CASE STUDIES OF HEALTH CARE SYSTEMS THAT DEMONSTRATE CLIMATE-SMART STRATEGIES

Robin Guenther, Perkins+Will
Josh Karliner, Health Care Without Harm

Prepared for:
The Commonwealth Fund
2017 INTERNATIONAL SYMPOSIUM ON HEALTH CARE POLICY
CASE STUDIES OF HEALTH CARE SYSTEMS THAT DEMONSTRATE CLIMATE-SMART STRATEGIES

KAISER PERMANENTE, OAKLAND, CALIFORNIA

This major U.S. nonprofit integrated health care provider, based in Oakland, California, serves 11.8 million Americans and employs approximately 208,000 people in nine states and the District of Columbia. Kaiser Permanente operates a network of 39 hospitals and more than 675 medical offices and other facilities, and it has annual operating revenue of more than $64 billion. Its mission is to “improve the health of our members and the communities we serve.”

System leaders view carbon reduction as integral to the goal of “total health,” and they have been leaders in environmental sustainability and climate in the United States for close to two decades. “Climate change isn’t a distant threat,” says Kathy Gerwig, Kaiser Permanente’s environmental stewardship officer. “The health impacts of a changing climate can be felt today in the form of increasing rates of asthma and other respiratory ailments, spread of infectious diseases, heat stress and injuries from severe weather events. By addressing climate change for the future, we are improving the health of communities today.”

Kaiser Permanente is aggressively working on mitigation, adaptation, and leadership in pursuit of zero net resource use. Since 2008, Kaiser Permanente has reduced greenhouse gas emissions by 29 percent while increasing membership by 20 percent. In May 2016, it announced the intention to be “carbon net-positive” by 2025 through purchasing enough clean energy and carbon offsets to remove more greenhouse gases from the atmosphere than the system emits. This is the most aggressive target set by a major U.S. health system, and it includes efforts to design and construct new zero-net-energy medical office buildings. “The energy we use to run our medical centers and other buildings produces the majority of our greenhouse gas emissions,” says Ramé Hemstreet, Kaiser Permanente’s chief energy officer. “Replacing fossil fuels as an energy source with green power is the most important action we can take to address the impacts of climate change on health and to reduce pollutants that can lead to disease.”
Exhibit 1. Sources of Kaiser Permanente’s Greenhouse Gas Emissions in 2016 (operations only)

Kaiser Permanente’s emissions totaled 600,417 metric tons in 2016. Purchased electricity dominates the greenhouse gas profile, accounting for 66.1% of emissions. Purchasing renewable electricity will have a dramatic impact on climate impacts.

Source: Kaiser Permanente.

For the last 20 years, Kaiser Permanente has engaged in a massive building program to expand, upgrade, and replace its California hospital buildings in response to changing seismic design requirements. As this has happened, it has integrated sustainable design goals in all projects: energy and water demand reduction targets, healthy materials, and advanced storm water management strategies have been included in the portfolio of buildings. Most recently, the new 617,000 square foot (57,320 square meter) San Diego Medical Center became the largest U.S. hospital to achieve a LEED® Platinum certification, incorporating on-site combined heat and power (CHP), innovative ventilation systems, and an energy-efficient building envelope.

As part of its climate adaptation strategies, Kaiser Permanente is currently installing 70 megawatts (MW) of distributed, grid-connected solar power at as many as 120 facilities across California and will sell the excess electricity produced to the local utilities. It has also made long-term commitments to purchase off-site renewable energy that enabled the construction of 43 MW of wind generation capacity at the Altamont Pass in California and 110 MW of solar generation capacity in Riverside County, California. It is also aggressively pursuing new technologies for energy production and storage, from fuel cells to batteries.
Kaiser Permanente is installing solar panels on surface parking lots on campuses throughout the system.

Source: Kaiser Permanente.

Alongside this work, the organization’s groundbreaking work on “anchor” investments in prevention and health management services as well as local community infrastructure is a model for other U.S. systems. It has instituted a robust network of farmers markets on hospital sites in urban “food deserts” to support local and sustainable agriculture and improve access to healthy food. By 2025, Kaiser Permanente’s goal is to source 100 percent of its food locally or from farms that use sustainable practices, including the responsible use of antibiotics. Since 2006, Kaiser Permanente has supported more than 50 place-based community change efforts around nutrition and physical activity, leading to better school food offerings, safe places to play, and engaged residents advocating for positive changes in their neighborhoods. Through the HEAL Cities and Towns Campaign, the organization partners with state municipal leagues and public health organizations to help local elected officials create conditions for health in their cities. And Kaiser Permanente is expanding work around upstream influencers on health, such as economic opportunity, housing, and mental health and wellness, to bend the chronic disease curve in under-resourced communities.

Finally, Kaiser Permanente understands that this work requires a commitment to partnership and collaboration well beyond a narrow definition of health care services. “It requires that hospitals and health care systems work together using a coordinated approach to achieving sustainability, one which can prevent environment-related illness, create environmental benefits and save billions of dollars in health care expenses.” One of the 2025 goals: “We will pursue new collaborations to reduce environmental risks to foodsheds, watersheds and air basins supplying our communities.” Collaborators include climate and renewable energy organizations, sustainable food and toxics advocacy organizations, the U.S. Green Building Council, and Health Care Without Harm.
Notes

7 Ibid.
STOCKHOLM COUNTY COUNCIL, SWEDEN

The Stockholm County Council in Sweden provides health care services, public transport, regional planning, and culture for the greater Stockholm area, serving 2.3 million citizens and employing 45,000 people. With a growth of 35,000 inhabitants per year, Stockholm is one of the fastest-growing metropolitan regions in Europe. The health care in the county is of high quality, but it faces major challenges. Like many regions in the United States, the need for care increases with a growing and aging population. The region is also experiencing an increasingly multicultural population. Patients make new demands on availability, interaction, and information. To meet these challenges, the council is making major investments in digitalization, new hospital buildings, and expanded public transport.

Ambitious goals produce results
The county council has worked since the beginning of the 1990s to continuously decrease the environmental impact of health care and public transportation. Since 1990, the council has reduced its total greenhouse gas emissions by 72 percent (42% since 2011). Compared with the European Union goal for 20 percent reduction from 1990 to 2020, this is an outstanding achievement. Stockholm County Council has worked to reduce transportation emission impacts, primarily by increasing the number of so-called “clean vehicles” and increasing the use of renewable fuels in all its operations. Its 2016 report indicate that the bus service is 96 percent renewable fuel by volume, and 96 percent of Stockholm council buildings are run on renewable energy.

Another significant and innovative greenhouse gas reduction initiative is the destruction of nitrous oxide, a common gas for medical use, with 300 times the global warming impact of carbon dioxide and a contributor to ozone depletion — Yasny and White suggest that these gases may contribute 6 percent to the total heating effects of greenhouse gases. Hospitals typically exhaust these gases into the atmosphere after a single use. In 2004, the Stockholm County Council installed a pilot facility at Karolinska University Hospital that splits the gas into nitrogen and oxygen, breaking down nearly 97 percent of the nitrous oxide supplied. The facility was the first of its kind in the world, and the program has since been extended to all hospitals overseen by the Stockholm County Council. Since 2001, the total climate footprint of used nitrous oxide has been reduced by 75 percent. In the United States, substitution of nitrous oxide and new methods of capturing and recycling the gas are allowing facilities to effectively reduce greenhouse gas contributions from anesthetic agents.

Engaged employees
How is it possible to engage and motivate a large organization to work hard to achieve environmental goals? Firstly, it is important to have clear and ambitious direction from the political level, coupled with resources and tools to execute the needed actions. A strong tool in the environmental work has been the ISO 14001 certification, which all the organizations within the county council have achieved. One of the criteria is to educate staff and management in environmental issues, which results in a high level of understanding regarding environmental goals and actions needed. Another success factor has been to engage the employees in the yearly Environmental reward that is handed out to the best innovative method, product, or idea that leads to achievement of environmental goals. The winner gets a prize cup and funding to develop the idea. The aim of the process is to boost innovation and spread good ideas. The
communication about the nominees and the winner is used to motivate and strengthen the environmental work.

An example of innovations resulting from the Environmental reward is 2017’s prize winner: A worker at Stockholm County’s Health Care Services developed a common online intranet database for the basic supply of antibiotics, often-used drugs, and the most environmentally harmful drugs listed by Stockholm county. The database visualizes the drugs that are available in storage and those that are retrieved. The database also signals when drugs should be discarded. The method has been used since 2012 at a department at the Stockholm County Council, Health Care Services; the department has since reduced its medical waste by 50 percent.

The database also includes statistics showing how much and what kind of drugs are being discarded, and why. A key early finding: Passed expiration date is the main reason why drugs are discarded. In practice, this means that departments use the data to review their order patterns, change procedures, and optimize the medical drug assortment at their units.

In 2016, the Stockholm County Council discarded the equivalent of SEK 400 million (approximately US$50 million) in drugs. The environmental impact from production, distribution and consumption of pharmaceuticals is one of the largest caused by the supply chain. By streamlining the handling of drugs in health care and avoiding unnecessary purchases of drugs, the environmental impact of the production and distribution is reduced.

A circular and bio-based economy
From 2017 to 2021, the Stockholm County Council will be taking action to reduce greenhouse gas emissions by increasing the use of renewable energy, rationalizing energy consumption, reducing emissions of nitrous oxide and anesthetic gases, and limiting the climate impact from construction and civil engineering projects. Through environmental requirements and the resource-efficient use of products, the county council will also reduce the climate impact from consumption and production. In addition, the council is preparing a climate adaptation plan to outline resilience measures to prepare regional infrastructure for the increasing incidence of heat waves and extreme storms.5

Besides climate work, the goal of this initiative is to lead a transition to a circular and bio-based economy. The Stockholm County Council is using public procurement to drive green public product development and human rights using due diligence in the global supply chains. In 2008, the Stockholm County Council developed a code of conduct for companies, which has been applied and used since 2010 by all regions in Sweden.6

Environmental goals for the health sector include actions to reduce the environmental impact from pharmaceuticals, textiles, food, and other goods at all stages — from production to use and waste. Action is being taken to achieve more secure and cost-efficient management of pharmaceuticals as well as resource-efficient textile management, together with continuous work to reduce emissions of anesthetic gases. The council is also continuing its work against antibiotic resistance by means of sensible prescription and requirements for reduced antibiotic use in the field of food production.
**Investing for the future**

In May 2014, the Stockholm County Council was the first county council in Sweden to issue a green bond. The county council has specified investment objects with an environmental focus in the green bond, so investors know that their money is being spent on projects that are good for the future. Green bonds, first issued by the World Bank in 2008, are bonds where the proceeds are earmarked to different environmental projects. Most often, these are projects aimed at reducing carbon emissions. The bonds are a tool for raising awareness of climate-related challenges and solutions while at the same time safeguarding green development projects in the county. In terms of risk, return, legislation, and documentation, green bonds have the same characteristics as other investments offered on similar terms. They still account for a small portion of the overall bond market, but both interest in and the market for green bonds are growing rapidly. So far, the Stockholm County Council has issued green bonds to a sum of US$800 million to finance the railway expansion program, increased energy efficiency of public transit, and new construction and renovation of hospitals.

In 2018, the Karolinska University Hospital will be fully operational in its new hospital buildings. The hospital provides highly specialized health care and conducts basic research, patient-focused clinical research, and education. It will achieve environmental certifications from both the Swedish Miljöbyggnad certification Gold and the international Leadership in Energy and Environmental Design (LEED) Gold. It is the ninth-largest health care project in the world to be LEED Gold certified, and when the project is complete it will be one of the world’s most sustainable university hospitals.

The Karolinska University Hospital’s new building is one of the most environmentally advanced health care buildings in the world. It is situated above a new public transit hub and adjacent to a public square that seamlessly links Stockholm and Solna.

**Source:** Skanska.

Electricity production at the hospital is 100 percent renewable. A “carbon neutral” target was set for this 2 million square foot (185,000 square meter) complex: Thermal energy is provided by a biomass-fueled district heating plant and ground-source heat pumps. It is estimated that the in-house geothermal heating
facility will reduce the total need for purchased energy by 26 percent, or 60 kilowatt-hours/square meters per year. For the whole hospital, this equates to a reduction of 17 million kilowatt-hours per year, which corresponds to the heating energy for approximately 800 average single-family homes for a year.\(^8\)

_Leadership for health and the planet_

Taken together, these initiatives demonstrate a strong commitment to community health and well-being in the face of climate change. The Stockholm County Council demonstrates innovative leadership in the transition to a new, circular, bio-based economy based on explicit human and environmental health goals. As a large public body, the Council has the ability, but also the responsibility, to set environmental standards, encourage new innovations, and influence other organizations, both nationally and internationally. Using sustainable criteria in procurement can drive the market through product development and improved working and living conditions globally where products are manufactured.

Notes

1 Stockholms läns landsting, *Information in English*.
THE UK NATIONAL HEALTH SERVICE SUSTAINABLE DEVELOPMENT UNIT

Long a global leader in environmental sustainability, the United Kingdom’s National Health Service (NHS) has committed to carbon reductions of 34 percent by 2020, 57 percent by 2030, and 80 percent by 2050, as required by the UK’s legally binding Climate Change Act. The NHS is the oldest and largest single-payer health care system in the world, and is divided by territory: NHS England, NHS Scotland, NHS Wales, and NHS Northern Ireland. Collectively, the NHS serves more than 64.6 million people; public and private health care represents approximately 8.5 percent to 9.0 percent of the UK’s gross domestic product. Its enlightened view of health equity and health care is deeply rooted in organizational culture, captured in one of its founding principles: “[to] improve health and prevent disease, not just provide treatment for those who are ill.”

Sustainable design and operations are emerging as keystone components of a broad commitment not only related to climate change, but also to achieve effective quality health care for all citizens of the United Kingdom. In 2008, NHS England and Public Health England established the Sustainable Development Unit (SDU) to develop and promote sustainable development plans and influence policies across the entire NHS public health and social care system. Considering the three pillars of sustainability — environmental, social, and economic — the SDU develops tools, strategies, policies, and research to empower the health and social care system. The NHS-SDU is the first major national health system to publish a comprehensive greenhouse gas inventory of its clinical operations (for NHS England), and it has implemented changes in food policy, purchasing, building design, and siting of new clinical services aimed at reducing greenhouse gas emissions related to travel. The health sector represents 40 percent of the public sector’s greenhouse gas emissions.

The NHS building program has shown impressive results in reducing energy and water demand in new buildings. An enormous period of hospital replacements and new construction in the past 20 years has significantly shifted the profile of physical facilities — prior to this investment, approximately 50 percent of the hospital building stock predated the birth of the NHS in 1948; today, that number is less than 20 percent. The NHS is now shifting its capital focus toward local and primary health facilities as well as renovations of existing buildings. It continues to focus on the carbon footprint of its operations as it seeks to align with national carbon reduction targets. As part of this shift, the NHS is encouraging local organizations to explore environmental initiatives that resonate with their localities.

In 2010, the Sussex Community NHS Trust launched “Care Without Carbon” (CWC), an action plan that provides a simple framework for delivering sustainable health care in existing facilities throughout the trust. The program strategy works to cut carbon, save money, and support staff and patient well-being. Since 2010, the CWC program has enabled Sussex Trust to reduce its carbon footprint by 1,623 tons of carbon dioxide equivalents (CO2e), or 21 percent, and to reduce water use by 55 percent. Sussex Trust is also developing a Climate Change Adaptation Strategy to prepare for the impacts of extreme weather. The trust is equipped to deal with damage to infrastructure from extreme weather events via business continuity planning, and is also working with local authorities to identify climate change risks at a local level as part of a climate adaptation plan.
As a community services provider, Sussex Community NHS Trust performs 90 percent of its activities in patients’ homes. The trust provides care to 9,000 patients every day over an area of 1,000 square miles. Implementing sustainable travel policies, such as reducing business mileage through season tickets for transit and shifting to low-emission or electric vehicles, have led to an average drop of 17 percent in business miles per year compared to 2010. By 2015, the trust achieved a total 25 percent reduction compared to 2010.

In keeping with its commitment to link sustainability and resilience to quality of care, the trust launched Operation TLC with the Bart’s Health NHS Trust in 2012 to see if it was possible to save energy while improving patient comfort through a series of operational and low-cost facility interventions. Implementation of “lights-off” quiet time after lunch, for example, improved patient rest and saved lighting energy. In two years, the trust reported one-third fewer sleeping disruptions and 38 percent fewer patient requests to change room temperatures, while also saving 1,900 tons of CO₂ and £428,000 (over US$500,000).

In 2016, an updated Carbon Footprint Report indicated that overall carbon footprint of NHS England in 2015 was 22.8 megatons of CO₂e, representing an 11 percent carbon reduction since the initial inventory in 2007. The public health and care sector combined achieved a 13 percent reduction. This is in the context of an 18 percent increase in inpatient admissions over the same period (see diagram below). NHS England had identified a 10 percent reduction target by 2015 as crucial to achieving the 80 percent reduction by 2050. The main contributions have been from reduced expenditures on goods and services, causing an overall reduction in emissions from procurement of 16 percent. Building energy use and travel have been reduced by 4 percent and 5 percent respectively.
Exhibit 2. NHS England Carbon Footprint

From 2007 to 2015, NHS England has reduced carbon emissions by 11%. This is in the context of an 18% increase in inpatient admissions over the same period.\(^9\)

Making the business case

In its landmark report *Securing Healthy Returns*,\(^{10}\) the SDU has estimated that the cumulative savings from energy measures alone implemented in England since 2007 is approximately £1.85 billion (about US$2.44 billion), in addition to environmental and health benefits such as reduced air pollution.

“Continuing to realize the savings to date with investment maintained at the current expected rate to 2025 would return a cumulative saving of £6.2bn [about US$8.16 billion] against a business as usual case. Significant further savings have been made in waste, water, transport and increasingly procurement,” the report states. At the same time, the NHS recognizes the need for investments in population health improvement through, among other things, radical prevention of disease. Clearly, reducing fossil fuel energy use contributes to longer-term, albeit more difficult to quantify, health improvements.
Exhibit 3. Healthy Returns from Sustainability Actions

This infographic, based on data in the Securing Healthy Returns\textsuperscript{11} report, highlights the financial and health returns of a range of carbon reduction interventions implemented by the NHS SDU since 2010. The SDU has also released an interactive tool that allows organizations to calculate these and other benefits.

In 2014, the Sustainable Development Strategy (SDS)\textsuperscript{12} was launched to guide the transition toward a sustainable health care system by 2020. While NHS England has also launched a Carbon Reduction Strategy focusing on reducing carbon emissions, the implementation of the SDS seeks to extend the reach of sustainable practices beyond carbon emissions and toward the protection of all natural resources and the resilience of communities to the impacts of climate change, with the goal to promote and construct healthy lifestyles and environments. The approach includes a new focus on community building: “We are clear that we need to work in partnership not only within and across our organizations but also with our communities, to unleash the opportunities and benefits needed to improve genuine health and wellbeing. Unless we make working sustainably a priority all our other priorities could be undermined.” This awareness is encapsulated in three specific goals that align with the three-part climate-smart framework for engagement developed in this paper and captured by the infographic in Exhibit 2:
1. A healthier environment. This includes contributing to the Climate Change Act target with a 34 percent reduction in carbon emissions by 2020.

2. Communities and services are ready and resilient for changing times and climates.

3. Every opportunity contributes to healthy lives, healthy communities, and healthy environments.

In 2015, the NHS-SDU released its first climate adaptation strategy report."""13 This report outlines a vision for climate adaptation, as well as outlining both opportunities and challenges ahead. As this strategy develops and evolves, the SDU is poised to achieve the following aims by 2020:

1. Reduced environmental impacts. Meet or exceed the 34 percent reduction in CO\textsubscript{2}e emissions to position the system to meet the 50 percent target by 2025.

2. Communities prepared for the impacts of climate change. Have plans in place to deal with extreme weather events such as heat and cold waves and flooding.

3. Local community leadership. Launch Health and Wellbeing Boards in communities to develop strong and proactive health and well-being strategies within new and existing services.

4. Embedded sustainability. Account for sustainability in purchasing, investment, operational, and strategic decisions.

5. Improved health outcomes. Measurable progress is made against NHS, public health, and social care outcomes frameworks.

6. Recognition and replication. Make the public proud of community-level efforts; allow citizens to carry that experience into other areas.

Notes

1 Committee on Climate Change, *UK regulations: The Climate Change Act* (Committee on Climate Change, 2008).


