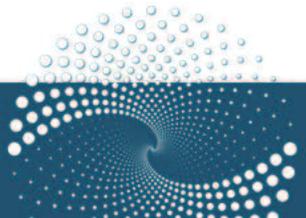


Demystifying Strategic Decarbonization Planning in Healthcare



Today's Speakers



Saadat Khan

Energy Engineer
Sustainability Program Office
Stanford Health Care



Christina Vernon
Sanborn, AIA LEED AP

Associate Principal
Senior Decarbonization Specialist
Mazzetti

Learning Objectives

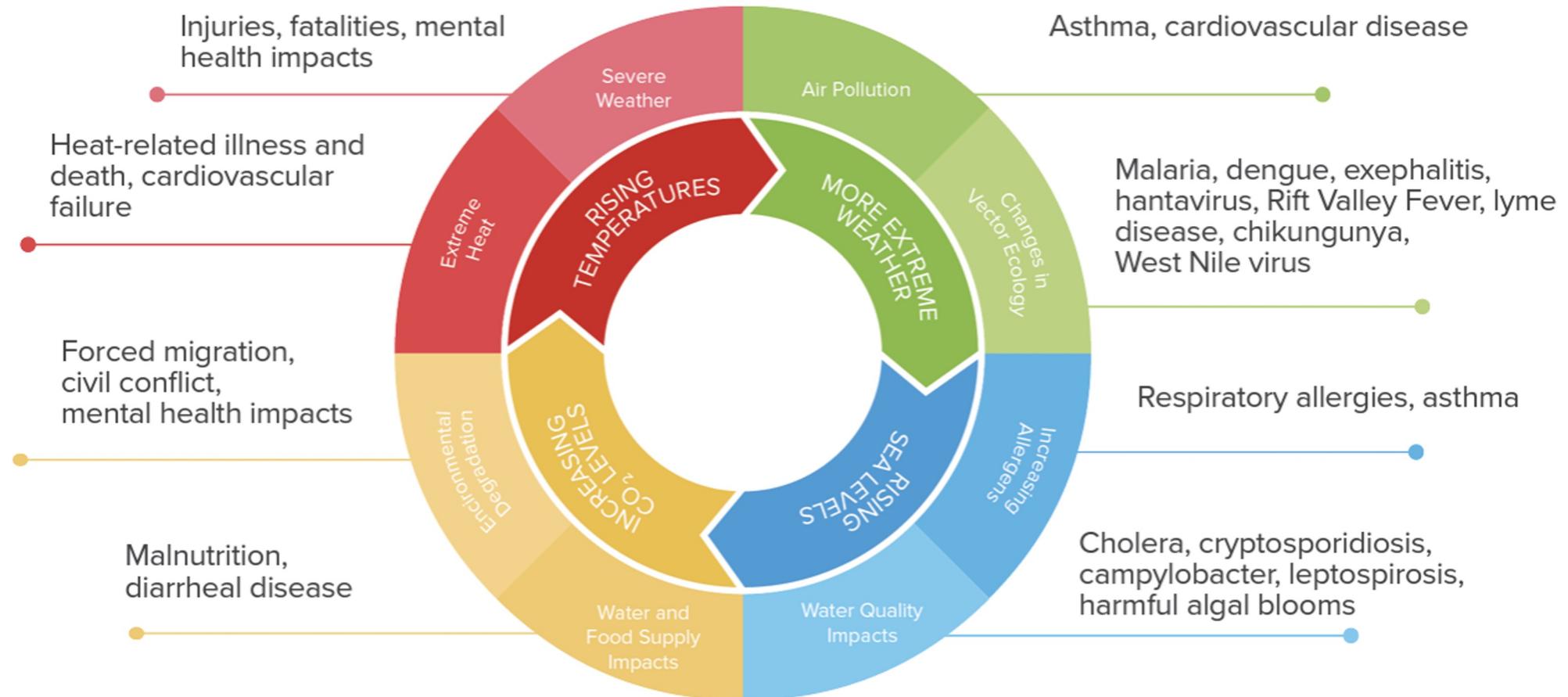
As a result of this session, attendees will be able to:

- Understand the scale of US healthcare's greenhouse gas emissions in a global context and their sources on campus
- Define decarbonization, its practical implications, and key strategies
- Understand a practical, strategic, stepwise approach to tackling greenhouse gas emissions at their facility
- Identify real-life examples of hospitals and health systems that are tackling their emissions



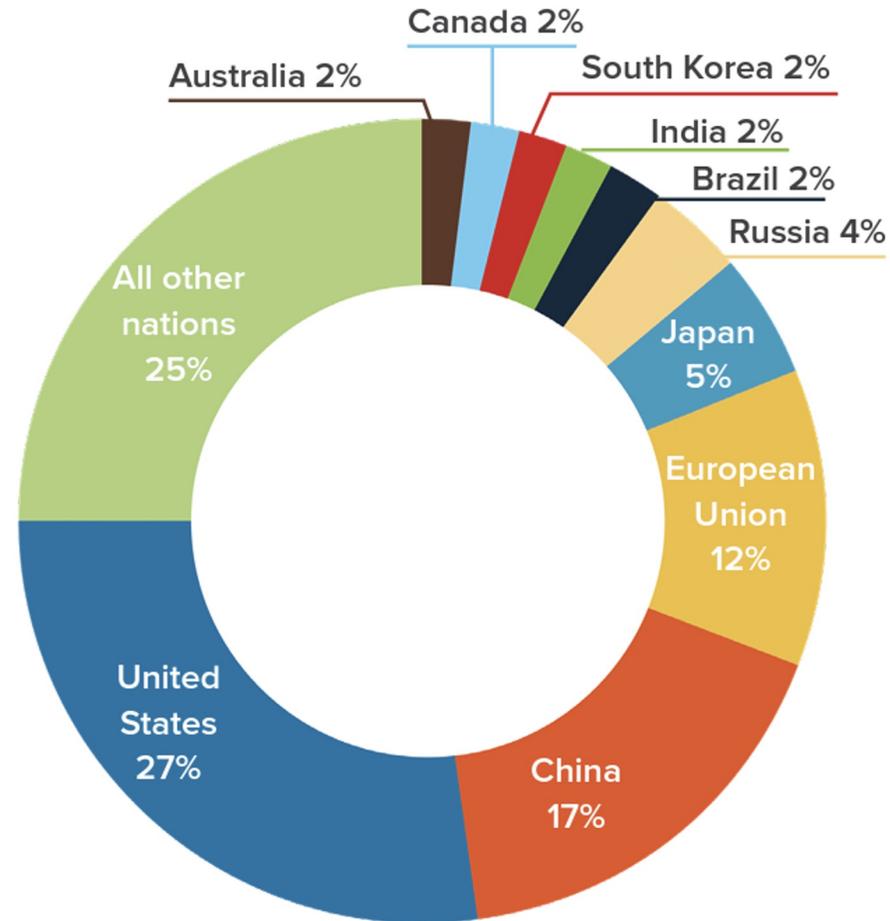
IPCC report: 'Code red' for human driven global heating, warns UN chief

Health and Climate are Inextricably Linked



Source: https://noharm-global.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_092319.pdf

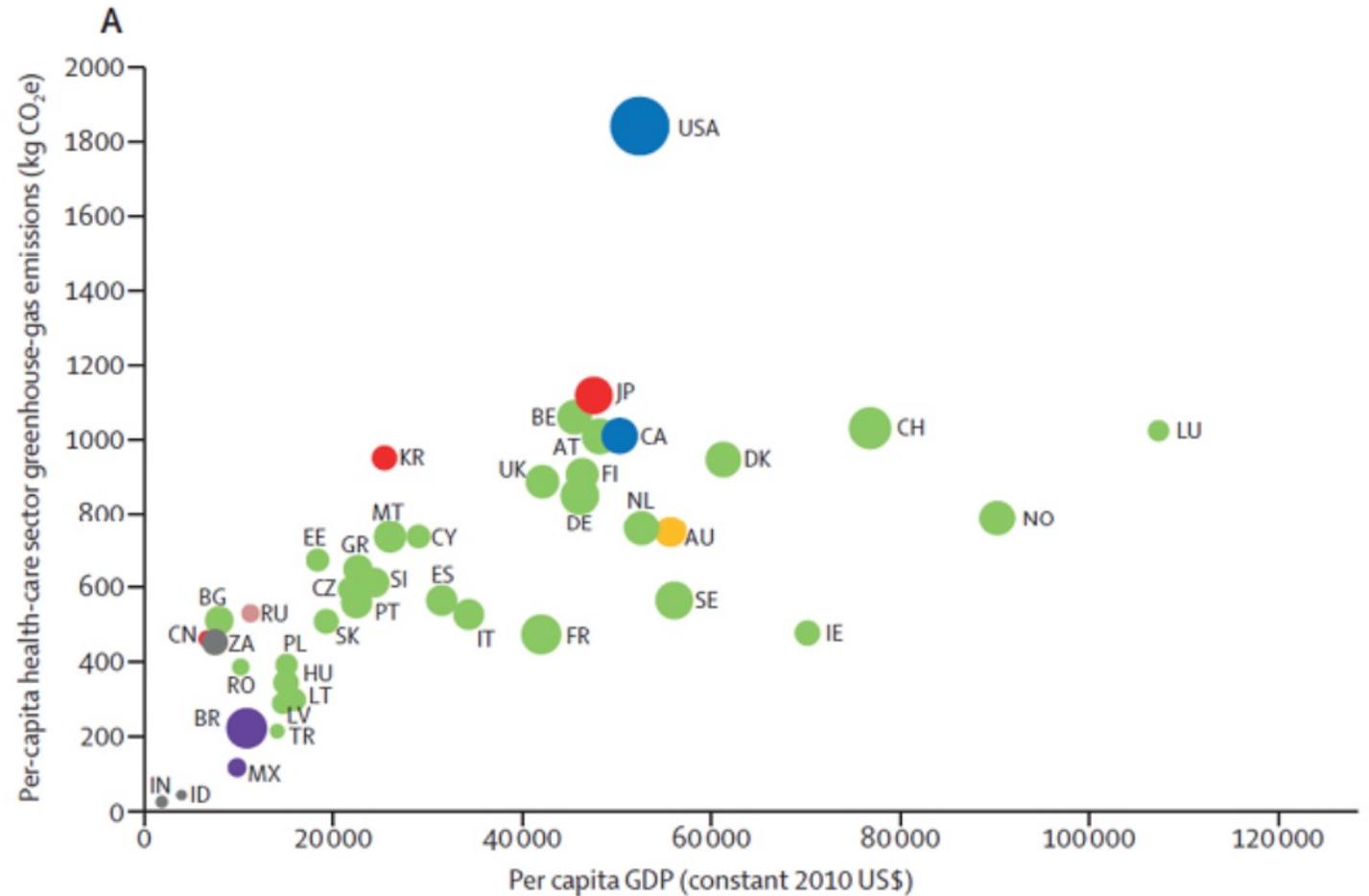
US Healthcare Emissions in a Global Context



Source: Healthcare Without Harm https://noharm-global.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_092319.pdf

US Healthcare Emissions in a Global Context

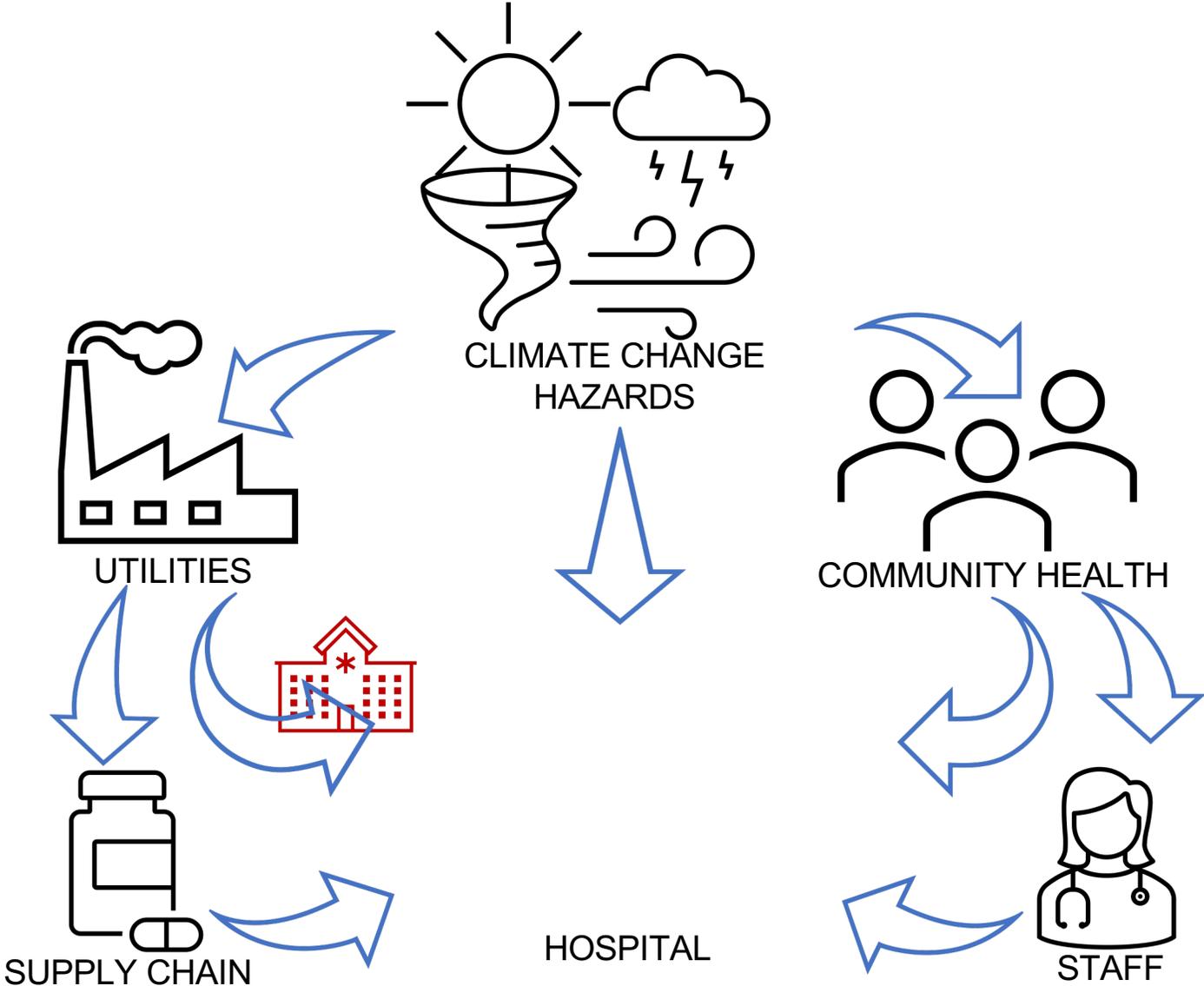
If global healthcare were a nation, it would be the 5th largest source of emissions on the planet



(A) Health-care sector emissions as a function of GDP per capita (bubble widths indicate the proportion of national spending on healthcare).

Climate Change = Risk

Climate change presents concurrent and compounding risks to your community, utilities, supply chains, staff, and facilities, so should be managed like any other likely hazard with tabletop exercises and risk assessments.



[Check for updates](#)

Kent

Cite this as: *BMJ* 2021;374:n2177<http://dx.doi.org/10.1136/bmj.n2177>

Published: 06 September 2021

Climate crisis: Over 200 health journals urge world leaders to tackle “catastrophic harm”

Jacqui Wise

More than 200 health journals have called on governments to take emergency action to tackle the “catastrophic harm to health” from climate change.

A joint editorial says that while recent targets to reduce emissions and conserve biodiversity are welcome, they are not enough and need to be matched with credible short and longer term plans.¹

The editorial was published simultaneously on 6 September in 233 international titles including *The BMJ*, the *Lancet*, the *New England Journal of Medicine*, the *East African Medical Journal*, the *Chinese Science Bulletin*, the *National Medical Journal of India*, and

investments and health systems. This will need substantial investment but will have enormous positive benefits, it argues, including reduced air pollution, increased physical activity, and improved housing and diet.

Wealthier countries that have disproportionately created the environmental crisis must do more to support low and middle income countries in building cleaner, healthier, and more resilient societies, say the authors.

Eric Rubin, editor in chief of the *New England Journal of Medicine*, said, “The environment and health are

US National Academies (NASEM)

“We have to be part of the solution to reduce carbon emissions”

Q+A with Victor Dzau, MD, President National Academy of Medicine

The National Academy of Medicine formed late last year a collaborative convening public and private stakeholders from across the healthcare industry to work together in reducing healthcare’s contribution to carbon emissions. Victor Dzau, MD, president of the National Academy of Medicine, discussed with Modern Healthcare Custom Media the impetus for establishing the collaborative, the importance of measuring this work and the business case for healthcare organizations to prioritize decarbonization.



NAM Action Collaborative



Healthcare
Delivery

Infrastructure &
Supply Chain

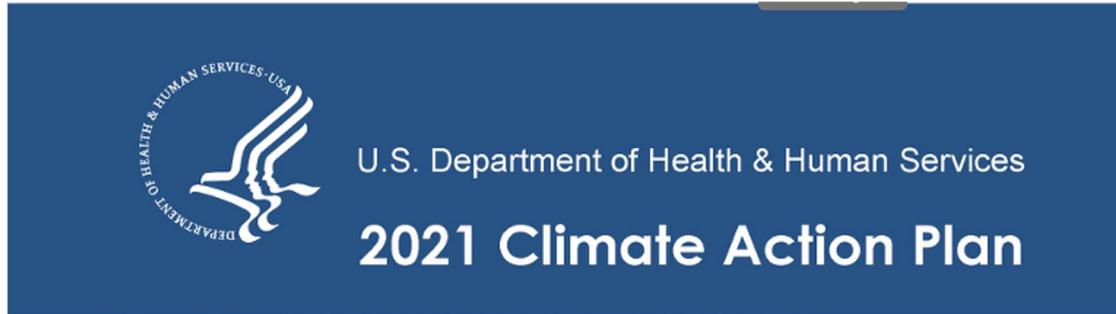
Healthcare
Workforce
Education

Metrics/Policy/Finance



NATIONAL ACADEMY OF MEDICINE

US Health and Human Services



Healthcare challenged to

REDUCE

Its carbon emissions

BY 50%

by 2030



An Introduction to the HHS Health Care Sector Climate Pledge

John Balbus, MD, MPH, Interim Director
Joe McCannon, Senior Advisor

May 5, 2022

Health and Human Services Pledge Goals

The HHS pledge was launched on April 22nd 2022 (Earth Day) and the initial signatories were announced on June 30th 2022. Signatories voluntarily pledged to:

1. At minimum, **reduce organizational emissions by 50% by 2030** (from a baseline no earlier than 2008) and achieve **net-zero by 2050**, publicly accounting for **progress on this goal every year**.
 - **Share publicly** our strategies for reducing on-site emissions (where relevant, addressing sources related to on-site energy usage, waste anesthetic gases, vehicle fleets and refrigerants).
2. Designate an **executive-level lead** for [their] work on reducing emissions by 2023 and conduct an inventory of Scope 3 (supply chain) emissions by the end of 2024.
3. Develop and release a **climate resilience plan** for continuous operations by the end of 2023, anticipating the needs of groups in our community that experience disproportionate risk of climate-related harm.

Over 60 Hospitals and Health Systems signed on to the Health and Human Services Pledge in spring 2022, representing over 600 hospitals in the US. Additionally, industry partners including pharmaceutical companies, GPOs and service providers joined the pledge. Healthcare entities may join the pledge until October 2022.

Over 60 hospitals and health systems signed on to the HHS Pledge representing over 600 hospitals:

- Providence Health
- Atrium Health
- HealthPartners
- Cherokee Health Systems
- Kedron Health
- University of California Health
- CommonSpirit Health
- Northwell Health
- University Medical Center of El Paso
- Rush University System for Health
- Northern Arizona Healthcare
- NYC Health + Hospitals
- Hackensack Meridian Health
- Boston Medical Center
- UW Medicine,
- Baystate Health
- Sun River Health
- Stanford Children's Health
- Ascension
- Stanford Health Care
- Mass General Brigham
- Boston Children's Hospital
- Tufts Medicine
- Southcoast Health
- Children's National Hospital
- Mount Sinai Health System
- Kaiser Permanente
- Keck Medicine of USC
- Beth Israel Deaconess Medical Center
- Montefiore
- Henry Ford Health
- Valley Children's Healthcare
- University of Nebraska Medical Center and Nebraska Medicine
- Advocate Aurora Health
- Gillette Children's
- University of Utah Health
- Steward Health Care System
- DaVita
- NYU Langone Health
- RWJBarnabas Health
- Seattle Children's

Further Commitments

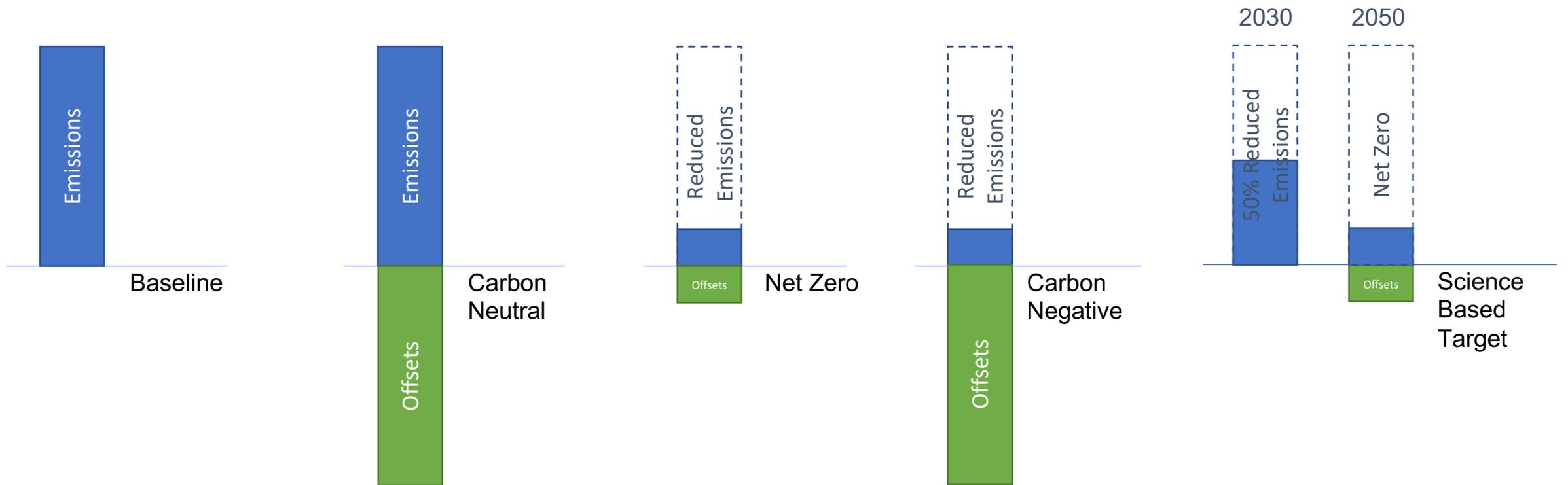
- Health systems are making bold commitments:
 - Ascension: [Net zero carbon emissions by 2040](#)
 - Providence Health: [Carbon negative by 2030](#)
 - CommonSpirit: [Net-Zero by 2040](#)
 - Cleveland Clinic: [Carbon neutral by 2027](#)
 - Kaiser Permanente: [Carbon Neutral by 2020](#)
- Bond rating agencies
 - Requiring climate risk disclosures
 - Moody's is rolling out an ESG scorecard focused on climate risks
- Investor implications
 - More socially aware of ESG issues



Ascension



Types of Goals



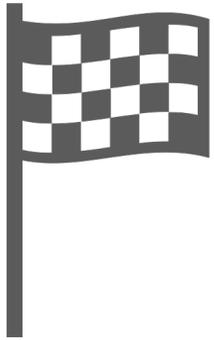
Visual Poll

A hand is raised in a visual poll gesture, with fingers spread and palm facing forward. The hand is in sharp focus in the foreground, while several other hands are visible in the background, blurred. The background is a solid green color.

What is your organization's commitment to climate?

- We haven't started talking about climate yet.
- We are just getting started, and are likely to make carbon reduction part of our business model
- We have a written commitment statement to track and reduce carbon
- We measure and disclose our GHG emissions and have a formal mitigation plan

The Basics of Strategic Decarbonization Planning



Define the starting line



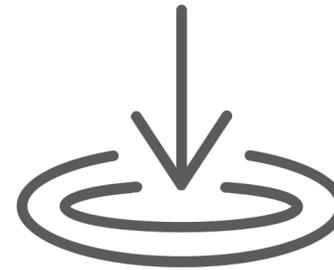
Establish a team and its priorities



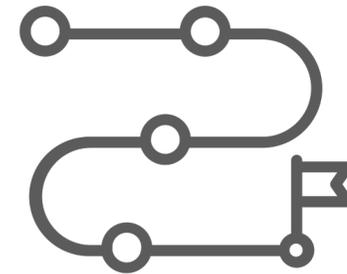
Engage stakeholders in action ideation



Evaluate and prioritize actions



Analyze action impacts

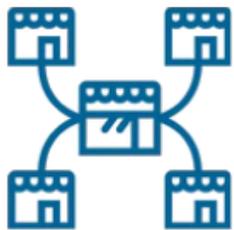


Choose a roadmap model to set goals



Build action-oriented roadmap

Emission Sources

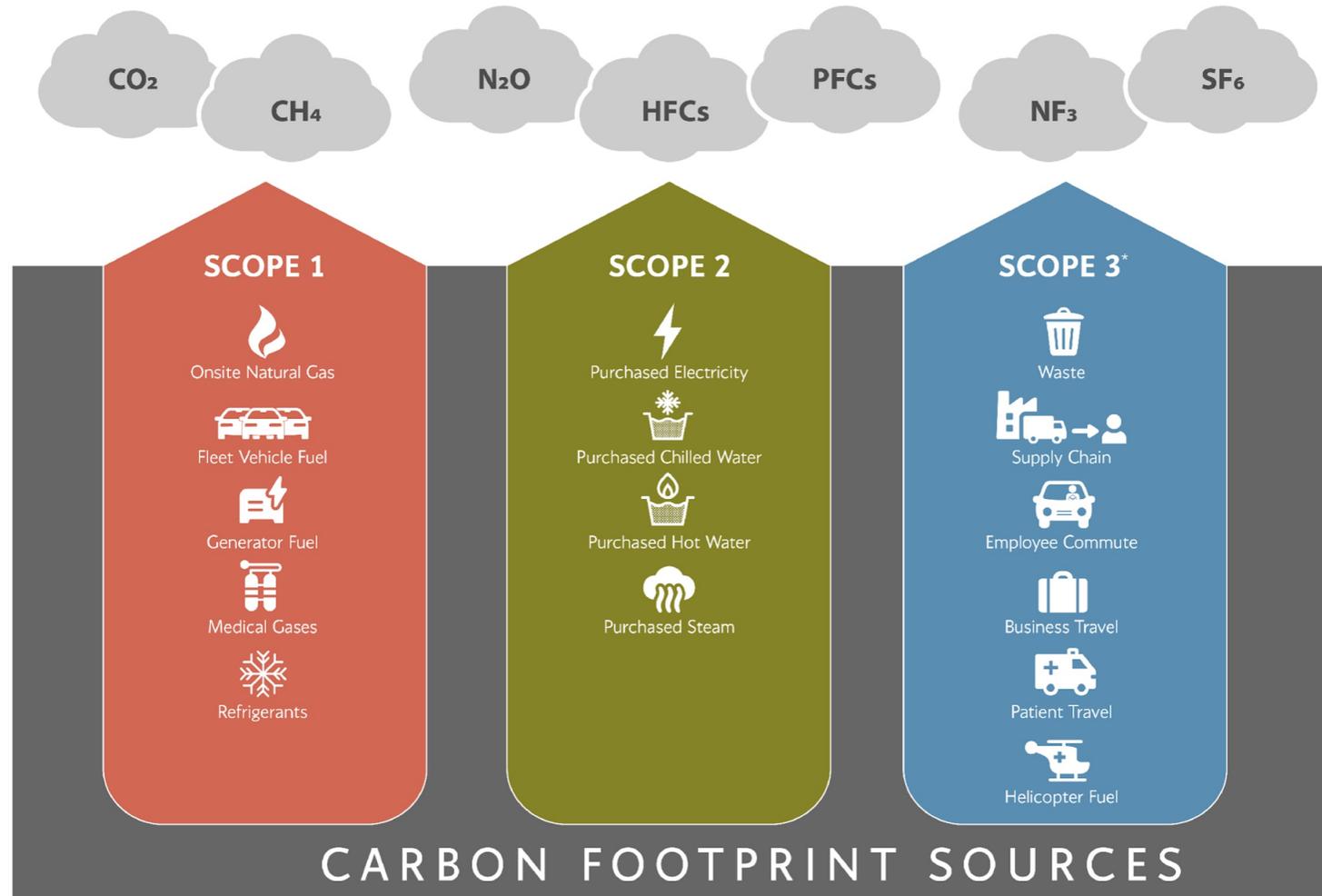


Climate Footprint: three types of emissions to consider

SCOPE 1: Direct emissions from fossil fuels burned **on site** or in owned and operated vehicles

SCOPE 2: Purchased electricity or other purchased utilities (ie steam or chilled water)

SCOPE 3: Other emissions the occur as a result of the entity's business such as waste or commuter travel.



*These are the scope 3 items currently being addressed in this effort, however there are additional scope 3 items that exist.

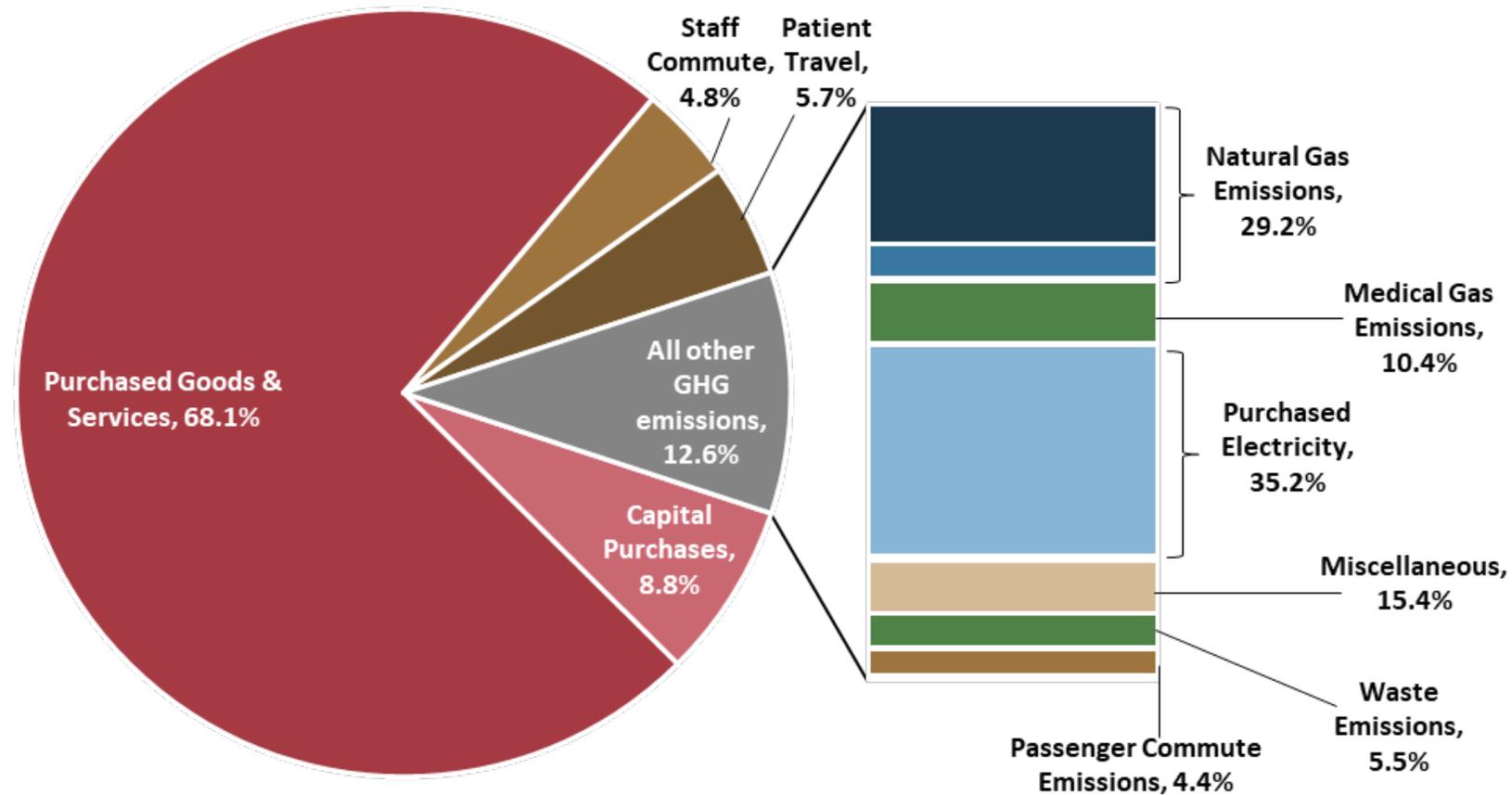
Establish a baseline GHG Emissions Inventory

- Follow the Greenhouse Gas (GHG) Protocol
- Decide to include or exclude Scope 3 emissions
- Choose organizational boundaries and choose Control method
- Engage stakeholders in data collection
- Perform analysis



Stanford Health Care (SHC) Emissions Profile

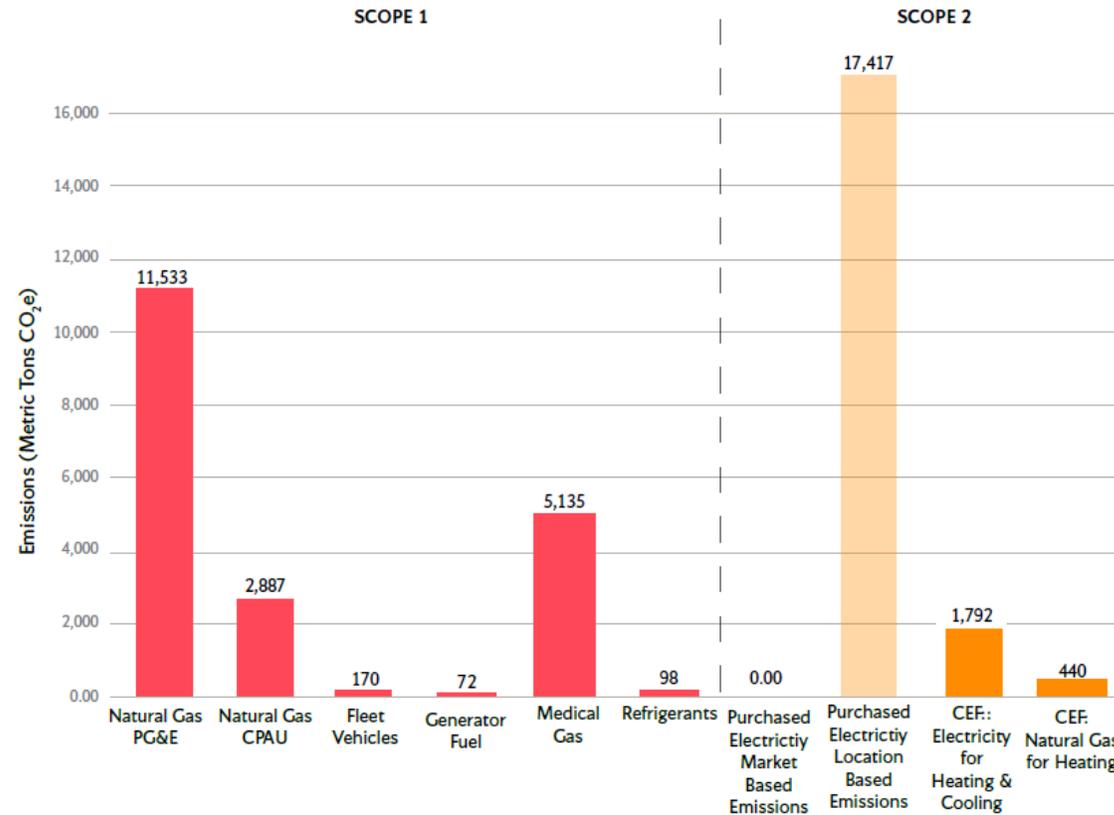
SHC's 2021 location-based carbon footprint was 392,522 mtCO₂e. Purchased goods & services & capital purchases represent ~ 77% of total



SHC's Scope 1 & 2 Emissions

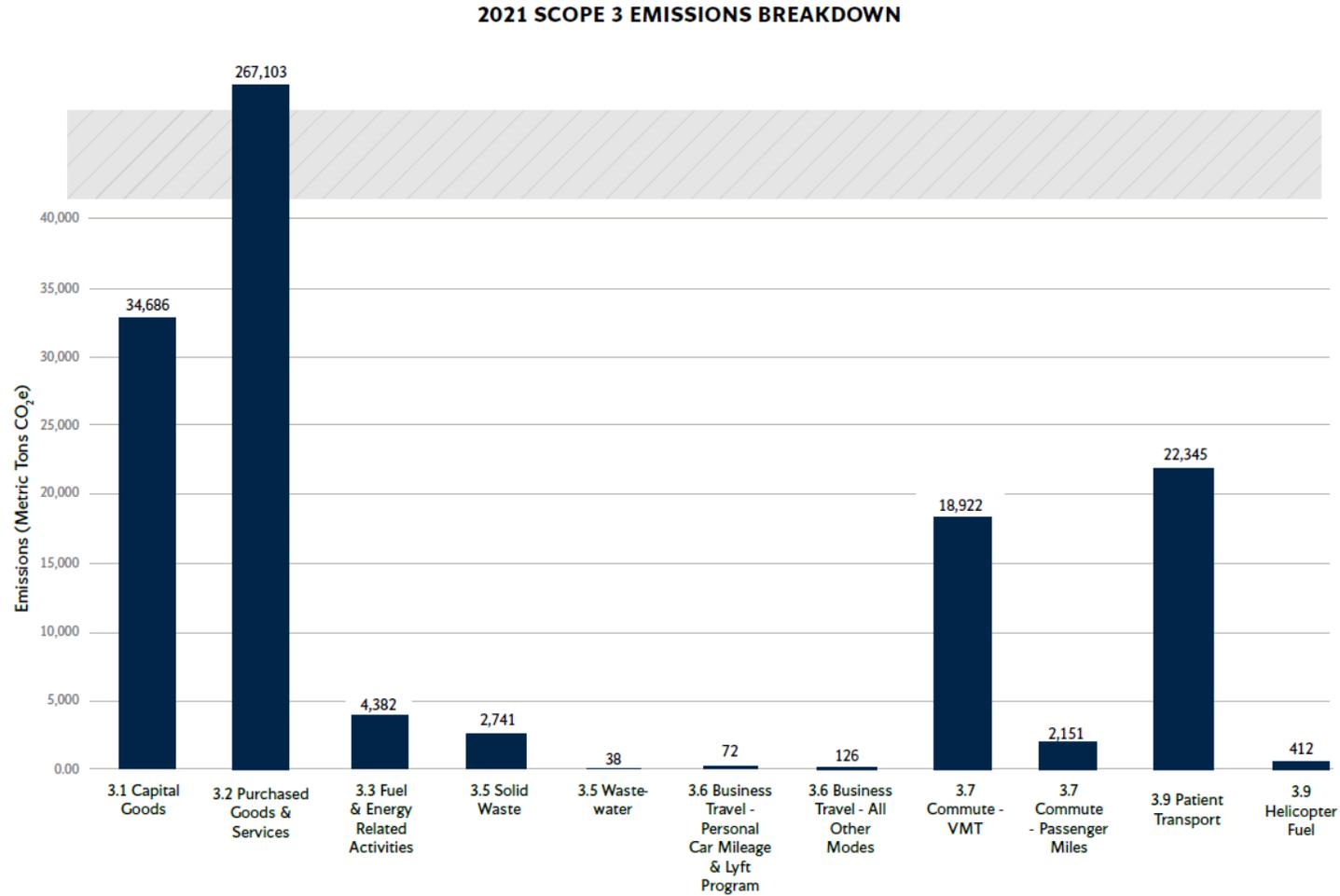
On-site combustion for steam production remains SHC's largest Scope 1 emission

2021 SCOPE 1 & 2 EMISSIONS BREAKDOWN

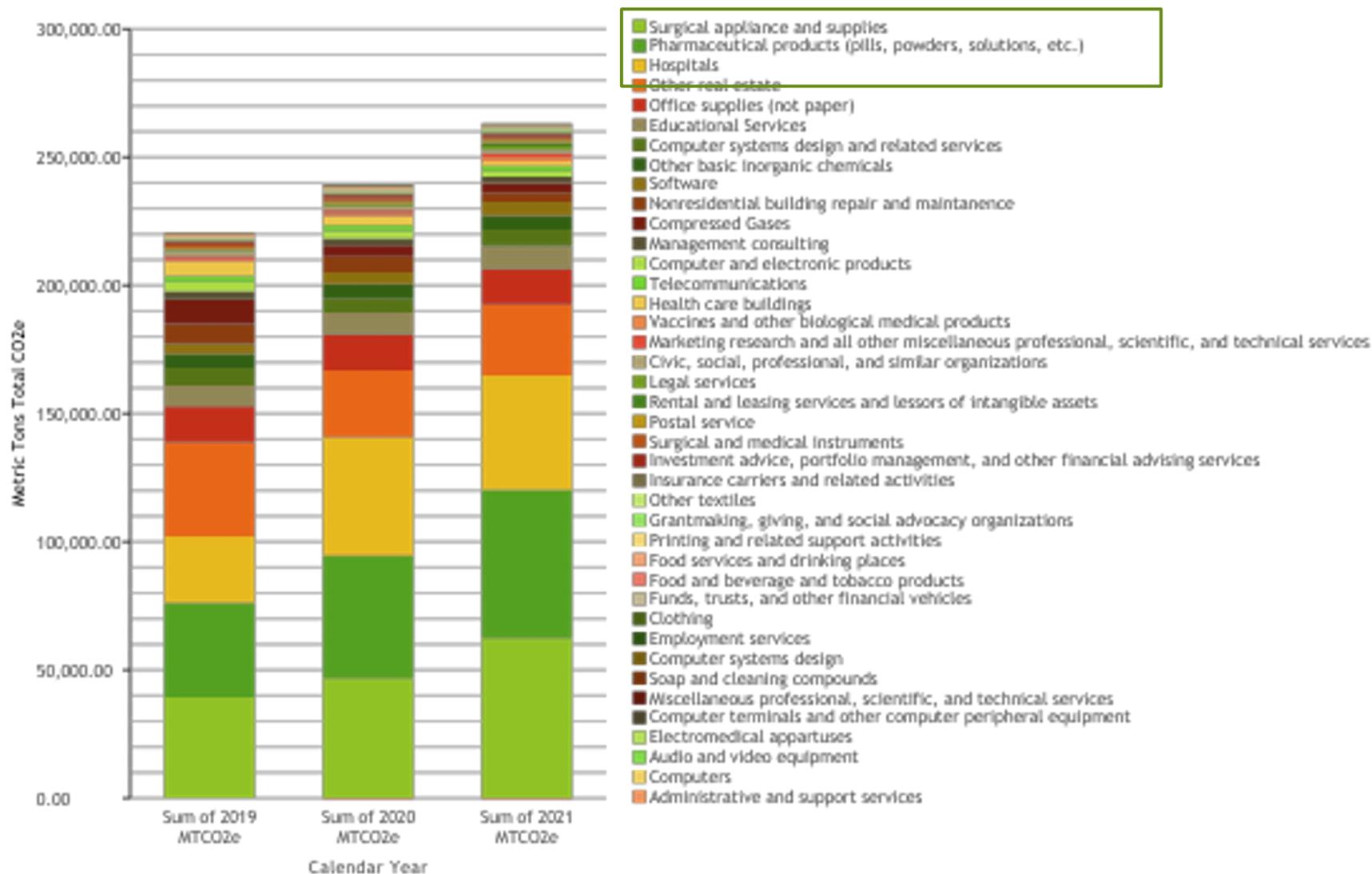


SHC's Scope 3 Emissions

Scope 3 represents ~80% of a typical organizations carbon footprint.



SHC's Supply Chain Emissions Data



Educate, Align, Build

In summer 2021, SHC hosted its 3-part, virtual Sustainability Visioning Workshop with 100+ participants and 10 guiding subject matter experts to set the long-term targets and plans for year 1.



Year 1 Plan



	Actions	Community Impact	Environmental Impact
Energy, Emissions & Water Carbon Neutrality in Scopes 1 and 2 by 2025	Plan for transition to CEF hot water loop w/LBRE, create roadmap to carbon neutrality, retrofit building equipment	Reduced exposure to particulate matter	Reduce scope 1 & 2 emissions, Improve local air quality
Transportation Carbon Neutral Transportation 2025	Increase use of alternative commute modes for staff, install EV charging stations, begin to convert fleet to electric vehicles	Decrease traffic congestion, reduce exposure to particulate matter, improve commute experience for staff	Reduce scope 1 & 3 emissions, Improve local air quality
Zero Waste Zero Waste Compliance 2025	Implement Zero Waste, Implement waste quality audits, Establish Health Stream education, Lead Waste Linen Study, Initiate Reusable & reprocessible program to NLS	Improve waste sorting education, reduce exposure to medical waste & toxic chemicals	Reduce scope 3 emissions, reduce landfill waste, conserve resources
Sustainable Procurement Sustainable Purchasing Program 2022	Develop Env. Preferable Purchasing Policy (EPP), Sustainable Product Guidelines, Measure supply chain carbon footprint	Educate purchasing decision-makers on impacts of decisions	Measure scope 3 emissions
Design & Construction Sustainable Design Guidelines 2022	Establish Sustainable Landscaping Design Guidelines, Green Building Standards and Sustainable Interiors Standards	Educate staff on benefits of sustainable guidelines/standards	Improved indoor air quality, improved building energy performance, improved environmental performance

Evaluate and Prioritize Action

- Assess all ideas on a rapid basis to begin dialogue
- Review scoring with stakeholder groups
- Identify projects that should proceed to the detailed evaluation phase

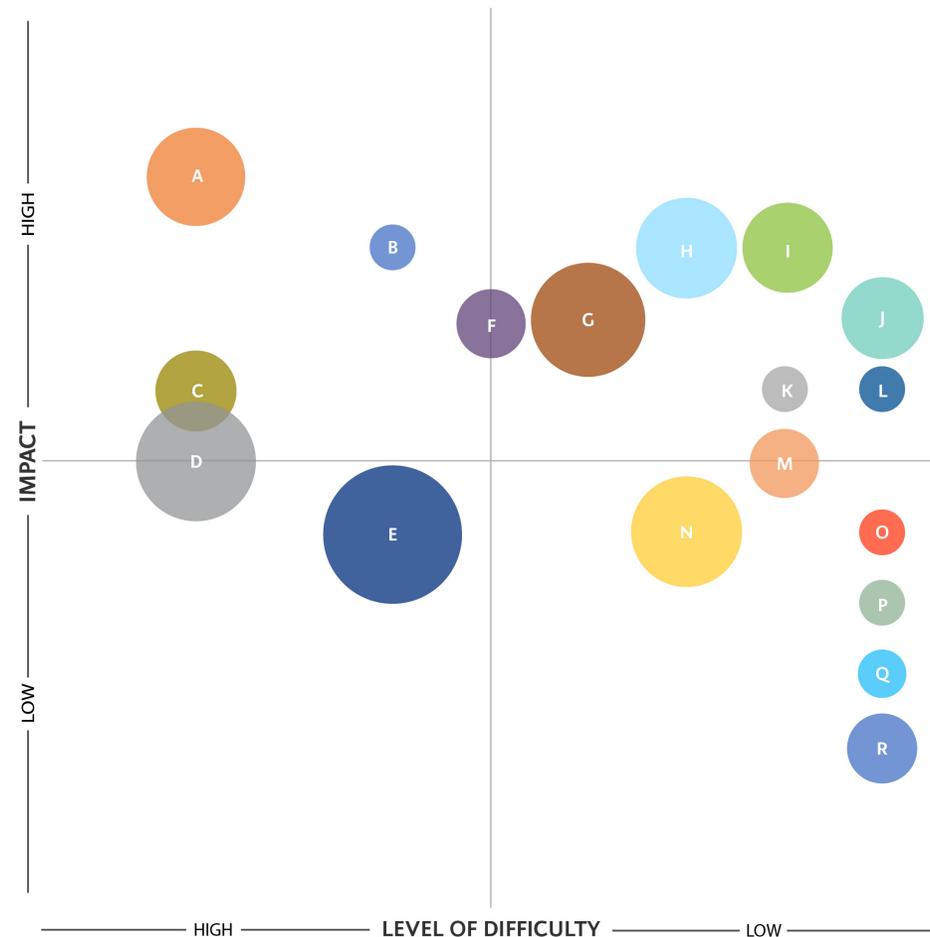
SCOPE 3 - COMMUTE DECISION MATRIX

High Impact, High Difficulty

- A Influence Transit
- B Increase Remote Work
- C Ensure Policies are Transit-Friendly

Low Impact, High Difficulty

- D Provide On-site Childcare
- E Add EV Infrastructure



High Impact, Low Difficulty

- F Expand Telehealth
- G Invest in Tech
- H Implement a Commuter IT Platform
- I Create a Transit Navigator Role
- J Reward Low-Carbon Commuters
- K Offer Daily Parking Model
- L Support Transit Users
- M Offer Emergency Rides

Low Impact, Low Difficulty

- N Add Cycling Infrastructure
- O Disincentivize SOV Commutes
- P Support Carpoolers
- Q Support Cyclists
- R Incentivize Bike Purchases

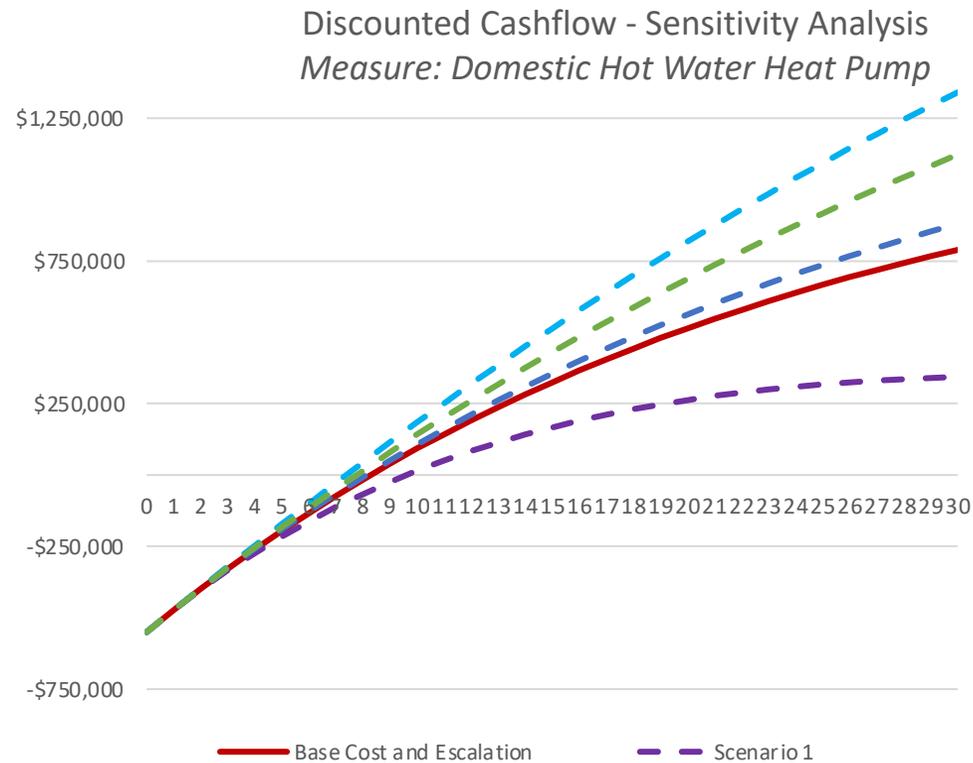
*The size of the bubble represents a relative cost of the proposed implementation strategy

Analyze Action Impacts

- Evaluate each project for carbon and energy cost reductions
- Estimate project cost, calculate simple payback, and calculate cost per MTCO₂e reduced
- In addition to a purely financial return, calculate returns including avoided cost of offsets and the social cost of carbon
- Identify and communicate non-financial returns (i.e. resilience)

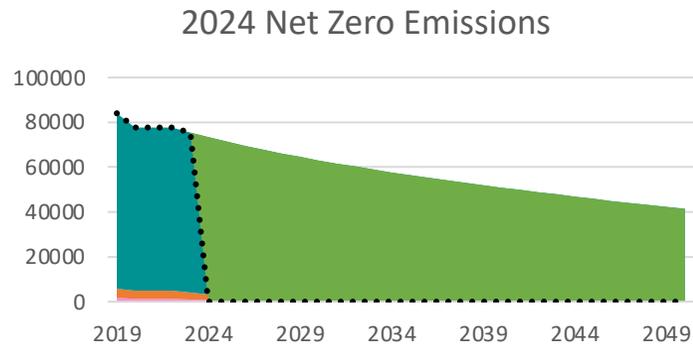


Financial and carbon analysis

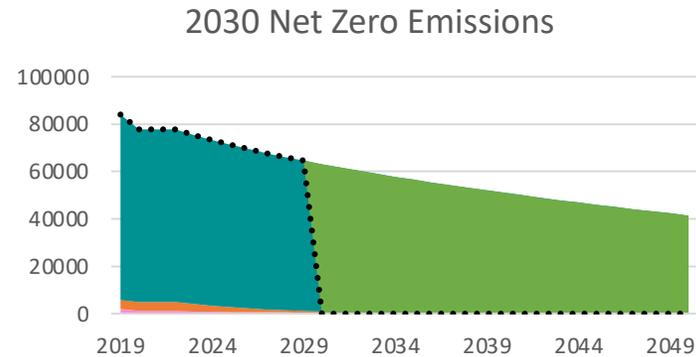


Project Categories	Measure Description	\$ / MT CO2e
Operations	Building operator training for efficient system operation	\$0
Operations	Building operator training for efficient system operation	\$0
Biogas	Biogas for cooking	\$21
Biogas	Biogas for other natural gas uses	\$45
West Building Steam	West: Review and adjust humidification setpoints for zones	\$111
West Steam	West: Install water-source heat pump water heaters using CHW return water	\$623
Main Building Steam	Main: Alt humidification: Elec steam generator	\$1,148
West Building Steam	West: Convert Space heating from steam plant to SESI heating HW	\$1,423
West Building Steam	West: Alternative sterilization and humidification: Electric steam generator	\$1,542
Operations	West: RCx / controls review	\$1,563
Refrigerants	Alternative refrigerants: Low GWP drop-in replacement refrigerants	\$2,018
Renewables	Waste to energy	\$3,811
West Building Steam	Single temp handwashing and vacuum plumbing. Heat recovery on waste water.	\$4,984
Fleet	Fleet Vehicle electrification + EV charging infrastructure	\$5,318
Renewables	Localized solar thermal	\$5,730
Operations	Main: RCx / controls review	\$6,527
Operations	Corridor ACH reduce from 6 to 2	\$6,922
Operations	West: Full building controls replacement	\$7,296
Refrigerants	Refrig Maint Program: Replace chillers with low-Pressure and low-GWP refrigerant	\$8,513
Med Gas	Anesthetic gas recovery system in West building	\$9,356
Operations	LPCH Main: Air distribution and use in ICUs & door issues	\$10,383
Envelope	LPCH Main: Decrease solar gain Main building lobby	\$12,170
Kitchen	Induction cooking - replacement	\$14,689
Kitchen	Main: Upgrade dishwashers to not use steam/NG	\$19,096
Main Building Steam	Heat recovery in thermal fluid heaters	\$25,922
Envelope	Exterior door weatherproofing	\$27,688
Envelope	LPCH West: Decrease solar gain (shading) West bldg. southern exp and atrium	\$49,088
Main Building Steam	Main: Alternative sterilization: Electric steam generator	\$80,791
Resilience	Upgrade generators - alternative technologies like Fuel Cells	\$1,025,914
Lighting	LED Lighting upgrades at both buildings	No emissions
Lighting	Lighting controls - occupancy and daylighting	No emissions
Renewables	Solar PV on West building parking structure	No emissions
Resilience	Microgrids: PV + Battery storage + load management	No emissions

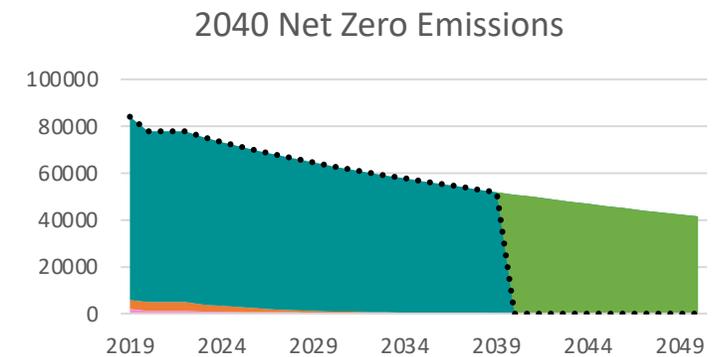
How Fast to Carbon Neutral: Three Conceptual Pathways



- 2024 Goal:
- Implement reduction projects
- Purchase offsets beginning in year 1 to achieve net zero emissions



- 2030 Goal:
- Implement reduction projects
- Purchase offsets beginning in 2030



- 2040 Goal:
- Implement reduction projects
- Purchase offsets beginning in 2040

Build an Action-Oriented Roadmap

- Move from ideas to formal projects with design and implementation timelines
- Discuss financing options



Boston Medical Center

420,000
MEMBER
HEALTH PLAN

MORE THAN
6,600
EMPLOYEES

>80%
OF PATIENTS
PUBLICLY
INSURED OR
UNINSURED

514
BED TEACHING
HOSPITAL

BOSTON
MEDICAL
CENTER

LARGEST
PROVIDER OF
TRAUMA AND
EMERGENCY
SERVICES IN NEW
ENGLAND

NEW
ENGLAND'S
LARGEST
SAFETY-NET
HOSPITAL

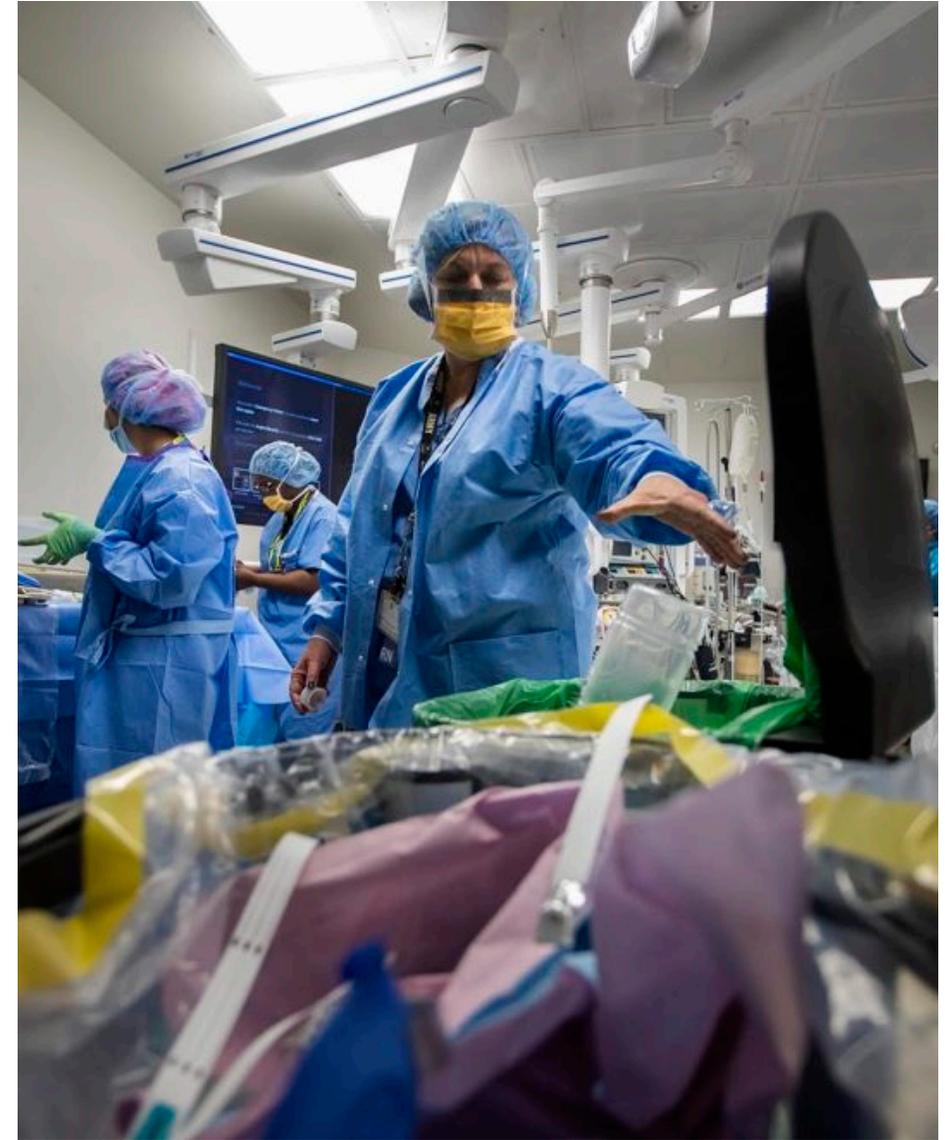
PRIMARY
TEACHING
HOSPITAL OF
BU SCHOOL OF
MEDICINE

>1 Million
OUTPATIENT
VISITS PER
YEAR

BMC's efforts to 'go green' extend beyond facilities, transforming the way they deliver clinical care

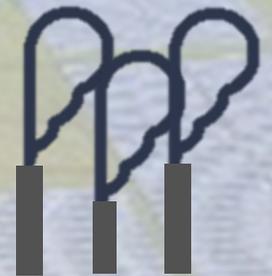
Within the operating rooms at BMC, typically the area of a hospital with the largest carbon footprint, changes have been implemented to reduce waste and decrease emissions while maintaining excellent care

- Anesthetics with bigger carbon footprints (e.g., desflurane) have been replaced with equally effective alternatives that have smaller carbon footprints (e.g., sevoflurane)
- A recycling system has been put in place which has led to 38% of what would otherwise be trash being recycled
- All hospital lighting has been converted to LED bulbs which are 50-80% more efficient than traditional bulbs
- BMC is working to find a use for used "blue wrap," such as making them into BMC totes
- Food consumed by post-operative patients is put in BMC's biodigester, which turns four tons of food waste into water every month



BMC is also investing in solar energy on a large scale

- In partnership with the Massachusetts Institute of Technology and the Post Office Square Redevelopment Corporation, BMC enabled the construction of **Summit Farms**, a 650-acre, 60-megawatt solar installation on farmland in North Carolina
- Summit Farms is the largest renewable-energy project ever built in the US through an alliance of diverse buyers
- The solar farm has been delivering power into the mid-Atlantic grid since the beginning of 2017
- The solar purchase is equivalent to 100 percent of BMC's projected electric consumption, making BMC the greenest hospital in Boston
- Over the course of the 25-year power purchase agreement, it is expected that 146 gigawatt-hours of emissions-free power per year will result in **the reduction of 119,500 metric tons of carbon dioxide emissions—the equivalent of removing 25,250 cars from the road**



Estimated reduction of 119,500 metric tons of carbon dioxide

Atrium Health

72,500+ Teammates | **39** Hospitals

65 Urgent Care Locations | **39** EDs | **44** Cancer Care Locations



Environmental Sustainability at Atrium Health

On June 30, 2022, Atrium Health's CEO [signed the Health Care Sector Pledge at the White House](#), deepening Atrium's commitment to reduce carbon emissions and make health care facilities more resilient to the effects of climate change.

Atrium Health has committed to achieve carbon neutrality by 2025, and to meet the Biden administration's climate goal of reducing emissions by 50 percent by 2030 and achieving net zero emissions by 2050.

Work is already under way in these areas:

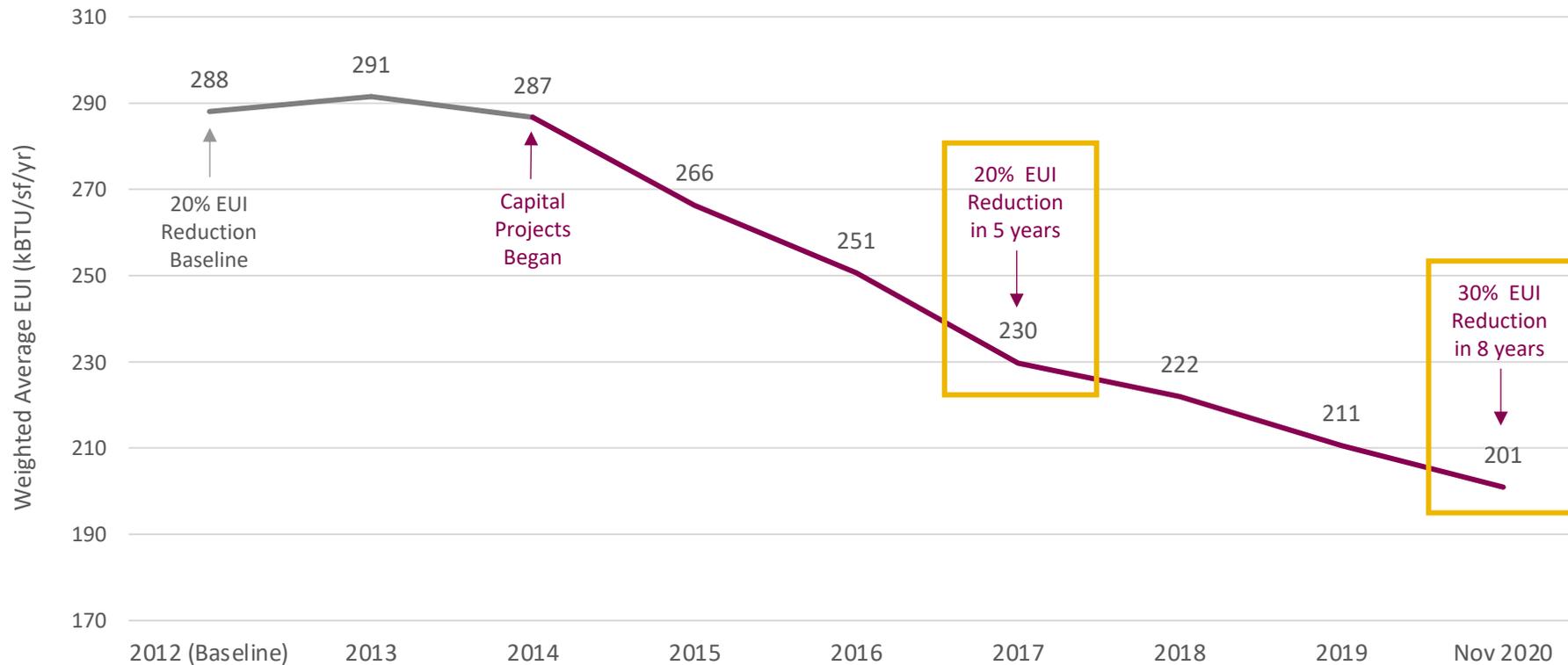
- Emissions reduction from on-site energy use, waste anesthetic gases, vehicle fleets and refrigerants
- The designation of an executive-level leader to spearhead emissions reduction
- An inventory of supply chain emissions
- Development of a climate resilience plan that includes anticipating the needs of the community

One lesson we learned during the COVID-19 pandemic is that health systems have the moral obligation, the social responsibility and the technical skills to lead coalitions that tackle big, complex challenges – including climate change. As a leader in health, hope and healing, we must do everything we can to protect and preserve the environment that sustains our communities.

**- Eugene A. Woods, President and
CEO of Atrium Health**

Energy-driven Emissions Reduction

Weighted Average EUI Trend for Primary Enterprise (27 hospitals)



Energy used in buildings makes up 94% of Atrium's Scope 1 & 2 GHG emissions

Since 2012, Atrium has reduced energy consumption by >30%, thus shrinking its Scope 1 and 2 footprint by >28%



Environmental Sustainability at Atrium Health in 2022



Waste Reduction

- Recycling rate at 25% in Charlotte market
- Reduced 98% of single-use plastic water bottles at 32 locations (incl. Charlotte hospitals)
- Composting food waste is in the planning stage



Energy Efficiency

- Nine (9) facilities are ENERGY STAR certified; avoided \$5.5M in energy expense in 2021 compared to 2012 (enough money to power 7 hospitals)
- Received the [2022 ENERGY STAR Sustained Excellence award](#) (5th year in row)



Air Quality

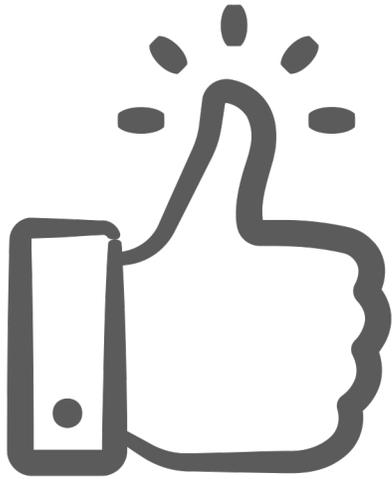
- Designation as a [Tree Campus Healthcare Institution](#) by the Arbor Day Foundation.
- Part of the inaugural class of 16 Tree Campus Healthcare facilities
- Planted and sponsored 340 trees at school tree planting with TreesCharlotte, prepped 800 tree seedlings for giveaways at a COVID vaccine event



Engagement

- Facility-based Green Teams & Sustainability Champions across the Enterprise
- Environmental Action Council with cross-functional task forces
- Public [Atrium Health Environmental Sustainability](#) webpage

Top Lessons Learned



Must have leadership buy in



Data, data, data!



Engagement

Thank You!

Follow up questions may be addressed to

Saadat Khan saadat.khan@stanfordhealthcare.org

Christina Sanborn csanborn@Mazzetti.com

