



CLIMATE RESILIENCE FOR HEALTH CARE AND COMMUNITIES

Strategies and Case Studies

JANUARY 2022



I. INTRODUCTION & PURPOSE OF PAPER

- **Resilience** refers to a community's ability to adapt to changing conditions and recover from a disruptive event. Disruption may be caused by extreme weather, a public health crisis, or other disaster.
- **Equity** is treating an individual or community according to their needs, ensuring that historically marginalized people and disinvested communities—especially people of color, low-income residents, and English-isolated residents—gain access to opportunities and resources and discharge the negative consequences of unsustainability.¹

Since 2020, health care has been at the epicenter of concurrent disruptions. Ushered in by the COVID-19 pandemic and occurring at a time when the country is grappling with a national reckoning on race, these crises have been exacerbated by economic uncertainty and compounded by devastation wrought by extreme weather. COVID-19 has complicated the response to climate disasters and exposed significant disparities in health and economic indicators that cut along racial lines. The pandemic has tested the limits of health system preparedness and crisis management and posed a risk to the financial stability of many institutions. This moment has illuminated the essential role of health care workers and highlighted the importance of accessible health care facilities as critical infrastructure. It has also reinforced the deeply rooted connection between community health, equity, and resilience and a hospital's ability to withstand disaster.

The confluence of events that defines recent years has affirmed the inextricable link between climate, health, and equity. Pollution caused by burning fossil fuels, which is driving the climate crisis, has worsened the effects of the virus on people of color, the elderly, the chronically ill, and low-income communities. These populations are also most vulnerable to the effects of climate change yet have the fewest resources to respond to crises. Climate change is a threat multiplier for all social and environmental factors that contribute to disease and widen inequality. Its effects exacerbate underlying chronic stressors that impact a community's health status and vitality—economic viability, physical environment, and availability of necessary services.

Health systems have care and healing at the core of their mission and are often community anchors, making these organizations critical to building and supporting socially and climate-resilient communities. Health care institutions can leverage their political and economic influence to address social and environmental determinants of health in the communities they serve. It is in the interest of the long-term sustainability of health care and public health for health care institutions to assess and address climate risks in the communities they serve.

Equitable community resilience is achieved through intentional engagement of residents and community leaders, sustained collaborative partnerships, and decision making that prioritizes social and physical infrastructure. To achieve this, health institutions must be reimagined—not simply as decarbonized versions of themselves, but as anchor institutions within healthier, more resilient, and more equitable communities. The sector will need to remake not only its facilities and supply chains but also its relationships with communities, including leveraging system assets to support community health and resilience in the face of climate change.



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Health Care Without Harm works to transform health care worldwide so that it reduces its environmental footprint, becomes a community anchor for sustainability and a leader in the global movement for environmental health and justice.

As detailed in “*Safe haven in the storm: Protecting lives and margins with climate-smart health care*” and “*Building a climate-smart health care system for California (Safe haven)*,” the business case for investing in facility resilience and reducing the carbon footprint of health care facilities is strong. As a follow-up to *Safe haven*, this paper explores how health care institutions can leverage investment dollars and economic capital to support equitable decarbonization to build community resilience, health, and wealth. It is important to note that no single health care facility today fully

embodies what it means to be a climate-smart health system; to which maximally reduces negative impacts of operations, prepares facilities and communities for climate impacts, actively engages in climate policy, and invests deeply and equitably in community resilience. This paper seeks to highlight the important ideas and work of those in the health care sector who are leading this effort in different areas. Their examples begin to create an outline for fulfilling a healing mission equitably while building community and facility resilience to adapt to and recover from climate impacts.



Climate-Smart Health System

- 1 Maximally reduces negative impacts of operations
- 2 Prepares facilities and communities for climate impacts
- 3 Actively engages in climate policy
- 4 Invests deeply and equitably in community resilience

II. SAFE HAVEN

Energy use and the material intensive operations of health care contribute substantially to carbon pollution. Globally, the U.S. health sector makes up 27% of the global health care footprint² and domestically, the health care sector is responsible for 8.5% of total national emissions.³ However, at 18% of the U.S. GDP,⁴ the sector also wields substantial economic influence. Health system investments in energy, transportation, food, waste reduction, and infrastructure can help accelerate a transition to a climate-smart economy.

In the years since *Safe haven* was released, many sector leaders have taken steps to pursue the first three strategies: hardening infrastructure, working to mitigate their carbon footprint, and engaging in local, state, and federal policy discussions. Although efforts may not be fully incorporated into a health system’s climate resilience planning, some leading institutions are investing in initiatives to address determinants of health in the communities they serve. These programs can contribute to social resilience, which better prepares residents for climate impacts.

8.5%

THE U.S. HEALTH CARE SECTOR IS RESPONSIBLE FOR 8.5% OF TOTAL NATIONAL EMISSIONS

Health care professionals regularly confront the human health impacts of climate change, and health care institutions find themselves more frequently at risk of interrupted operations due to climate-induced disasters. Proactive planning results in saved lives and averts disruptions to service and operations. This was the premise of *Safe haven*, which established a four-prong action plan for health system leaders seeking to become climate-smart and resilient:

1. Invest in climate preparedness,
2. Work to reduce their own carbon footprints,
3. Engage in policy discussions, and
4. Invest in community health and resilience.



III. COMMUNITY HEALTH AND RESILIENCE FRAMEWORK

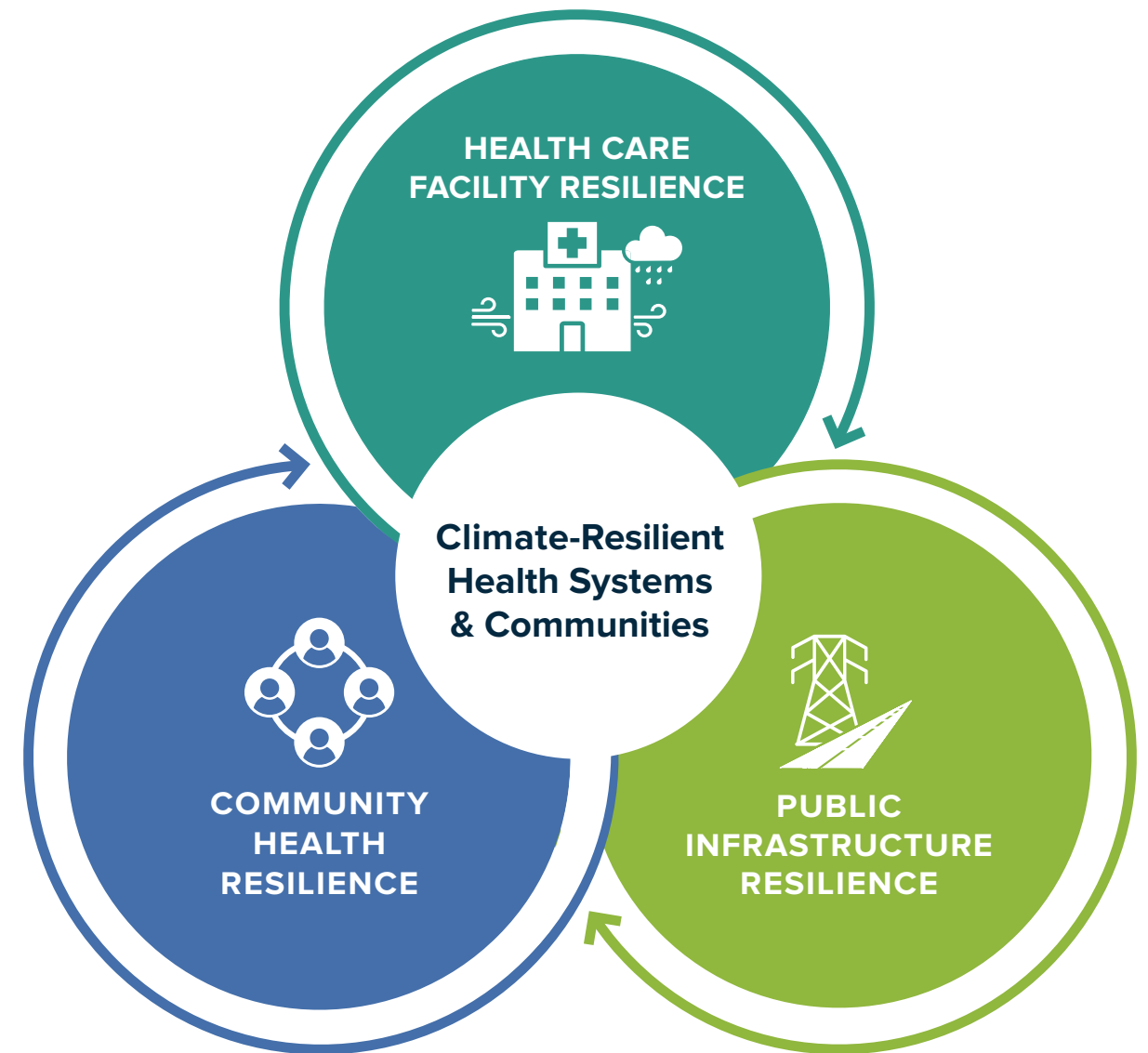
Anchor institutions are “large, usually nonprofit organizations tethered to their communities, like universities, medical centers, or local government entities.”⁵ They can have significant economic and social impacts on the communities they serve, often being the largest employers in the region. As anchor institutions, health systems have both a responsibility and an economic self-interest in making sure their communities are healthy, safe, and climate resilient.

There are three types of resilience that intersect and are mutually reinforcing.

- **Health care facility resilience:** As defined by the Resilient Design Institute, facility resilience is “the capacity to adapt to changing conditions and to maintain or regain functionality and vitality in the face of stress or disturbance. It is the capacity to bounce back after a disturbance or interruption.”⁶ With climate change, extreme weather

events are becoming more frequent and intense. Design thresholds for temperatures, wind velocities, and flooding are being exceeded and extreme weather is lasting longer, so health care facilities must be able to function longer without resupply. Adequate staffing is also critical to health care delivery, as facility staff and their families will also be impacted by extreme weather.

- **Public infrastructure resilience:** The Department of Homeland Security defines critical infrastructure as systems and networks required to maintain normalcy in daily life, such as transportation, commerce, clean water, and electricity.⁷ The ability of infrastructure to withstand disaster means roads are passable, and transportation networks including public transit are operating and accessible. Additionally, it means water and power supplies are functioning, and communication is clear and reliable. Infrastructure failure during



a crisis can be disastrous, but cascading failures can be catastrophic. Health systems need to partner with local and regional governments and other community stakeholders to ensure infrastructure and systems are well prepared for disaster so staff and patients have access to health care facilities and other essential services.

- **Community health resilience:** According to the U.S. Department of Health and Human Services, community health resilience refers to “the ability of a community to strengthen public health and health care systems and to improve the community’s physical, behavioral, and social

health to withstand, adapt to, and recover from adversity.”⁹ By prioritizing support for programs and resources that meet public needs as well as building relationships, hospitals can contribute to improved community health and well-being. Strengthened social connections can help reduce a disaster’s impact on the community.

When addressed collectively, facility and infrastructure resilience—along with resources leveraged to promote community health resilience—can significantly increase the ability to respond to, endure, and recover from crises.



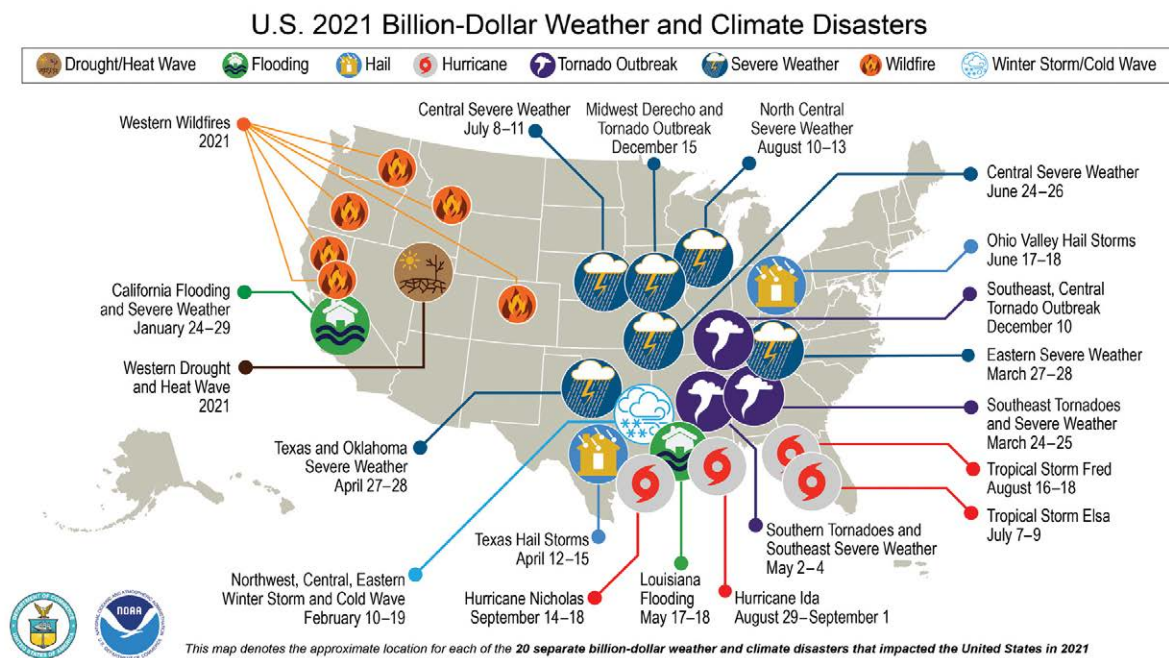
Decarbonization, climate resilience, and health equity can be mutually reinforcing. They are vital transformations that can often be delivered synergistically. If and how the health care sector tackles this will define, to a large degree, its success or failure in taking on the challenges of the 21st century.

– Health Care Without Harm, *Global road map for health care decarbonization*⁸

IV. CLIMATE-DRIVEN WEATHER IMPACTS

Fueled by climate change, extreme weather events are occurring more frequently, heat waves are becoming more relentless, and the wildfire season has become deadlier, longer, and more destructive. According to the National Oceanic and Atmospheric Administration (NOAA), 2021 was the second worst year on record for costly disasters nationwide.¹⁰ Twenty Billion Dollar Disasters—the classification given to weather and climate-related events that caused more than one billion U.S. dollars in direct losses—wreaked havoc on communities across the country, and resulted in a total of \$145 billion in damages and 688 fatalities.¹¹ This followed a record-breaking year in 2020, with 22 billion-dollar weather and climate-related disasters resulting in over \$100 billion in damages and 262 deaths.¹² These large-scale disasters have cost the United States more than \$742 billion since 2017. The annual average for billion-dollar disasters for the most recent five years (2017–2021) is 17.2 events compared with an annual average of 7.4 events for 1980–2021. And the average annual cost of those disasters in the last five years is \$148.4 billion compared to an average of \$51.4 billion from 1980–2021.¹³

On their own, each of these events was costly, but the COVID-19 pandemic undermined disaster response and worsened the impact on U.S. health care. According to FAIR Health, by March 2020, average per-facility revenue for midsize and large health care facilities had declined 5 to 9%.¹⁴ Halfway through 2020, Avalere, a leading health care consulting firm, projected that hospitalizations from COVID-19 could cost U.S. health care systems between \$9.6 billion and \$16.9 billion for the year.¹⁵ By October 2020, nearly 50 hospitals had closed or filed for bankruptcy.¹⁶ The financial fallout and supply chain disruptions caused by the pandemic mirror those initiated by weather disasters and have resulted in unprecedented resource constraints and revenue losses for hospitals. Nearly two years into the pandemic, these losses linger. A February 2021 analysis by Kaufman Hall on behalf of the American Hospital Association projects total hospital revenues to be down approximately 4 to 10 percent, or between \$53 billion and \$122 billion.¹⁷ Rural regions and low-wealth communities—many of which have limited access to health services—continue to be burdened by the most devastating effects of these crises.



Source: NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2022). <https://www.ncdc.noaa.gov/billions/>, DOI: 10.25921/stkw-7w73

V. EXTREME WEATHER’S IMPACT ON HEALTH FACILITIES, PUBLIC INFRASTRUCTURE, AND COMMUNITIES

Climate and health disasters leave health care facilities vulnerable to suspended services, postponed procedures, evacuation orders, inability to treat patients, and closure. Nationwide, public health crises and extreme weather events have strained hospital facilities, stressed staff, and depleted resources. Extreme weather and wildfires have been especially devastating in 2020 and 2021. According to New York Times analysis of Health and Human Services data, by September 2021, one in four intensive care units in the United States were at or near capacity, driven largely by another COVID-19 surge. These facilities were also stretched to the limit by heat-related illness, wildfires, flooding, and other climate-related emergencies.¹⁸

Weather disasters reveal the vulnerability of existing public infrastructure. A single event can severely impact transportation systems, water treatment facilities, telecommunications, and utility distribution networks. The loss of essential services like water, electricity, and transportation can make hospital facilities inaccessible, force them to operate at lower capacity, or cause them to close altogether.

The impacts of extreme weather on health care facilities and public infrastructure can have devastating effects on community health. In the short term, the direct impact of these events increases the need for care and further strains the health care system.

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Infrastructure failures can cause hospitals to close in communities where they are major employers, meaning jobs and local benefits associated with procurement of goods and services are lost. Access to care is also reduced, which can contribute to increased disparity in health outcomes, and population can shrink as people relocate. These impacts are especially acute in rural communities, low-income communities, and communities of color, exacerbating health risks and worsening health and resource inequality disproportionately incurred by low-income residents and communities of color.

The following are examples of extreme events in the last few years that highlight impacts in communities across the country.

HURRICANES

As Hurricane Ida approached southern Louisiana in August 2021, 30 area hospitals were already at capacity with COVID-19 patients. In anticipation of sustained power loss, some health systems preemptively relocated patients from smaller, less resilient rural hospitals to larger facilities that had made more robust investments in resilience.¹⁹ Ida's heavy winds caused structural damage to buildings, including the roof of Lady of the Sea hospital in Galliano,²⁰ and blew down all eight electricity transmission lines maintained by local utility Entergy. COVID-19 patients dependent upon ventilators had to be evacuated in locations where power outages threatened health and safety.²¹ In the immediate aftermath of the storm, one million Louisiana residents were without power and had no clear sense of when power would be restored. With Ida followed by a period of extreme heat, extended power outages exposed already vulnerable residents to the health risks of high temperatures due to lack of air conditioning—at least 10 deaths in the city were due to heat.²²

In 2020, Hurricane Laura led to power outages and water shortages that forced evacuations at 16 area hospitals and extended curtailment of services at the largest hospital in Lake Charles.²³ Similar to Ida, Hurricane Laura set off a series of infrastructure failures that left thousands of residents, many of whom were already suffering the worst economic and health effects of COVID-19, without power or potable water. Residents in Lake Charles and surrounding areas were told to shel-



ter in place while hurricane damage sparked a fire at the BioLab chemical plant, causing the release of highly toxic chlorine gas and highlighting the vulnerability of the region's substantial chemical industry to the climate impacts it has helped fuel.²⁴

New Orleans' Charity Hospital permanently closed in 2005 following Hurricane Katrina. As the region's largest safety-net hospital, Charity's closure significantly impacted the community, workforce, and patient health. Charity was a deeply rooted institution with a history of anchoring health care in the city for nearly three centuries. Initial closure resulted in the loss of 2,600 jobs and the region's only level 1 trauma center.²⁵ It took 12 years for the suite of services provided by Charity to be fully restored at University Medical Center of New Orleans. Tragically, building the replacement hospital required the demolition of a damaged but cohesive low-income neighborhood nearby, and Charity's buildings are still vacant and deteriorating 16 years after Katrina.



WILDFIRES

The United States experienced its most active wildfire year on record in 2020, with California recording five of the six largest wildfires in its history.²⁶ The 2021 Caldor wildfire forced Barton Memorial Hospital in Lake Tahoe to evacuate patients to partner facilities and transfer emergency department services to a sister facility in Nevada.²⁷ In an effort to maintain space for fire evacuees and COVID-19 patients requiring emergency care, medical personnel from Marshall Medical Center in Placerville, Calif., had to treat patients at evacuation shelters. The 2017 Tubbs wildfire forced the evacuation of 122 patients from Kaiser Permanente Medical Center in Santa Rosa to another nearby Kaiser Permanente hospital. Kaiser Permanente undertook similar patient evacuation procedures during the 2019 Kincadee Wildfire²⁸

EXTREME HEAT

Extreme heat kills more Americans every year than any other weather-related disaster.²⁹ All areas of the country are experiencing longer stretches of hotter temperatures, and the trend will continue to worsen. Due to the history of racist redlining in the United States, low-income neighborhoods with historically predominantly Black and immigrant populations have fewer trees and green space, resulting in temperatures on average five degrees hotter—and in some cases nearly 13 degrees hotter—than wealthier neighborhoods in the same cities.³⁰ During heat waves, residents in these neighborhoods are more likely to experience heat-related illness that requires emergency care at hospitals.³¹

In parts of the country that have historically been temperate, many residents do not have air conditioning, and health systems are not prepared to handle the influx of patients during extreme heat events. The heat waves that gripped the Pacific Northwest in the summer of 2021 triggered a surge in emergency room visits. In the span of five days, from June 25 to 30, approximately 175 record-high temperatures were set in northern California, Oregon, Washington, and Idaho. In the same period there were nearly 2,800 hospital emergency department visits in the region, including 1,038 heat-related ED visits on June 28.³² These high patient numbers challenged hospital capacity at many facilities and drew comparisons to the earliest days of the pandemic.

FLOODING

Emergency services and hospitals in much of the United States will face severe flooding over the next 30 years that will render their systems inoperable for extended periods of time. In Houston, Texas, alone, “there are 770 hospitals, public utilities, and water treatment plants at risk of flooding above their operational threshold this year.”³³

Hurricane Ida caused one of the worst flooding disasters in the Northeast, overwhelming infrastructure, flooding homes, and leading to at least 50 fatalities. Thirteen of the deaths were in New York City, where low-income residents became trapped in illegal basement apartments.³⁴ A once-in-a-generation flash flood in June 2020 forced the evacuation of more than 100 patients at Norwood Hospital in Massachusetts and temporarily trapped two people.³⁵ Eighteen months later, the hospital has not reopened, and construction on a new facility has not yet begun. Local emergency medical response is strained with the fire department supplementing

ambulance transportation to other hospitals. The trip to an alternate facility can take up to four times longer, increasing the risk of morbidity and mortality for patients with time-sensitive conditions. Local municipal planning has also been impacted, as wear and tear of emergency vehicles has been accelerated and maintenance and fuel budgets have been prematurely exhausted.³⁶

The 2019 Midwest floods resulted in hundreds of people being displaced from their homes, and impassable roads made emergency and health services inaccessible, which had a disproportionate impact on Indigenous and rural communities. Hospitals sustained damage and several long-term care facilities were forced to evacuate, with some closing permanently. Infrastructure failures increased residents’ risk of disease with the contamination of town wells and other drinking water sources. The region also suffered economic impacts with the death of thousands of livestock and the flooding of millions of acres of farmland.³⁷

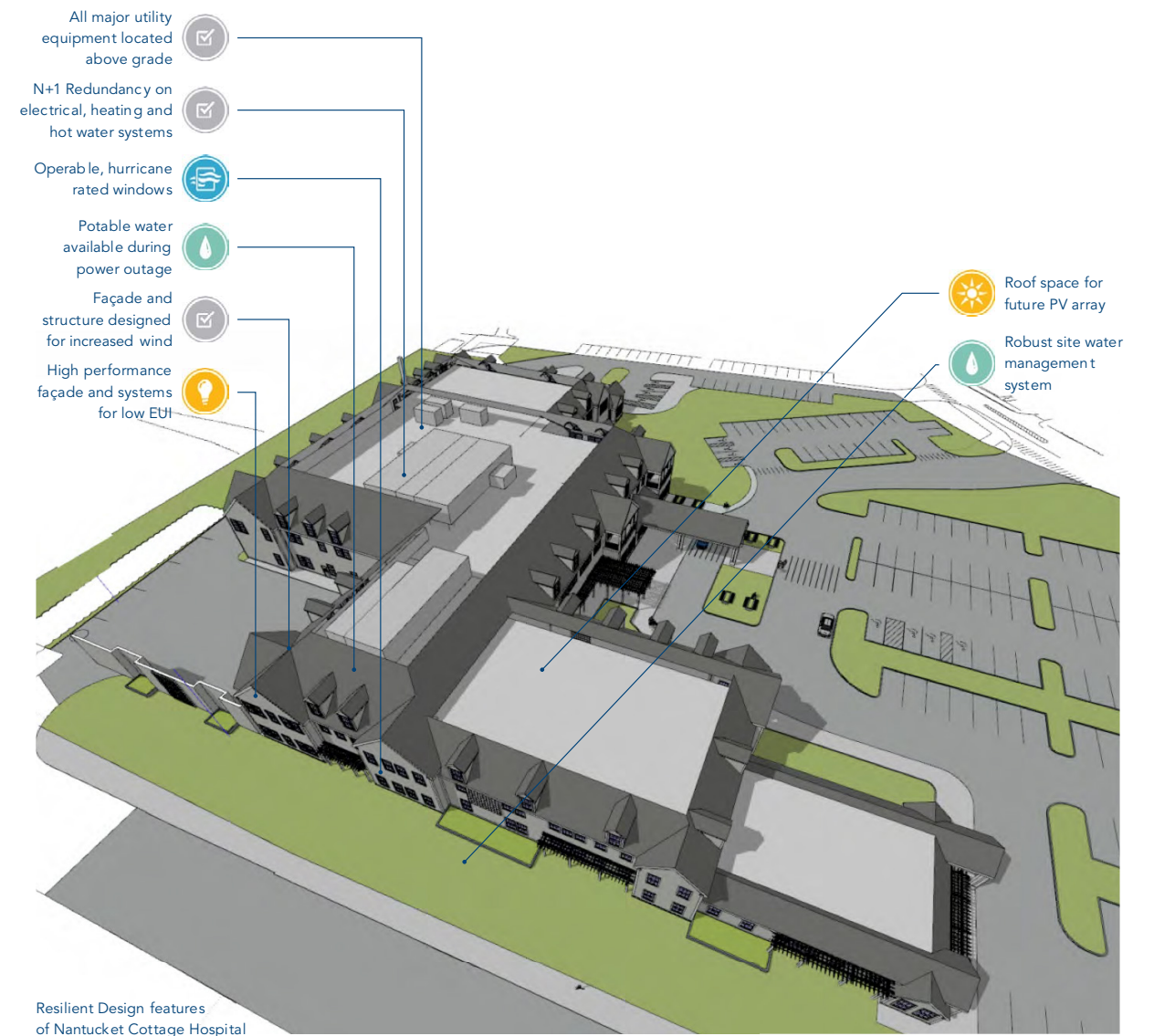


DESIGNING AND BUILDING FOR CLIMATE RESILIENCE

Poor resilience of critical public infrastructure, including health care facilities, can complicate and even prolong disaster response and recovery. Investment in both are complementary and should be coordinated to ensure operability and accessibility during a disaster and minimize impacts of cascading failures. Health systems are beginning to understand how to make their facilities climate resilient and the benefits of doing so. Every health facility requires its own geographically appropriate solution, but all must assess future environmental

conditions due to climate change, invest in materials to withstand extremes, secure critical equipment, incorporate redundancy, and design for adaptability.³⁸

It is less clear how to best leverage hospital resources to shore up communities in a way that mitigates health impacts of climate events while strengthening social and community resilience. The remainder of this paper will explore efforts of health systems to build more resilient communities.



Source: Cavanaugh, M. and B. Farbstein. "DESIGNING RESILIENT HOSPITALS THAT SAVE LIVES AND ADAPT TO A CHANGING CLIMATE" <https://www.cannondesign.com/assets/HC-Resilient-Hospitals-Final.pdf>

VI. MODELS OF INVESTING IN COMMUNITY RESILIENCE

The urgency of the climate crisis and compounding events underscore the need for hospital systems to prioritize and invest in local resilience measures that go beyond hardening of infrastructure to support engagement, coordination, and collaboration with community partners. To bolster community resilience and lessen financial and operational impacts of climate disasters, health systems must proactively invest in building community health and wealth. They can help restore self-determination for residents through engagement and processes that are transparent and inclusive.

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There are several ways health care institutions can act as anchors for community health and resilience. Health care can enable communities to better prepare for, adapt to, endure, and recover from extreme weather events and public health crises brought on by climate change. Health systems can build and support climate and social resilience in the following ways:

1. Leverage their purchasing power to procure products and services from local, diverse, and sustainable businesses to create robust, equitable, and resilient local supply chains that support the transition to a low-carbon economy.
2. Support workforce development, including prioritizing local hiring and employee retention, building job skills, educating and preparing staff, advancing resilience in the facility, and supporting economic resilience in the community.
3. Identify and address community health needs that make people more vulnerable to climate impacts such as lack of access to air conditioning, use of powered medical devices or refrigerated medicines. Plan for patients who have chronic medical conditions exacerbated by climate impacts or that require regular access to medical care such as dialysis or methadone.
4. Invest directly in affordable healthy housing, energy efficiency and weatherization, the local food economy, community renewable energy, and clean transportation.
5. Leverage institutional political capital and an outsized, credible voice to champion policies and programs that promote environmental and racial justice.

Highlighted in the next section are examples of established programs from nonprofit organizations and new initiatives from leading health care institutions to address determinants of health or meet an identified community need. These efforts include components of a community resilience strategy that can and should be replicated and expanded upon to explicitly support community health.



VII. ESTABLISHED INITIATIVES AND CASE STUDIES

Anchors in Resilient Communities (ARC) and the impact purchasing commitment (IPC) are notable initiatives designed to reorient hospitals to work in partnership with their communities to direct procurement and investment dollars towards community health, wealth, and climate resilience. Tree Campus Healthcare provides another way for hospitals to support climate resilience. In the face of extreme heat, tree canopy is a critical component of community health infrastructure. Health systems can invest in tree planting in urban heat islands to support resilience.

• **Anchors in Resilient Communities** was established in 2013 by Health Care Without Harm and Emerald Cities Collaborative to engage hospitals and other anchor institutions to work in collaboration with their communities to develop strategies for how anchor assets and procurement can influence upstream interventions for health. *Anchors in Resilient Communities'* first project, the Regional Food System Initiative, aims to strengthen the local food economy in California's East Bay by creating living-wage jobs and food sector business opportunities to build community wealth in under-resourced communities of color. The Union City Culinary Center opened in January 2021

and at capacity will deliver 50,000 ready-to-eat meals each day to anchor institutions throughout northern California, sourcing food from diverse local farmers and food entrepreneurs of color.

• **Impact Purchasing Commitment** was created by hospitals of the Healthcare Anchor Network in partnership with Practice Greenhealth and Health Care Without Harm to integrate health system strategies on local, equitable, and environmentally sustainable procurement. *This comprehensive purchasing commitment* made by 12 systems directs health care purchasing toward industries that decrease their carbon footprint, produce safer products and services, and grow economic opportunities for people of color- and women-owned businesses by at least \$1 billion over five years.

• **Tree Campus Healthcare** recognizes health institutions that make a mission-aligned impact on community wellness through tree education, investment, and community engagement. *The program* provides a framework for health care facilities to invest in tree planting on their campuses and in their communities to reduce health and equity impacts of extreme heat.

CASE STUDY: Building resilient, climate-smart energy systems with Kaiser Permanente

While market and regulatory barriers remain to be overcome, microgrid pilot projects undertaken by Kaiser Permanente have begun to chart a course for health facilities to achieve full decarbonization while ensuring continuous care to patients during emergencies, improving air quality and public health, and serving as anchors for more resilient communities in the face of a changing climate.

Due to California's extreme wildfires over the past four years, the state has authorized utilities to implement public safety power shut offs in response to extreme weather conditions, which can cause high fire risks. These risks have been brought on by historic droughts fueled by climate change, along with low humidity and high winds that have resulted in downed power lines sparking wildfires across the parched state.

In late October 2019, power shut offs impacted 14 health care facilities and campuses run by the state's largest health care system, Kaiser Permanente, forcing those facilities to either close or restrict operations. Many vulnerable patients in communities served by these facilities also lost power. Hospitals were able to continue providing care by relying on diesel backup generators for emergency power, but all surgeries were postponed or relocated. Reducing hospital services is significant, but shutting down medical offices for days at a time also has a serious impact. Most medical offices don't have generators, and the cumulative impact of patients delaying or foregoing routine care cannot be underestimated.

Resiliency also comes at a cost to both Kaiser Permanente and the surrounding community. Diesel generation is expensive, creates harmful pollution, and emits greenhouse gas emissions that fuel drought conditions. Leaders at Kaiser Permanente decided there had to be a better way. Pursuing their mission of care meant finding ways to provide essential health services without contributing to climate change and air pollution, even during climate-fueled natural disasters.

To mitigate health care's contributions to climate change while increasing the resilience of facilities and their communities, Kaiser Permanente participated in two California programs to pilot a new approach to keeping the lights on with sustainably powered microgrids.

Microgrids are not new in health care. In fact, regulations require every hospital to be able to disconnect from the grid and run on diesel backup generation in the event of a power outage. What makes Kaiser Permanente's green microgrid approach groundbreaking is primary backup power that comes from renewable solar energy and large-scale battery systems instead of diesel generation. In addition to providing carbon-free backup power, green microgrids can provide "peak shaving" services to the community, reducing strain on the grid and helping avert blackouts without contributing to air pollution and climate change. While diesel generators sit idle 99.9% of the time, these solar battery microgrids can provide valuable services to the facility and the grid every day.

In 2017, Kaiser Permanente deployed its first renewable energy-based microgrid as a pilot project at its Richmond, Calif., hospital. Kaiser Permanente's Richmond pilot combined a 250 kW onsite solar array with a 1 MWh lithium-ion battery and was funded through a \$4.7 million grant from the California Energy Commission. While regulations require that the facility keep diesel generators as its primary backup power source, the microgrid serves as a successful proof of concept, providing emergency backup power to the hospital's life-safety branch.

250 kW

ONSITE SOLAR ARRAY FOR KAISER PERMANENTE'S FIRST RENEWABLE ENERGY BASED MICROGRID

Emboldened by the success of the pilot, Kaiser Permanente is working with California regulators to expand green microgrid deployment to facilities in Ontario, Santa Rosa, and many other locations around the state. The Ontario project will be much more ambitious in both scale and impact, combining a 2 MW solar array (8 times larger than Richmond) with a 9.5 MWh battery (9.5 times larger) with an \$8 million grant from the California Energy Commission (1.7 times larger). These larger solar and battery systems may also be combined with existing fuel cell installation to provide primary backup power to the facility. This means only one of four existing diesel generators would be required to operate in stand-by mode if the grid goes down to provide the facility with a last line of defense.

Kaiser Permanente is now in the process of developing at least 10 other renewable energy microgrid projects at facilities across the state, some paired with fuel cells that run on natural gas. In the case of medical office buildings where diesel backup is not required by law, battery systems have potential to provide fossil fuel-free power, as well as contribute to energy grid resilience without increasing air pollution. At medical offices that do have generators, a few are being replaced with battery systems when the generators reach the end of their life, a pattern that's likely to expand.

While market and regulatory barriers remain to be overcome, these pilot projects have begun charting a course for Kaiser Permanente to accelerate decarbonization at its facilities while ensuring continuous care for patients during emergencies, improving air quality and public health, and serving as anchors for more resilient communities in the face of a changing climate. ■



CASE STUDY: Housing support, food pharmacy, and Nubian Square Market – Boston Medical Center

Guided by a commitment to community and population health, Boston Medical Center's (BMC) place-based investment and food programs are an excellent example of how—through sustainable efforts, community partnerships, and cross-organizational coordination—a hospital can make an immediate difference in the community while establishing enduring social infrastructure that can support the community over time, including during a crisis.

Boston Medical Center is the largest safety-net and level 1 trauma center in New England. In 2017, BMC challenged leaders to consider what their anchor institution could do over the next decade to have a substantial positive impact on the community. The result was to reimagine the hospital's approach to community health and resilience along with a vision to "make Boston the healthiest urban population in the world" by 2030. Housing instability and food insecurity were identified as two top challenges facing BMC's patient population, so stabilizing housing and addressing nutritional health became core to achieving a healthy population and building a resilient community.

Place-based investing

BMC is committed to strengthening the community through targeted, project-based investments and bolstering the broader ecosystem by collaborating with community partners, stakeholders, and other health care institutions. Diversity spending has increased from \$2 million in 2018 to more than \$20 million in 2019, indicating the hospital's intentional approach to driving impact through investment in solutions aimed at social determinants of health.

Since 2017, the hospital has made a concerted effort to improve community health and patient outcomes through housing stabilization, including by dedicating nearly \$7 million determination of need³⁹ dollars to support 12 partner projects. BMC's greatest contribution to community resilience is strengthening the local

ecosystem through targeted investment, which is why the hospital seeks to preserve housing affordability by investing "thematically in partnership" with trusted community-based organizations and other health care facilities rather than becoming a landlord or housing developer. Through this work, the hospital has forged deep partnerships with community organizations, including housing advocates and community development corporations. Early in the pandemic, these relationships were leveraged to push for statewide housing protections during the COVID-19 pandemic. Together with housing partners and other hospitals, BMC was among the first to advocate for a statewide eviction moratorium, credibly connecting housing and health for policymakers. As a result, Massachusetts was one of the first states to enact a housing moratorium, passing some of the strongest protections in the nation.

Nutritional health

Nourishing Our Community is a three-part program aimed at tackling malnutrition, hunger-related illness, and food insecurity (a priority detailed in BMC's community health needs assessment) by increasing access to nutritious, locally grown and sourced foods. It includes a *preventive food pantry* (2001), a *teaching kitchen* (2003), and a rooftop farm (2017).

Prior to the COVID-19 pandemic, 17% of Boston adults experienced food insecurity.⁴⁰ These numbers rose dramatically once the virus set in, with food insecurity



in Boston increasing by 59%. Each month approximately 7,000 patients and family members receive food prescriptions filled at the pantry, totalling nearly 75,000 greater Boston residents per year. Twenty-five crops are grown in the 2,658-square-foot farm that produces more than 5,000 pounds of produce annually for hospitalized patients, cafeterias, employees, and the food pantry. Patients can learn how to prepare healthy meals through classes offered at the teaching kitchen.⁴¹ The hospital's commitment to local food production is also connected to larger efforts to transform the regional food system while supporting local economies across the state. Because of BMC's established social network and community connections, the hospital was able to pivot during the pandemic to ensure families most in need continued to receive food through delivery, while many more benefited from food-focused programs offered virtually.

Nubian Square Market

In 2022, a community grocery initiative with a mission to improve food access and health will open in Nubian Square. This community is the commercial hub and local business district at the heart of Roxbury, a predominantly Black, Latinx, and Asian neighborhood in Boston that represents approximately 8% of the city's population. In Roxbury, 36.1% of residents live below the federal poverty line⁴² and many struggle to meet basic needs, which contributes to poor health outcomes.

Nubian Square Market will provide healthy, locally sourced food for Roxbury residents. BMC provided a \$1 million no-interest loan to community partner Nuestra Comunidad to outfit the market location. This represents the culmination of BMC's commitment to supporting community resilience through stakeholder collaboration and place-based investing. BMC has also leveraged relationships with food suppliers and used its procurement power to reduce operating costs and ensure fresh, quality food products are available to the community. ■

CASE STUDY: Clark-Fulton/MetroHealth EcoDistrict – MetroHealth System

MetroHealth System has leveraged its once-in-a-generation \$1 billion campus redevelopment project to help revitalize the Clark-Fulton neighborhood on Cleveland’s west side. By the end of 2021, the Clark-Fulton/MetroHealth EcoDistrict will become the first hospital-anchored certified ecodistrict in North America, moving the hospital closer to establishing a model of community resilience that can be scaled across the MetroHealth network and an approach to people-centered community planning to improve patient health outcomes and health equity nationwide.

• An **ecodistrict** is a neighborhood that has been planned or redeveloped with an eye towards sustainability and equity. *The ecodistricts protocol* “provides a flexible, holistic, and rigorous ‘how to’ framework for organizing and achieving important public policy, sustainability, and investment goals.”⁴³

MetroHealth System operates four hospitals, four emergency departments, more than 20 health centers, and 40 additional sites across Cuyahoga County, Ohio, an area with some of the highest rates of health and income disparity in the state. Two-thirds of the 300,000 MetroHealth patients cared for each year are uninsured or covered by Medicare or Medicaid. As the region’s public hospital, MetroHealth is committed to addressing climate-driven health challenges and improving health outcomes for all residents in northeast Ohio—especially low-income communities and communities of color—beginning with the neighborhoods where its facilities are located.

In 2018, a \$1 billion redevelopment project⁴⁴ at the hospital’s main campus created an opportunity to build a modern, climate-resilient facility while leveraging community investments to improve health outcomes for residents of Clark-Fulton, where MetroHealth’s main campus has been an anchor for more than 150 years. The neighborhood is roughly one square mile and home to nearly 13,000 predominantly Black and Latinx residents, many of whom suffer chronic disease and have some of the poorest health outcomes in Cleveland.

Those outcomes are tied to social determinants such as poverty, unemployment, housing instability, food insecurity, poor access to health care, lack of green space, and community trauma. Planning for the new Glick Center and main campus is a catalyst for neighborhood revitalization that coincides with the launch of Mayor Frank Jackson’s neighborhood transformation initiative, Clark-Fulton’s community master plan led by local community development corporation MetroWest.⁴⁵

At the direction of president and CEO Dr. Akram Boutros, MetroHealth prioritized a collaborative, neighborhood-led planning process rooted in sustained community engagement. MetroHealth has always taken its role as an anchor institution seriously by leveraging its influence as a coalition builder and convener. This experience was beneficial as the hospital began to pursue ecodistrict certification. Once attained, ecodistrict certification is maintained through ongoing reporting and monitoring of key metrics that are identified and agreed upon by a core group of stakeholders.

STEP 1: AGREEMENT – IMPERATIVES COMMITMENT

MetroHealth leveraged its convening power as an anchor institution and relied upon the grassroots advocacy of the local community development corporation to bring together residents and neighborhood leaders, community-based organizations, and local



elected officials with the goal of desiloing the neighborhood planning process and restoring ownership to the community. This group made commitments to core imperatives, established their shared values, and determined metrics used to evaluate progress over time.

STEP 2: DECLARATION OF COLLABORATION

Because community ownership helps maintain momentum, MetroHealth and partners were intentional about ensuring residents and community members can provide feedback and have a meaningful impact. The Clark-Fulton core team was composed of three community residents, five community ambassadors, MetroWest Community Development Organization, Ward city council representative Jasmin Santana, the city of Cleveland, Cleveland Foundation, and MetroHealth. Together the team *agreed to pursue a neighborhood master plan* in tandem with the ecodistricts planning process.

STEP 3: CERTIFICATION AND ROADMAP

The Clark-Fulton core team worked to finalize the neighborhood master plan and develop a *roadmap* for implementation. Additionally, informed by community input, the core team developed systemic metrics to measure progress. These will be included in the implementation strategy that is the underpinning of certification for the Clark-Fulton/MetroHealth EcoDistrict.

From the outset, MetroHealth sought to use its investment in a state-of-the-art facility to lift the neighborhood it anchors and bolster community resilience by addressing social determinants of health. Rather than imposing a vision on Clark-Fulton, MetroHealth has partnered with residents, neighborhood leaders, the Community Development Corporation, community-based organizations, and elected officials to help the neighborhood define and achieve its vision. The process to secure ecodistrict certification and develop the neighborhood master plan was comprehensive and rooted in community. One measure of success is a framework and social infrastructure for collective impact that can sustain dialogue and transparency over time. Ultimately, the goal is to revitalize a neighborhood, strengthen the hospital’s connection to the community, and improve health outcomes for the residents of Clark-Fulton neighborhood. ■



CASE STUDIES:

Hospitals advancing health access and addressing health inequity through transportation decarbonization

As health care facilities think about mitigating climate change, ensuring continuity of care, and protecting their facilities and communities from impacts such as extreme storms, flooding, heat waves, and wildfires, it is critical that plans extend to transportation systems. Many health care systems have recognized opportunities to improve community health and resilience through transportation initiatives. Work underway at University of California San Francisco (UCSF) Health and UCSF campus, Rochester Regional Health, and Inova illustrate how health care is rethinking transportation systems and exploring opportunities to reduce GHG emissions and associated pollution while improving health care access and encouraging active transportation options that can improve health outcomes.

UCSF Health and UCSF campus: Electrifying transportation systems

Like hospitals across the country, UCSF Medical Center maintains a fleet of shuttle buses that bring patients and staff to their facility and move people around their campus while also serving as critical connectors to the Bay Area's public transportation systems including subway, bus, and rail. Every year UCSF shuttles carry roughly 2.5 million passengers and travel nearly 1 million miles. While these shuttles are a critical part of delivering world-class care to UCSF patients and removing commuter vehicles from the road, they also create more traffic, and emissions from their diesel and gas engines contribute to climate change and harm the health of the community.



Leaders at UCSF knew they could do better. They set out to reimagine this critical connection between their facility and the community and find solutions that improved the rider experience, reduced community impacts, advanced their mission to improve public health, and helped them achieve their goal of being carbon neutral by 2025. After much consideration, one key solution emerged: an all-electric bus fleet.

Electric shuttle buses offer a number of advantages over their diesel and gasoline counterparts. They are quieter, cleaner, and better for the environment, and they offer much lower maintenance costs. The models UCSF chose also allowed them to carry more passengers, reducing the number of trips needed and helping reduce local traffic congestion.

In 2018 UCSF began phasing in a new 15-bus all-electric fleet that will reduce emissions by 60 metric tons of CO₂ per year and help improve air quality in the community. These 30-foot buses, built by Los Angeles-based BYD at their Lancaster, Calif., facility, can travel 135 miles between charges and fully recharge in less than three hours. They also include bike racks to make people-powered transportation more accessible and attractive in hilly San Francisco. Based on the success of this program, UCSF is now 28% of the way toward transitioning to a fully electric fleet, leading all other university and health care facilities in the UC system.



60 MT OF CO₂ PER YEAR REDUCTION FROM ALL-ELECTRIC BUS FLEET

Since 2018 the electric buses have performed at or above expectations, resulting in a quieter ride, cleaner air, less carbon emissions, reduced maintenance costs, and happier drivers. UCSF's leaders are beginning to explore how their growing electric fleet could play a central role in future resilience efforts. Since electric buses are essentially large batteries with wheels, when not in use they could theoretically be used to provide backup power, eliminating the need to run diesel generators. They could also be tapped by the grid to help prevent power outages and displace dirty peaking plants, helping make San Francisco's electric grid cleaner and more reliable for all.

Rochester Regional Health: Building electric vehicle infrastructure beyond facility walls

Rochester Regional Health is another system embracing a healthier, more sustainable transportation system. The healthiest and most sustainable transportation modes are powered by people. Partnering with Reconnect Rochester, a local nonprofit that champions alternative transportation, Rochester Regional developed a program to encourage staff to bike to work. They also installed bike racks and ran a campaign to encourage bike commuting,

which included a map that showed how much of the city could get to their campus by bike in 20 minutes or less.

They also knew that not everyone is willing or physically able to bike to work—and that even those who were willing in the spring or summer might not want to brave upstate New York winters on two wheels. To reduce emissions from those who drive to the facility, Rochester Regional Health helped make it easier for drivers to go electric. They launched an initiative in 2018 to install 90 charging stations across the health system for staff and patients to use. The program was so successful that they launched another program to install an additional 41 charging stations in 2021. These stations allow drivers to charge their batteries at work for roughly \$13, far less than it would cost to fill up a gas tank.

Electric vehicles are a great way to reduce carbon emissions, but the upfront cost of EVs can serve as a barrier to accessing clean mobility. While installing charging stations is key to promoting EV use, improving transportation equity is critical to addressing health and economic inequalities. This requires innovative thinking to address economic barriers to electric transportation. When the city of Rochester and Mobility Development Partners approached Rochester Regional Health with an innovative partnership to expand EV access in underserved communities, the health system's leadership embraced the opportunity.



That is why Inova joined Champions of the Commute, an initiative of the Greater Washington Partnership, a civic alliance with many of the capital region's largest employers as members. Champions of the Commute aims to reduce traffic congestion and pollution by increasing transit use and building a better, more accessible transit system for all residents in the region. Inova's participation in the initiative was facilitated by the system's CEO, who serves on the organization's board of trustees, and is managed through Inova's government affairs and sustainability teams.

Together, these partners developed a program called *FloShare* with the goal of increasing access to affordable, reliable, low-carbon transportation through a low-cost EV car sharing program. Rochester Regional's St. Mary's Medical Center is located in one of the communities the city had identified as most in need of additional transportation options. The hospital agreed to host FloShare EVs at several of their charging stations on campus. These shared vehicles are available to the community for rent by the hour or by the day, and rentals include insurance so they are accessible to people who don't typically drive.

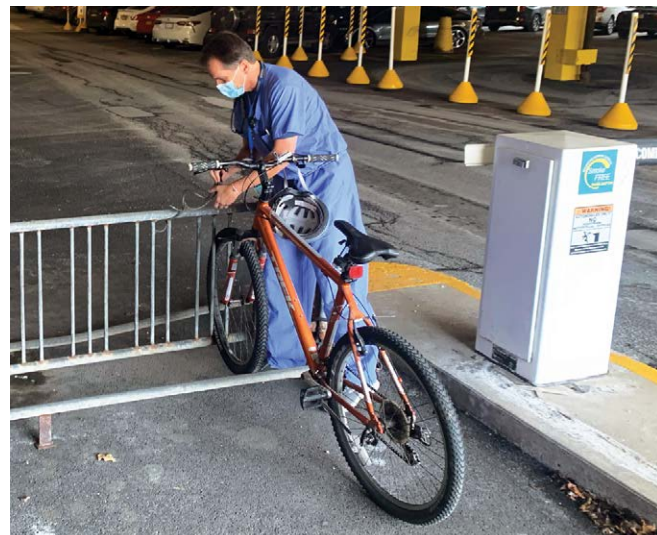
By thinking beyond the walls of their health facilities and embracing innovative community partnerships, Rochester Regional is not only reducing harmful air pollution and carbon emissions that contribute to climate change, they are helping ensure every member of the community is able to participate and share in the benefits of the green economy they are helping grow.

Inova: Improving transit for staff and community through regional planning and partnerships

From its very start, the sustainability team at Inova, a health care system in Northern Virginia, has made transportation a top priority. The growing capital region (greater Washington, D.C., Baltimore, Md., and Richmond, Va.) is known for traffic congestion, and with that comes harmful air pollution and carbon emissions. Inova has long worked to address that issue by encouraging their employees to use public transportation, but they also recognize solving regional transportation challenges must be a team effort built on strong partnerships with local governments, other major employers in the region, and the communities they serve.

The initiative decided to focus on two pilot initiatives: encouraging EV adoption and mass transit use. For commuters who are unable to take transit to work, Inova installed several EV charging stations to encourage employees to swap their internal combustion engines for cars powered by electric motors. Encouraging EV use helps reduce carbon emissions and air pollution but does little to address traffic congestion or make transportation more equitable.

Enter the Greater Washington Partnership's transit program. Inspired by the ORCA pass in the Seattle region, this program will encourage transit use through a bulk pass and will be open to everyone in the region. It allows riders, including Inova employees and patients, to buy one pass that will give them access to the 12 different transit systems that serve the region. This pilot will benefit Inova by lowering administrative burdens associated with transit benefits, providing potential savings



to the organization on a per-trip cost, making it easier for employees to use transit, supporting sustainability goals, and reducing traffic congestion and harmful air pollution.

By taking this approach, Inova will not only help reduce carbon and traffic congestion by incentivizing transit use, they will also help build a stronger transit system in the region by increasing ridership and funding for the many transit agencies that serve the capital region. Beyond the bulk transit pass pilot, Inova and the Greater Washington Partnership are working with transportation agencies to better integrate their services. They are also working with government agencies to address funding and planning needs so the 12 different systems

in the region can work together to make commuting by transit a better experience and encourage ridership.

While the development of the program has been delayed by the pandemic and the shift to telehealth, which also reduces traffic and emissions, Inova remains committed to simplifying transit programs and expanding transit access for all. By prioritizing public transit through this innovative partnership, Inova hopes to encourage transit ridership beyond facility walls, leading to further emissions reductions and higher-quality transit systems that can provide expanded economic opportunities and improve quality of life for riders across the region. ■



CASE STUDY:

Live Well Springfield, Public Health Institute of Western Massachusetts, and Pioneer Valley Planning Commission

For more than a decade, Live Well Springfield, a robust coalition of diverse partners, has worked to advance community health and well-being in Springfield, Mass. LWS is an excellent example of how trust-based relationships between residents and community groups, government, and organizations can be leveraged to meet community needs, galvanize grassroots movements, and create collective action to achieve policy, environment, and systems changes, as well as solutions to health equity.

Live Well Springfield (LWS) is a multi-sector community-based coalition founded in 2007 by the Public Health Institute of Western Massachusetts (formerly Partners for a Healthier Community, Inc.) to address childhood obesity. It has evolved over time to include housing solutions, age-friendly environments, and climate action and resilience with a focus on climate justice. LWS membership has also evolved and includes residents, grassroots organizers, health care systems, local health insurer Health New England, Caring Health Center (an FQHC), higher education, childcare providers, local government, housing, policy councils, the regional planning agency, health equity organizations, food producers, refugee and immigrant service providers, youth development groups, and social service agencies.

Mercy Medical Center-Trinity Health of New England and Baystate Health—whose presence in the community date back to 1873 and 1883, respectively—are committed to supporting efforts to reduce health disparities, including investments to promote community wellness and improve access to care for priority populations. Together with Health New England, these health systems have underwritten LWS since its inception. The spirit of collaboration and cooperation (backed by funding, technical assistance, capacity building, and physician champions) that Baystate Health and Mercy Medical Center bring to LWS is extremely important and transformative. Both have provided unrestricted grants to many coalition members, supporting capacity building for key partners and further strengthening the coalition.

Located in Hampden County, Springfield is the third largest city in Massachusetts and fourth largest in New England. It is an economic center anchored by higher education and health care institutions. Like other gateway cities in Massachusetts that experienced decades of disinvestment, the city is culturally rich but faces social and economic inequities and environmental pollution that contribute substantially to poor health outcomes overall.

Many residents struggle to meet basic needs. Almost 27% of Springfield residents and 13.8% of county residents live in poverty, compared to 9.4% statewide.⁴⁶ Hampden County has the highest rate of homelessness in western Massachusetts. Together with neighboring cities Holyoke and Chicopee, Springfield has particularly high rates of food insecurity, which affects up to 20% of residents in some neighborhoods. Air pollution is detrimental to the health of local residents, especially low-income residents and residents of color who are consistently at higher risk of complications such as respiratory illness and chronic disease.⁴⁷ Springfield is consistently designated by the Asthma and Allergy Foundation of America as one of the most challenging places for asthma sufferers to live.⁴⁸ The risk of developing cancer from breathing toxic air is 80% higher in Springfield than elsewhere in the state.⁴⁹

Since its inception, LWS has been working to build and sustain a culture of health. Over 15 years, great strides have been made with ongoing collaboration

and community engagement. Achievements include the creation of farm-to-preschool program, the founding of the Springfield food policy council, passage of a community gardening ordinance, expansion of the city's zoning ordinance to include urban agriculture, a citywide complete streets plan and policy, the city's first on-street bike lane, increased usage of the Connecticut River and the 3.2-mile riverwalk/bikeway, evolution of the Go Fresh mobile market including fresh food prescriptions from health centers, increased awareness of food deserts, the passage of tobacco 21 policy statewide, and both city and health care age- and dementia-friendly designations. The formal structure of Live Well Springfield also enables initiatives or topics that originate with individual members to be pursued and executed efficiently.

In 2017, funding from Tufts Health Plan Foundation supported the creation of an age- and dementia-friendly citywide plan and multiple designations. The age-friendly work was also critical in supporting the important creation of a resident advisory council to provide ongoing input on strategies and policy action, including climate justice work.

The Springfield Climate Justice Initiative originated with Arise for Social Justice, a grassroots environmental justice organization and partner in LWS, and Pioneer Valley Planning Commission (PVPC) focused on addressing health impacts of climate change on low-income residents. Because it fit well with the LWS model, the work moved forward seamlessly. In 2021, the Kresge Foundation awarded LWS a \$600,000

\$600,000

GRANT AWARDED TO LWS FROM THE KRESGE FOUNDATION, ADMINISTERED THROUGH THE PUBLIC HEALTH INSTITUTE OF WESTERN MASSACHUSETTS (PHIWM) TO SUPPORT THE LIVE WELL SPRINGFIELD CLIMATE JUSTICE INITIATIVE

grant administered through the Public Health Institute of Western Massachusetts (PHIWM) to support the Live Well Springfield Climate Justice Initiative. Members of the LWS coalition—including the resident advisory board, Arise for Social Justice, Way Finders, Neighbor to Neighbor, PHIWM, PVPC, the city of Springfield, and other cross-sector collaborators—are developing a multi-year plan to address community-defined health and climate priorities.⁵⁰ These work plans will inform policy design and implementation in western Massachusetts, as well as statewide and beyond.

Live Well Springfield's successes are directly tied to trust-based partnerships that have been established between coalition members over time. Its model of shared ownership and transparent decision making enables the coalition to be fluid and responsive to emerging opportunities led by different partners based on strengths and relevant expertise. Securing ongoing robust funding and fostering leadership in community members helps sustain programs that originated as coalition initiatives, drive change, and influence policy at multiple levels. ■



VIII. CONCLUSION

Our future health and prosperity depend on how quickly and ambitiously we act to limit carbon emissions and prepare health systems and communities for climate impacts. Investments in facility and infrastructure resilience, together with resources leveraged to address determinants of health, can significantly increase a community's ability to adapt, respond to, endure, and recover from disaster. As we remake our energy systems and infrastructure to transition away from fossil fuels, we must ensure that what we put in its place—both physical and social—is not only cleaner but built to protect our communities. To protect human health and lives, we must recognize, prioritize, and address the racial, economic, and other inequalities that leave so many communities—from the towns of Louisiana's gulf coast, to mountain communities in California, to basement apartments in New York City—so vulnerable to the impacts of climate change.

In partnership with the community, the health care industry is uniquely positioned to be a leader in the dual mission of limiting climate crises and protecting people from future impacts. In the years since *Safe haven* was released, many sector leaders have taken steps to invest in climate resilience and mitigation and address determinants of health in the communities they serve. The impact of these efforts is greater when they are well integrated.

The transformation of health care institutions into climate-smart anchors of sustainable and resilient communities requires community-led engagement, sustained partnerships, and a process for designing and implementing programs in support of community health and wealth building. This is achieved through collaboration anchored in equity, trust, and innovation.

To do this, health systems must:

- Collaborate with community based organizations; state, municipal, and regional agencies; sustainability leaders and cross-sector partners; and health care professionals to be responsive to emerging needs, advance impactful solutions, and make durable change.
- Examine historic inequities and collaboratively design and implement initiatives to address social, economic, and physical infrastructure vulnerabilities.
- Pursue innovative resilience solutions that simultaneously advance community and institutional decarbonization in ways that promote health improvement and reduce health disparities in historically overburdened communities.



- Build trust-based partnerships with transparent and inclusive decision making to work towards a common vision.
- Embrace partnership and utilize models of shared ownership to develop an effective social infrastructure for collective impact.

The work to address climate change must be infused with a deep sense of urgency. Our current emissions trajectory will lead to unimaginable harm to human populations, communities, and the natural ecosystems that we depend on—in every corner of our planet. Every tenth of a degree of warming we are able to prevent significantly reduces that harm, and every measure we take now to increase resilience and prepare for change saves lives and livelihoods. This sense of urgency is not an argument for shortcuts or sacrificing equity in the name of short-term results that only undermine our work in the long haul. It does mean we must pursue transformative work with a tenacity that reflects that the stakes could not be any higher.

Understanding climate change as a threat to all determinants of health, health systems—in partnership with the communities they serve—have a key role to play in supporting the community's physical and social resilience. The case studies highlighted in this paper can be replicated and scaled, and additional innovative approaches

Authentic partnerships with community groups and governmental agencies stands to yield an enduring response to climate change that increases the resilience of hospital operations, improves community health outcomes, and protects the lives and livelihoods of the most vulnerable members of our society.

need to be piloted and shared. Integration of these strategies across health system departments—and authentic partnerships with community groups and governmental agencies stands to yield an enduring response to climate change that increases the resilience of hospital operations, improves community health outcomes, and protects the lives and livelihoods of the most vulnerable members of our society.

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HEALTH CARE WITHOUT HARM works to transform health care worldwide so that it reduces its environmental footprint, becomes a community anchor for sustainability and a leader in the global movement for environmental health and justice.

