Health Care Without Harm

Health Care & Climate Change

An Opportunity For Transformative Leadership

THIS DOCUMENT WAS WRITTEN FOR
HEALTH CARE WITHOUT HARM BY DAN QUINLAN.

THIS DOCUMENT WAS MADE POSSIBLE
WITH GENEROUS SUPPORT FROM
THE ROCKEFELLER BROTHERS FUND
AND THE WALLACE GLOBAL FUND.

Health Care Without Harm is an international coalition of more than 500 organizations in 53 countries working to transform the health sector, without compromising patient safety or care, so that it becomes ecologically sustainable and a leading advocate for environmental health and justice.

April 2014

www.noharm.org

Health Care Without Harm

Health Care & Climate Change

An Opportunity For Transformative Leadership

CONTENTS:

F O R E W O R D

Dear Health Care Leaders,

As we strive to deliver the best care to our patients and improve the health of the communities we serve: energy efficiency, resiliency, and reducing the environmental footprint of the health care sector are subjects that increasingly demand our attention.

For this reason, I urge you to read this informative paper from Health Care Without Harm, entitled "Health Care & Climate Change: An Opportunity for Transformative Leadership."

The paper effectively makes the case that clean energy investments can help control health care costs, improve the quality of care, and reduce the environmental impact of the health care sector.

This has been our experience at Kaiser Permanente. As a result of strategic clean energy investments, we have been able to improve quality and value in patient care, while advancing energy efficiency and the use of renewables.

After you've had an opportunity to review the paper, please share your comments. Let us know if you are interested in participating in a larger strategy discussion about clean energy investments. Please send comments and questions to Eric Lerner, HCWH U.S. Climate Director, at elerner@hcwh.org.

Sincerely,

Don Orndoff
Senior Vice President, National Facilities Services
Kaiser Permanente

INTRODUCTION

In a recent speech on climate change, President Obama said, "...the question is not whether we need to act. The overwhelming judgment of science has put all that to rest..... the question now is whether we will have the courage to act before it's too late. How we answer will have a profound impact on the world that we leave behind."[1] As the inexorable changes in climate continue to create weather driven crises across the globe, society faces urgent yet unknown challenges—including widespread and devastating impacts on human health—should global warming remain unchecked.

The reversal of anthropogenic climate change will pivot around fundamental realignments in the ways that energy is created and consumed. Reducing our reliance on fossil fuels will require comprehensive changes in the everyday practices of every business, every institution and every community. For the health care sector, this clean energy imperative is powerfully connected to the deeply rooted mission of the people and organizations that comprise the sector. As a driving economic engine of many national economies, the health care sector is presented with a unique opportunity to illuminate the path forward.

This is more than an intangible, philosophical argument. A comprehensive clean energy strategy for a health system will be built upon robust, practical benefits that are consistent with the financial and operational challenges faced by management teams. The direct financial benefits of clean energy projects are further enhanced by a set of tangible and intangible benefits. The concrete benefits can include on-site power systems that provide resilience in the face of extreme weather events or water management systems that lower consumption. In urban areas, commuting subsidies alleviate traffic congestion and reduce the need for parking facilities. A powerful yet less tangible benefit is the energized response of employees and local communities who resonate with a deep commitment to environmental stewardship.

From the broader, long-term societal perspective, the direct financial benefits of clean energy investments today are compounded by the aggregate financial benefits of avoiding a deteriorating climate—including a vast set of human health impacts whose true value is incalculable.

Health systems have the opportunity to become beacons of hope and action—providing urgent and catalyzing leadership. Each step forward will support healthy communities and contribute to vibrant local green economies.

THE STARTING POINT

The consumption of energy in buildings has grown to more than 1/3 of global energy demand and is an equally dominant contributor to carbon emissions.[2] For some companies and institutions, the cost of energy has motivated investment in clean energy projects. One of the indicators of this trend is an estimated $80B investment in energy efficiency building retrofits by businesses and public institutions worldwide.[3] From a qualitative perspective, the growing breadth of attention is indicated by the list of companies that have signed the Business for Innovative Climate & Energy Policy (BICEP) "Climate Declaration"—including global brands like GM, Unilever and Nike.[4]

But, other data contains a very different, far less positive message. The International Energy Agency (IEA) has concluded that the current level of investment is insufficient to meet the required improvements in building energy savings. They also estimate that approximately 80% of energy savings potential in buildings remains untapped. Within other groups, there is wide concern regarding whether global companies are actually reducing their emissions, despite highly publicized announcements.[5] One reference point to consider is that a company with a global brand will often spend $2B (and higher) on annual marketing expenses. Compared to metrics like this, the estimated spending on building retrofits begins to look feeble. This overall view is consistent with the recent report from the International Panel on Climate Change which concludes that the global response to greenhouse gas emissions remains too slow and too narrow.[6] So, while there may be breadth, there is a clear lack of depth.

The nature of modern hospitals—24 hour services provided by teams of specialized professionals supported by an expanding use of technology—creates an extraordinary demand for energy. On a per square foot basis, hospitals consume 2½ times the energy used in other institutional and commercial sectors.[7] Based on data last collected in 2007, the aggregate energy demand of large US hospitals (at least 200,000 sq. ft.) was 460 trillion BTU.[8]

> "The question is not whether we need to act. [...] The question now is whether we will have the courage to act before it's too late."
>
> **— President Barack Obama**

This level of demand gives rise to a particularly potent greenhouse gas emissions profile. Based upon estimates for the carbon dioxide "equivalent" for each fuel in the energy mix (electricity, natural gas, fuel oil and district energy), the composite impact is 56 $MMTCO_2EQ$ (million metric tons of carbon dioxide equivalents) per year. To get a sense of scale, this is roughly equivalent to the emissions from driving 12 million cars, powering 3 million homes, or simply burning 240,000 railcars filled with coal.[9]

As an indicator of the impact of US health care systems, it is worthwhile to note that these estimates are inherently conservative. Data indicating the energy expended in extracting, refining, processing and delivering the fuels involved is not available. A second issue is that the data does not cover all US hospitals and healthcare facilities. The Energy Information Administration (EIA) data represents the 3000 largest hospitals—while the American Hospital Association reports more than 5700 registered hospitals. These figures also do not include a host of other emission sources including travel (i.e., employee commuting and business trips) and energy consumed across supply chains. Air travel is a particularly intense and damaging source of greenhouse gas emissions.

Another way to think about impacts is to consider the health consequences of emissions. The spectrum of direct health effects in the form of increased incidence ranges across cardiac disease, respiratory disease, stroke, premature birth, and developmental defects. Indirectly, dramatic and unpredictable climate driven shifts in the spread of infectious disease looms as a major threat to human health.

In 2007, Health Care Without Harm and Practice Greenhealth partnered with the Clean Air Task Force and others to create the health care Energy Impact Calculator (EIC).[10] The EIC can be used to estimate the direct effects of emissions from power plants. Based again on EIA data for large hospitals, the health impacts of electricity demand are shown in the table below (impacts of non-electric energy consumption such as heating fuel, supply chains and travel are not included).

INCIDENTS	PER YEAR
RESPIRATORY SYMPTOMS	452,561
WORK LOSS DAYS	83,798
ASTHMA ATTACKS	9,521
PREMATURE DEATH	464
HOSPITAL INCIDENT VISITS	420
CHRONIC BRONCHITIS	295

DIRECT MEDICAL COSTS
$415 m

SOCIETAL VALUE
$3.5 B

Not surprisingly, the health care sector also consumes an immense amount of water. The EIA data for large US hospitals indicates the figure to be about 133 billion gallons. With respect to climate change and energy, this matters because pumping, heating, and treating water requires a substantial amount of energy. Within the broader context of sustainability, conservation of water is becoming an increasingly important concern for many communities. In many areas, water scarcity and an aging distribution infrastructure has more than doubled the cost of water over the past decade.

THE POTENTIAL

As they stand, these figures are sobering. And, given the various limitations in the available data, the numbers likely underestimate the total direct impacts by a wide margin—perhaps a factor of two or more. Even without that correction, extrapolating to a global view, it is clear that a sustained worldwide push by the health care sector would be a driving catalyst for transforming the global warming narrative.

The potential for climate leadership begins with energy and water efficiency investments at the level of individual buildings. Data from new and retrofitted hospitals, as well as from hospital facility modeling work, demonstrates that energy savings of 30-50% are often readily achievable (and that these projects are highly cost effective).[12] There is also ample evidence that hospital water consumption can be cut significantly without negatively impacting the delivery of patient services.

A second component of a comprehensive clean energy strategy is investment in renewable power generation. Whether applied to a single building, a hospital campus

> "A typical 200-bed hospital dependent upon electricity generated from coal using 7 million kWh is responsible for more than $1 million per year in negative societal public health impacts and $107,000 per year in direct health care costs."
>
> **— Practice Greenhealth[11]**

or as part of a larger community-based partnership, investment in clean generation will drive the carbon footprint of health care even lower. In fact, the most progressive health systems are planning to use this combination to eliminate/offset virtually all of the carbon impacts associated with energy.

Health care represents 18% of US GDP ($2.7T in 2011).[13] If health systems across the US embraced an aggressive clean energy vision, the collective impact of the investments would be stunning—sending an empowering and inspirational message throughout the nation. As leaders of other businesses and institutions begin to appreciate the benefits of such an initiative, there is little doubt that the leadership of the heath care sector would encourage a new wave of investment. Engaging entrepreneurs in the deployment of new technologies would place health care in the forefront of the emerging new energy economy. This vision is no less compelling in other parts of the developed world since health care is a driving component of economies worldwide.

As major energy consumers and highly respected anchor institutions in their communities, health systems have a unique opportunity to become powerful beacons of change. By significantly ramping up investment in energy efficiency, clean energy generation and water conservation projects, the health care sector will illuminate ideas and actions that will spread quickly into the wider economy.

> "Kaiser Permanente is committed to creating healthy communities, and it's critical we work to reduce the impact of our operations on the environment."
>
> **— Bernard J. Tyson (CEO)[14]**

EARLY ADOPTERS

In recent years, forward thinking health systems have been moving to meet this potential. These organizations have demonstrated a persistent commitment to aggressive goals and have embraced innovative solutions. In the table below are examples of clean energy strategies from three US health systems that have each invested tens of millions of dollars. Refer to appendices for complete details on these clean energy case studies.[15]

HEALTH SYSTEM	PROGRAM TARGET	ACHIEVEMENTS	CURRENT PROJECT EXAMPLES
GUNDERSEN HEALTH SYSTEM	Energy independence by 2014	• Strategic plan in place • Energy efficiency measures widely installed • Large innovative, community-based renewable power generation projects	• New facility will consume less than ½ of energy used in typical hospitals • New co-generation projects
PARTNERS HEALTHCARE	25% reduction in energy demand by 2015	• Strategic plan in place • Energy efficiency measures widely installed • Renewables meet 25% of demand	• New co-generation projects • Extensive system upgrades and retro-commissioning • Pursuing large scale solar installation
KAISER PERMANENTE	30% reduction in green house gas emissions by 2020	• Energy efficiency measures installed throughout system • "Continuous commissioning" approach ensures optimal system performance • 11MW solar installed in CA • 2MW CHP installations • 4MW fuel cell installation • 100% of energy demand offset with energy credits (DC and MD facilities)	• All new hospitals—LEED Gold (or higher) requirement • 11MW planned for CO and HI

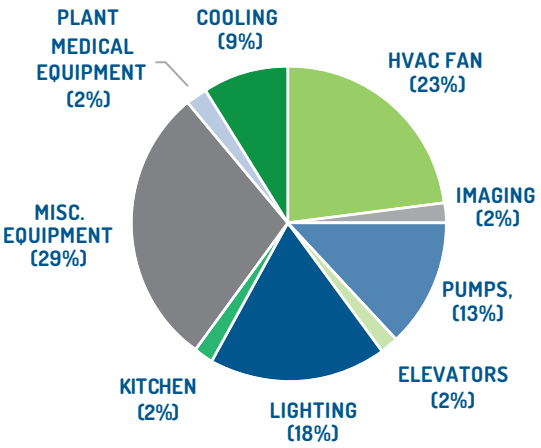
PROJECT INVESTMENT OPPORTUNITIES

The energy used in hospitals can be organized around two broad end use categories—electric and thermal—with each breaking down by end use as shown below.[16]

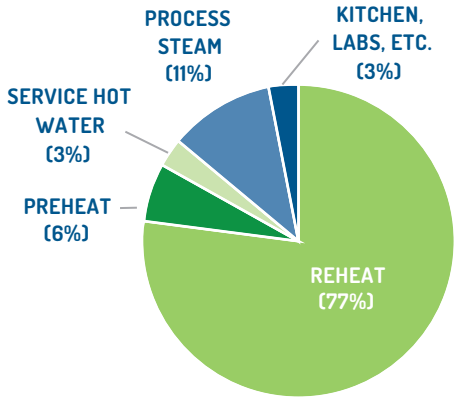
Referring again to the 2007 EIA data, these end uses result in a collective energy spend of more than $7.5 billion per year by US hospitals.[17] Within that aggregate spending, these charts provide an indication of where the opportunities lie. (For any given hospital, the relative impact of the opportunities will vary from these example charts—based on the age of the facility, type of facility, geographic location, equipment age, and similar factors.)

When considering a facility project, the specific end uses point to a wide range of potential opportunities. Some opportunities are derived from improvements made to systems that are integral to the operation and use of the building. Other opportunities are associated with installation of on-site energy generation systems. A different set of possibilities arise through staff engagement projects that target day-to-day conservation of energy, including transportation and the purchase of energy efficient office equipment.

ELECTRICAL USES



THERMAL USES



OPPORTUNITY FRAMEWORK FOR CLEAN ENERGY & WATER MANAGEMENT PROJECTS

FACILITIES & BUILDINGS	• Heating & cooling systems • Ventilation/outside air systems • Interior/exterior lighting • Control systems • Building envelope • Information systems	• Equipment cooling systems • Laundry equipment • Kitchen equipment • Low-flow faucets, toilets, etc. • Sterilizers & autoclaves • Water purification systems
ENERGY GENERATION	• CHP/Cogeneration • Solar PV • Wind	• Geothermal • Biogas & biomass • Solar hot water
OFFICE EQUIPMENT	• Desktops computers • Laptop computers • Data centers	• Low energy displays • Other plug loads
STAFF ENGAGEMENT	• "Green" advisory teams • Conservation behaviors • Communications & training	• Maintenance processes • Continuous Energy Improvement (CEI) process development
TRANSPORTATION	• Fleet fuel-type changes • Reducing air travel • Distribution of supplies	• Teleconferencing systems • Commuting subsidies

COMBINED HEAT & POWER

With long operating hours and high energy demands, hospitals hold particular promise for the widespread adoption of combined heat and power (CHP) solutions.[18] CHP plants:

- Capture and use waste heat (lost in conventional on-site power generation systems)
- Eliminate the effect of transmission and distribution losses (inherent to the delivery of utility based power)
- Operate when the utility grid is down (providing robust backup power)

The net financial benefit of a CHP solution alone provides compelling motivation for installing these systems. In response to growing concerns around both global warming and operational resiliency, leading hospitals have also adopted CHP as a component of a broader strategy for addressing both concerns.

Installations within health care facilities are among the leading examples of the potential of CHP technology. The US Department of Energy (DOE) estimated that the 47.5 MW system installed within Boston's Longwood Medical Area reduced total fuel consumption by 24% and reduced annual CO2 emissions by 177,500 tons. Gundersen Health System has taken the concept even further. A CHP system fueled by landfill gas serves the full heating demand of its Onalaska Campus, while also offsetting 7% of Gundersen's total electricity demand and productively redirecting the emissions from the landfill.

> "With fuel use efficiency of up to 85%—significantly higher than conventional generation—and payback periods as short as four years, CHP systems can help Massachusetts hospitals reduce their greenhouse gas emissions by an average of 18%, in addition to lowering their power costs."
>
> **—John Cleveland, Executive Director of the Boston Green Ribbon Commission**

ENABLING THE VISION

For most entities, the decision to undertake a clean energy project hinges on the project economics. One of the fundamental barriers to faster and deeper levels of investment is the misconception that energy and water projects are weak investments. Yet, the facts tell a different story. As noted above, leading hospitals are making successful, substantial energy-based investments in their buildings today—based on attractive payback periods and compelling returns. The average operating margin for US hospitals typically lies between 2% to 4%.[19] From this perspective, every dollar saved on energy use is analogous to raising revenue by $25 to $50. **A breakthrough will occur when the health care sector fully embraces the perspective that leading the fight against climate change is inherently aligned with both mission and fiduciary responsibilities.**

As medical technology advances, physicians naturally advocate for investment in new technologies that enhance patient outcomes, and business managers often see new revenue opportunities in these ideas. The evaluation of competing proposals to optimize performance of HVAC systems or to install energy efficient lighting will require a different decision making perspective. A deep and lasting change in the energy spend and the carbon footprint of a hospital requires a broad mindset, built upon a multi-year commitment to a series of cohesive investments. Organizations that are committed to climate leadership raise clean energy investment to be on par with other long-term strategic priorities.

Persistent organizational commitment to a clean energy initiative begins with the development of a "Strategic Energy Management Plan" (SEMP). A SEMP creates a roadmap of investments for the long haul.[20] As a result, energy project planning becomes an expected component of the annual budget conversation. A successful SEMP process will engage staff in a conversation that ultimately turns their concerns and challenges into long-lived opportunities to:

- Provide improved patient outcomes and satisfaction
- Improve bottom line financial performance
- Provide better working conditions for staff
- Replace aging infrastructure
- Provide resiliency in the face of future weather events
- Protect against volatility in energy prices

INVESTMENT DECISIONS

The SEMP process will uncover an array of energy savings opportunities, even in new facilities. The many ideas that emerge will need to be organized and evaluated. A carefully executed approach will include selection of decision criteria that allow the tradeoffs and complexities of competing project proposals to be assessed methodically. The decision criteria will typically include:

- Energy and water savings
- Net return on investment
- Size of expenditure
- Greenhouse gas emissions
- Time to completion
- Operational disruption
- Energy diversification and resiliency

Over time, the approach will need to be fluid, allowing the investment team to adapt their thinking as the SEMP initiative matures. For example, many organizations will choose to build early momentum by emphasizing quick wins, and then move to more complex projects as the overall energy plan gathers steam. And, over time the landscape will change with the advancement of technology, and shifts in costs and external financial incentives.

FINANCIAL CONSIDERATIONS

From a financial perspective, the two fundamental attributes of a project proposal that management teams consider are the size of the investment and the return. The finance team within a health care organization will have an established method for evaluating the expected return—built around a subset of project finance metrics including:

- **Payback Period:** the period of time required for the savings from the project to offset the funds invested in the project. (Also referred to as the *"breakeven"* period.)
- **Net Present Value (NPV):** the aggregate value of the cash flows over the full life of a project, including the cost of the upfront investment and the time value of money.
- **Internal Rate of Return (IRR):** the discount rate that yields a net present value equal to zero.
- **Cost of Capital:** for a non-profit health care entity, the interest paid on loans or bonds. For a for-profit organization, the cost of capital may also include the effects of expected returns to equity investors.[21]

Engaging the finance team on the preferred approach for estimating financial return places proposed projects into a framework that will be familiar to decision makers.

A key consideration in developing a strategic approach to project investment is discussion of the budget allocations and span of control. The cost and saving allocation methodology can influence how key department managers view individual projects and the overall clean energy initiative. The discussion begins with clarity around whether a project will be considered to be a capital expense, an operating expense, or a portion of both. When capital and operating budgets are evaluated independently, first cost considerations may cause the large long term gains that clean energy investments provide to be missed.

PROJECT SAVINGS

A forecast of the energy and/or water savings for most projects can be estimated using established engineering methods. For building and transportation projects, experienced professionals will usually be able to forecast these savings with good accuracy.[22] For building energy projects, the results may be impacted by interaction effects. For example, replacing the windows in an older facility can have a significant impact on the design of a retrofitted HVAC system. Savings projections will also include an assessment of expected performance over time—as the efficacy of some systems will diminish with age. In a building project, the savings are converted into financial savings based on projected costs of fuel, electricity, and/or water. For transportation projects like fleet changes or commuting subsidies, straightforward methodologies for estimating energy and emissions benefits have also been developed.

Clean energy projects will often have ancillary financial savings. Reductions in operations/maintenance labor and longer equipment performance life are two common examples.

PROJECT COSTS

The obvious counterpart to estimating project savings is the estimation of project costs. Besides the need to evaluate the cost to design and execute a project, an evaluation of the costs incurred during the full life of the project must be part of the cash flow analysis.

While the savings estimate includes an assessment of avoided costs, there is the corollary of potential added costs. Using the retrofit of an older health care facility as an example, the potential addition of new sensors and control equipment is an additional cost. (A benefit of advanced monitoring is the ability to directly measure and control energy and water savings at a more granular level—while providing more direct quantification of the energy savings being realized.)

INCENTIVES

In the United States, financial incentives for clean energy investments emerged as one of the responses to the oil embargo that occurred in the 1970's. Since that time, a variety of federal, state and, more rarely, local energy incentive programs have been deployed. Similarly, in some communities, concern over water scarcity has been the genesis of water conservation incentives. The financial

mechanisms employed include rebates, grants, tax deductions and low interest loans.[23] Where they exist, incentives are often a significant component of the financial picture of a proposed project. It is worthwhile to note that the details of individual programs can change as regulators and administrators adapt to market response. (An additional benefit of many programs is access to technical assistance resources that can accelerate project design and execution.)

PROJECT FINANCING

In addition to incentives, the overall approach to project financing will be a central consideration for large projects. Interest payments from incurred debt will impact the net project savings. In some cases, the potential benefits of off-balance sheet treatment may also affect the decision process. For example, a large scale community wind project partnership, or a contract with an Energy Services Company (ESCO), may be a candidate for this type of approach.

An emerging method to sustained institutional investment in clean energy projects is the "green revolving fund (GRF)." In a GRF, financial savings from projects are dedicated to fund new clean energy projects. The multiple benefits of this approach have given rise to an aggregate US investment in GRFs of more than $100m.

TAX EFFECTS

In addition to potential incentive based tax deduction programs, for-profit hospitals will have additional tax specific factors to consider when developing the financial view of a proposed project.

1. Like other capital investments, some types of facility improvements can be depreciated according to set accounting rules. Depreciation results in a reduction in tax expense.
2. If the funding for a project is obtained through borrowing, the resulting interest payments also lowers net income and therefore tax liability.
3. A countervailing effect to the above items is the increase in net income that arises from lowered energy costs. This resulting increase in operating income creates an associated increase in tax expense.

SENSITIVITY ANALYSIS

Creating cash flow projections for a project includes estimation of the future values of key variables. The most obvious example is the translation of expected energy or water savings into dollar savings based on projected future unit costs. Other variables can be related to system performance or environmental factors like average outside temperature. A typical project investment analysis will include a sensitivity analysis that provides a view into how the financial projections change if the estimate of a core variable proves to be too high or too low. The sensitivity analysis is a central component of the discussion around the financial risks of a proposed project.

OPERATIONAL RESILIENCE

> "The cost of system downtime at a hospital goes far beyond financial implications—patients' lives are at stake."
>
> **— John Messervy, Director of Capital and Facility Planning, Partners HealthCare**

Health care systems will be forced to consider the operational implications of the increasing frequency and intensity of weather events—including the flood of short and long term health needs they trigger, especially for the most vulnerable populations in the community. As demonstrated during events like Hurricanes Katrina and Sandy, and Typhoon Haiyan, this is more than a hypothetical consideration. One of the key dimensions of the discussion will be preparing for the likelihood of grid-based power outages that last for weeks rather than hours. After Hurricane Sandy shut down the New York and New Jersey coastline in 2012, the 11 MW CHP system at the Montefiore Medical Center and the 1.3 MW CHP system at the South Oaks Hospital allowed both facilities to deliver critical medical services, and accept patients from other shut down hospitals in the region.

Operational resilience will also begin to factor into insurance costs. Given the growing weather related payouts in recent years, the cost of insurance will rise as insurers develop new approaches to climate related risk.

An additional benefit of a comprehensive energy efficiency initiative is a lower cost for robust on-site power generation systems. When a facility's overall demand for energy has been lowered, on-site systems can be sized to meet the reduced load.

STAFF RESPONSE

Within the broader economy, one of the drivers behind growing corporate and institutional interest in sustainability is the positive reaction from employees. In a recent survey, 75% of the responding health care executives indicated that "staff retention and talent acquisition" was a key driver of the management team's interest in sustainability.[24] A study of the

> "NYC hospitals incurred an estimated $1 billion in costs associated with emergency response measures taken during and immediately after Sandy... damaged hospitals will spend at least another $1 billion on repairs and mitigation."
>
> **— New York City Special Initiative for Rebuilding & Resiliency**

attitudes of US public health nurse administrators and nurses found that 51% felt that their teams have "a responsibility to address the health-related impacts of climate change."[25] Other attributes of clean energy projects, such as improved workplace comfort or saving money with commuting subsidies, also contribute to employee goodwill. As the climate story unfolds, there will be a subtle yet increasingly powerful response within the employee base as hospitals choose to proactively respond to the threats of global warming.

> "Climate change is potentially the biggest global health threat in the 21st century.... Health systems must not act only as a platform for the delivery of clinical services but also provide the foundation for an effective public health response to the many climate-induced threats to health."[27]
>
> **— The Lancet and University College London Institute for Global Health**

CONCLUSION

If current trends remain unchecked, the full force of global warming on global human health will be massive. The direct effects will include radical shifts in the transmission and potency of many forms of disease, and rising mortality rates attributable to heat waves, floods, hurricanes, typhoons and other weather events. Myriad secondary health consequences will arise from extensive shifts in the growth and distribution of food, and radical changes in biodiversity. The deep human health questions that arise when considering a wave of migration away from coastal areas—where 1/3 of the global population lives and 13 of the world's largest cities are located—are no less disturbing.

The World Health Organization estimated that at the turn of the century climate change was the source of "2.4% of worldwide diarrhea, 6% of malaria in some middle income countries, and 7% of dengue fever in some industrialized countries. In total, the attributable mortality was 154,000 deaths and the attributable burden was 5.5 million disability-adjusted-life-years."[26] More than a decade has past since that estimate was made. And so, we can fully expect that their next estimate of human health impacts will deliver a far more potent message.

In his speech the President said: "...critics seem to think that when we ask our businesses to innovate and reduce pollution and lead, they can't or they won't do it. They'll just kind of give up and quit. " Efforts like the C40 Cities program, the Clinton Climate Initiative and the Investor Network on Climate Risk have begun to shine a light on an expansive view that includes the role of business as a partner with public and private institutions and government. Despite positive mobilizations like these, an essential strategic void remains elusive and unfilled—a full-court press by a single sector that has both the economic clout and the societal respect required to ignite a revolution in the thinking of all people.

The solutions to global warming will be both universal and local. Individuals, both at work and at home, will need to cultivate a new way of thinking about energy. The health care sector is naturally poised to create the driving leadership that the reversal of global warming demands. By bringing clean energy and water conservation investment into every hospital and every health care facility in every corner of the globe, health systems will become a beacon of leadership and hope for a healthy planet.

Across the world's high income countries, the heath care sector represents 12% of global GDP. Just as the President's vision is that America should lead the global initiative to reduce greenhouse gas emissions, the health care sector is naturally positioned to lead a global movement toward a low carbon future.

If the health care sector does not step into the void, can we realistically expect a different core sector of the economy to take on the sorely needed mantle of leadership?

APPENDICES

CASE STUDY ▶ LEED Saves Energy, Water and Money

KAISER PERMANENTE®

Benefits/Results

- First Kaiser Permanente hospital to receive Leadership in Energy & Environmental Design Gold certification
- Will use 27 percent less energy than required by Oregon energy code
- Will use 35 percent less water
- 70 percent of power comes from clean energy
- Built entirely using green power
- Accomplished LEED gold for a net additional cost of $170,000, which is less than 1 percent of the medical center's total cost of construction. Those additional up-front costs are expected to pay back fivefold in operational savings over the medical center's lifetime.
- Other outcomes: Demonstrating that building a sustainable hospital can be done with little added costs, Westside created a "business case" for Kaiser Permanente to commit to pursuing a minimum of LEED Gold for all new construction, potentially impacting 100 buildings over the next decade.

Total project cost: $344 million

Sustainability and LEED-specific features total costs: $1,726,251

Sustainability costs after rebates: $927,277

LEED costs after rebates: $167,271

Net sustainability and LEED-specific features total costs after rebates: $1,094,548 million

Projected annual savings from combined sustainability and LEED features: $250,000/ year

Payback period of combined sustainability and LEED features: 5 years

Challenge/Situation

Kaiser Permanente had long pursued green building strategies for construction and renovation of hospitals and medical offices, including construction waste recycling, healthy building materials, and energy conservation. However, there was a general perception that LEED was too expensive, and would delay schedules.

Strategy/Actions

Hospital leadership in the Northwest understood that Kaiser Permanente members in the Portland area, known to some as America's "green capital," valued environmental stewardship as much as state-of-the-art technology and design. With leadership's support, the Westside project team hired Green Building Services to guide them through the LEED process. Because the decision to pursue LEED certification was made late in the design phase, the team discovered there would be added costs associated with LEED. Green Building Services helped the team earn $2 million in rebates from both the Oregon Energy Trust to offset some of the additional upfront costs.

The Kaiser Permanente Westside Medical Center in Hillsboro Ore., is the organization's first LEED Gold-certified hospital. Kaiser Permanente is committed to pursuing a minimum of LEED Gold for new construction of all its hospitals and major projects.

8/13

Healthier Hospitals Initiative
http://healthierhospitals.org/get-inspired/case-studies/kaiser-permanente-leed-saves-energy-water-and-money

Continued ▶ LEED Saves Energy, Water and Money

Implementation Process

LEED points earned for:

- Built on a "brownfield" site with local transit lines within ¼ mile
- 100 percent green power during construction and operations
- Zoned heating and cooling system that captures and converts exhaust air so it never leaves the buildings
- Irrigation system captures and reuses rainwater to water native dry creek beds on campus and green screens on parking structure
- Removed 95 percent of turf on site
- More than 75 percent of construction waste recycled
- Reflective roof
- Solar-powered, energy-neutral parking structure
- Access to natural daylight
- Occupancy sensors and lighting controls
- Low-emitting materials, including paints, adhesives, and finishes
- Recycled building materials (more than 20 percent)
- Local sourcing of building materials (more than 10 percent)
- Earned Energy Trust of Oregon rebates for high-efficiency chillers, boilers, and equipment.

Lessons Learned/Recommendations

Establish a clear sustainability vision early, and hire LEED-accredited design partners and consultants who can help get to LEED with no - or little - first costs. When LEED is included from the beginning as an integral part of the design process, the result is an environmentally responsible building at little added cost.

Demographic information

The Kaiser Permanente Westside Medical Center is a 126-bed, acute-care hospital in Hillsboro, Ore. It will be Kaiser Permanente's 38th hospital when it opens to patients Aug. 6, 2013, and is the first new hospital in Oregon's Washington County in 40 years.

Healthier Hospitals Initiative
http://healthierhospitals.org/get-inspired/case-studies/kaiser-permanente-leed-saves-energy-water-and-money

CASE STUDY ▶ Partners HealthCare Strategic Energy Master Plan

Benefits

- Reduction of 25% in energy consumption over 5 years on a $100m. p.a. energy bill
- Annual pollutant reduction resulting from the energy conservation measures include 21.6 tons of sulphur dioxide, 5 tons of nitrous oxide, 6,332 tons of carbon dioxide and 0.15 tons of mercury.
- According to the Practice Greenhealth Energy Impact Calculator the annual reduction in the health impact on the population is estimated to be $500,000.

The Problem

In 2008 Partners HealthCare was incurring $100m. in annual energy costs in 15 constituent facilities with a consumption escalation rate of 1.5% per year. Power sources were 49% carbon fuel, 30% hydro, 18% nuclear, and 3% renewables. Massachusetts imports over 90% of its energy and is subject to volatile price swings.

The Strategy Selected

Increasing volatility in energy costs and the availability of incentives to improve the efficiency of existing systems and to install renewable energy systems suggested the need to undertake a system-wide energy master plan.

Goals for the Strategic Energy Master Plan (SEMP):

- Reduce energy consumption by at least 25% in 5 years (2008 base)
- Identify and evaluate renewable energy sources to reduce dependence on carbon fuels
- Increase efficiency of energy delivery through on-site cogeneration
- Develop a 10-year capital plan to implement SEMP recommendations

Implementation Process

A consultant team was retained to identify opportunities for energy conservation at each campus and to evaluate the feasibility of alternative energy installations and cogeneration. Detailed evaluation of the mechanical/electrical infrastructure was undertaken. Utility sources, consumption, and cost data were collected and benchmarked.

For each campus opportunities to install cogeneration and renewable energy systems were evaluated to determine their impact on the overall reduction in purchased energy. Six renewable energy systems were evaluated: solar hot water, solar photovoltaic, wind, geothermal, biomass and biofuel, and tidal energy.

The Team:

- Co-chairs: Partners Director of Engineering and Director of Capital Planning,
- Team members: Hospital Directors of Facilities and Engineering (10 members)

Challenges and Lessons Learned

230 energy conservation measures (ECM's) were recommended with a projected aggregate energy reduction of 28%. The total cost of implementing the ECM's was estimated to be $61M and the average payback 3.7 years, representing a 27% annual return on investment.

- 18 months into the 5 year program implementing the ECM's, September 2011, 32% of the first phase energy cost savings had been realized, representing an overall reduction of 9%.
- Cogeneration facilities are in design or construction at two hospitals and being planned for a third hospital. The average simple payback on the three installations is calculated to be 7.8 years.
- An effort is underway to locate and finance an off-site 10Mw photovoltaic installation to serve several PHS hospitals.

Demographic Information

Partners HealthCare consists of 15 principal facilities in Boston and eastern Massachusetts providing acute inpatient care, ambulatory care and rehabilitation with a total of approximately 3,300 beds. Including administration, the total built assets amount to 16 million square feet, of which approximately 10 million SF is owned and 6 million SF leased.

Healthier Hospitals INITIATIVE

3/12

Healthier Hospitals Initiative
http://healthierhospitals.org/get-inspired/case-studies/partners-healthcare-strategic-energy-master-plan

CASE STUDY ▶

Incorporating Sustainable Principles into New Hospital Design

GUNDERSEN HEALTH SYSTEM®

Benefits/Results

- When Gundersen Health System's new Hospital opens in January 2014, it is expected to run at approximately 115 kBTU per square foot per year.
- At current energy costs, achieving 115 kBTU will save Gundersen approximately $660,000.
- By designing and building the Hospital using sustainable principles, Gundersen will improve the building's overall impact on the environment.

Challenge/Situation

In 2011, Gundersen Health System broke ground on a 425,000 sq. ft. hospital building that will serve people in a 19-county, 3-state service area. Those involved with the project were challenged with designing and constructing a building that used sustainable principles to limit the building's overall impact on the environment, both during construction and once the building is open. Two main sustainability goals guided Gundersen's plan:

- The building will run at 115 kBTU per square foot per year, putting the new hospital in the top 1 percent for the energy efficiency of hospitals in the Midwest.
- Achieve LEED certification for the building.

Strategy/Actions

In order to achieve the goals set forth for the new Hospital, the environmental plan includes a number of components, including energy efficiency, recycling and building design. The LEED certification process provides a roadmap for any facility owner in navigating the decisions and choices they face throughout the planning, design and construction of their facilities to incorporate sustainable values. It is a common language and methodology that's been well vetted. The facility planning process is incredibly complex and the LEED certification process hard-wires a management methodology that delivers a more sustainable building that when done right, saves the facility money in the long-term.

Gundersen Health System's new Hospital, which will open in January 2014, was built and designed using sustainable principles to limit the building's overall impact on the environment.

Energy efficiency

Gundersen understood that the 115 kBTU target is an aggressive one, but it will pay dividends over time and ultimately help Gundersen lower the cost of healthcare for patients.

One of the most significant pieces of the energy plan is a geothermal heat pump. Gundersen installed a field of wells under a parking lot on their La Crosse Campus. The wells will be used as a heating and cooling source for the new Hospital, and result in a savings of 70 to 80 kBTU per square foot annually. This system will drastically reduce Gundersen's dependence on fossil fuels and exposure to fuel price volatility. The geothermal heat pump is currently supplying heat for Gundersen's Inpatient Behavioral Health building, which opened in January 2013.

9/13

Continued ▶ Incorporating Sustainable Principles into New Hospital Design

Other elements include:

- Efficient lighting design with lower wattage lamps and high-efficiency ballasts, occupancy sensors and fixtures that better disperse light, for an anticipated savings of 5 to 7 kBTU per square foot.
- A highly insulated building shell (windows, walls, ceilings, etc.), for an expected energy savings of 17 kBTU per square foot.
- Energy efficient chillers, cooling towers and chilled water pumps that replaced an aging infrastructure and will allow the new Hospital to be cooled more efficiently. This will save 8 to 10 kBTU per square foot.

Recycling

During construction, Gundersen aims to keep as much construction waste as possible out of area landfills. Gundersen worked closely with their contractors to separate and recycle construction waste. The contractors have set up several dumpsters at the construction site to sort the waste by metal, wood, concrete, cardboard, etc. Since 2010, construction recycling/reuse rates for the new Hospital and Inpatient Behavioral Health building has exceeded 93 percent.

Building design

When the building interior was designed, Gundersen worked with their architects and designers to incorporate a wide array of green elements, such as:

- Eliminating PVC materials from interior finishing, such as flooring, carpeting, upholstery and wall coverings, as much as possible.
- Water-efficient landscaping.
- Using materials with a recycled content when possible, such as counters in public rest rooms made from 50 percent recycled materials, a decorative ceiling in a main concourse, and the ceiling tiles and carpeting throughout the building.
- Using FSC-certified wood throughout the project. Companies with FSC-certification practice forestry in an environmentally responsible way.
- Using materials sourced within 500-miles of Gundersen when possible. For example, the decorative cast stone that will be used in the Lobby, Healing Garden and Café will be manufactured in New Ulm, Minn.

Implementation Process

Sustainability was one of the primary guiding principles for all teams involved in the planning, design, construction and operations of the building project. Gundersen believes that by integrating those responsible for the daily operations of the facility, those responsible for furthering the organizational goal of sustainability and those with technical and industry expertise, the organization will achieve stronger outcomes.

Key stakeholders representing engineering, commissioning, architecture, building owners, planners and designers were at the table from the start. Why? Designers don't manage the day-to-day operations of a building. Design engineers aren't typically involved in the post-occupancy evaluation of design goals. Those with day-to-day building management responsibilities aren't always aware of operator decisions on overall energy consumption in an effort to maintain the basis of design. Gundersen used a multidisciplinary team who shared the value of long-term sustainability to achieve the desired results.

These groups evaluated barriers that may impact Gundersen's ability to advance its sustainable goals, prioritized sustainability items and continued to evaluate the impact of decisions on current and future sustainability and financial targets.

Lessons Learned/Recommendations

Gundersen found that careful and continual evaluation of sustainable outcomes is necessary throughout the planning and design process. It is necessary to evaluate each action based on an organization's location in the country and goals. Following are Gundersen's top three lessons and recommendations for other organizations.

Continued ▶ Incorporating Sustainable Principles into New Hospital Design

1. An action that could result in a sustainable outcome in one area of the country can have little to no impact in another part of the country. For example, vegetated rooftops are touted as energy savers and highly marketed in the "green-washing" of sustainable initiatives. However, they do not have the same outcome on energy savings in the northern part of United States as they do in the south. Prepare to evaluate each decision through the lens of sustainability and to delve into the details as to whether a choice really does have a favorable environmental impact before investing.

Contractors set up dumpsters at the Gundersen construction site to sort the waste materials. Since 2010, construction recycling/reuse rates for the new Hospital and Inpatient Behavioral Health Building has exceeded 93 percent.

2. Constant compromise is necessary as goals sometimes compete. One of Gundersen's objectives was to create a healing, homelike environment for their patients. Their sustainability goal for interiors was to reduce products with poor cradle-to-grave scores. Gundersen found they were faced with limited choices for sustainable flooring products within their life-cycle cost range that also provided a homelike finish. A decision had to be made. Gundersen focused on using sustainable flooring options throughout the facility, but chose a vinyl product for inside the patient room to bring a "wood-look" and more natural looking flooring. Gundersen focused cost savings on the energy savings for the project to maximize the long-term reduction of energy consumption and reduce the annual cost burden. Compromises and competing needs were a constant. Continuing to evaluate the short- and long-term impact of each decision in the face of competing needs is critical.
3. Not all involved will be champions of the sustainable choice. With each decision, there is a cause and effect and the decisions will impact the work of many of the stakeholders. One choice will create a benefit, such as gaining efficiency with low-maintenance, sustainable flooring (i.e., Nora rubber, non-waxed terrazzo, etc.). Another choice will create additional complexity and effort for another group (i.e., a highly complicated, technical sequence of operations for the central plant involving the geothermal well-field).

Demographic information

Headquartered in La Crosse, Wis., Gundersen Health System is a physician-led, not-for-profit healthcare system which includes a 325-bed teaching hospital; community clinics; affiliate hospitals, clinics and nursing homes; behavioral health services; vision centers; pharmacies; and air and ground ambulance services. Gundersen serves 19 counties throughout Wisconsin, Iowa and Minnesota. The hospital is a tertiary referral center and a Level II Trauma Center. The more than 700 medical, dental and associate staff are supported by a staff of more than 5,500.

ENDNOTES

1 June 25, 2013, http://www.whitehouse.gov/the-press-office/2013/06/25/remarks-president-climate-change

2 "Transition to Sustainable Buildings: Strategies and Opportunities to 2050", IEA, 2013.

3 "Energy Efficiency Retrofits for Commercial and Public Buildings", Pike Research, 2012.

4 Companies who sign the "Climate Declaration" express broad support for a US national strategy for addressing climate change (http://www.ceres.org/bicep/climate-declaration).

5 For example, see "World's largest companies doing little on climate change", Carbon Disclosure Project, September 2013, and "Most firms get greenhouse gas reports wrong", Reuters, May 2013.

6 IPCC information can be found at: http://www.ipcc.ch/.

7 Building Retrofit Industry and Market (BRIM) Market Research Scan (http://www.rockefellerfoundation.org/blog/building-retrofit-industry-market-brim).

8 In 2012, the US Energy Information Agency (EIA) published 2007 energy consumption data for large US hospitals (http://www.eia.gov/consumption/commercial/reports/2007/large-hospital.cfm).

9 Aggregate estimate of impacts per fuel type from the 2007 EIA data and using the US Environmental Protection Agency (EPA) "Greenhouse Gas Equivalencies Calculator." (http://www.epa.gov/cleanenergy/energy-resources/calculator.html)

10 The EIC is a free, web-based, self-serve tool that conservatively estimates power plant emissions and some of the resulting negative health impacts (using data from the EPA, DOE, and other sources). Users enter their annual kWh consumption and geographic location. The tool can be found at: http://www.eichealth.org/.

11 "Leaner Energy", Healthier Hospitals Initiative, 2012. http://healthierhospitals.org/hhi-challenges/leaner-energy

12 Examples include "Large Hospital 50% Energy Savings: Technical Support Document, Report TP-550-47867, US Department of Energy (DOE) National Renewable Energy Laboratory, September 2010, and "Targeting 101: Advanced Energy Efficient Building Technologies for High Performance Hospitals", H. Burpee et al, University of Washington Integrated Design Lab, May 2013.

13 World Bank: http://data.worldbank.org/indicator/SH.XPD.TOTL.ZS.

14 http://share.kaiserpermanente.org/article/kaiser-permanente-pledges-to-reduce-its-carbon-footprint-by-30-percent-by-2020/

15 Case studies from these (and other) health systems available at: http://healthierhospitals.org/get-inspired/case-studies.
More information on the work of these organizations can be found at: http://www.gundersenenvision.org/
http://www.partners.org/Innovation-And-Leadership/Better-Together/Sustainability-Story.aspx
http://share.kaiserpermanente.org/article/environmental-stewardship-climate-energy/

16 Legacy Salmon Creek Medical Center built in 2005. See "Targeting 101" reference above (xii).

17 Estimate based on EIA data noted above and EIA pricing information for 2007. The cost for the district heat component was extrapolated from an EIA study of consumption of energy in commercial buildings in 2003.

18 CHP systems are also referred to as "cogeneration" systems." Helpful references include the recent HCWH report, "Powering the Future of Health Care—Financial and Operational Resilience: A Combined Heat and Power Guide for Massachusetts Hospital Decision Makers," and the more general resources found within the CHP materials located on the DOE Solution Center Website (http://www1.eere.energy.gov/wip/solutioncenter/).

19 "Chapter 4: Trends Affecting Hospitals and Health Systems", American Hospital Association Chartbook. http://www.aha.org/research/reports/tw/chartbook/ch4.shtml

20 One of the steps within the SEMP process is the creation of a baseline view of energy consumption (and should include water consumption as well). As more municipalities adopt energy and GHG emissions reporting requirements, developing processes and systems for monitoring energy use will become required activities. For example, see the Boston "Building Energy Reporting and Disclosure Ordinance at: http://www.cityofboston.gov/environmentalandenergy/conservation/berdo.asp.

21 Some organizations will use a risk-adjusted version of the cost-of-capital in project investment calculations. This step accounts for the idea that the financial risk of a project depends on the type of project undertaken.

22 The performance of employee engagement projects are inherently more challenging to predict. Historical data from other similar projects may be the most effective basis for estimating results.

23 DOE funded the development of a highly useful database located at: http://www.dsireusa.org/.

24 "Business Case for Energy Efficient Building Retrofit and Renovation, McGraw-Hill SmartMarket Report, 2011.

25 "Public health nurses' knowledge and attitudes regarding climate change", B. Polivka et al. Environmental Health Perspectives, Vol. 120, March 2012

26 "The world health report 2002", World Health Organization, 2002.

27 "Managing the health effects of climate change", A. Costello et al, Lancet and University College London Institute for Global Health Commission, May 2009.

12355 Sunrise Valley Dr.
Suite 680
Reston, VA 20191

Phone: 703.860.9790
Fax: 703.860.9795

www.noharm.org
info@hcwh.org