years, the organization has worked in partnership with the health care sector to reduce its use of toxic chemicals and generation of waste, decarbonize its operations, transform its supply chain and foster broader climate action. With regional teams in the United States, Europe, Southeast Asia, and Latin America; and strategic partnerships with organizations in Australia, Brazil, China, India, Nepal, and South Africa; Health Care Without Harm is a leader in mobilizing the health care sector to realize this vision. For more information, visit noharm.org.

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